

SBML Model Report

Model name: “Buchnera aphidicola”



September 13, 2011

1. General Overview

This is a document in SBML Level 2 Version 1 format. Table 1 shows an overview of the quantities of all components of this model.

Table 1: The SBML components in this model.
All components are described in more detail in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	1
species types	0	species	508
events	0	constraints	0
reactions	336	function definitions	0
global parameters	0	unit definitions	0
rules	0	initial assignments	0

2. Unit Definitions

This is an overview of five unit definitions. All units are predefined by SBML and not mentioned in the model.

2.1. Unit `substance`

Notes Mole is the predefined SBML unit for `substance`.

Definition mol

2.2. Unit `volume`

Notes Litre is the predefined SBML unit for `volume`.

Definition l

2.3. Unit `area`

Notes Square metre is the predefined SBML unit for `area` since SBML Level 2 Version 1.

Definition m²

2.4. Unit `length`

Notes Metre is the predefined SBML unit for `length` since SBML Level 2 Version 1.

Definition m

2.5. Unit `time`

Notes Second is the predefined SBML unit for `time`.

Definition `s`

3. Compartment

This model contains one compartment.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
cytoplasm			3	1	litre	<input checked="" type="checkbox"/>	

3.1. Compartment `cytoplasm`

This is a three-dimensional compartment with a constant size given in litre.

4. Species

This model contains 508 species. Section 6 provides further details and the derived rates of change of each species.

Table 3: Properties of each species.

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
B_45_ALANINE	β-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124_0xo_45_-glutarate_45_-dehydrogenase_45_DH_45_-lipoyl_124_-124_Reduced_45_ferredoxins_-124_-	diacylglycerol transacylase (diacylglycerol)lysine	N6- cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
NADPH	NADPH	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PROPIONATE	propionate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
HEME_0	heme o	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PYRIDOXAMINE_45_-5P	pyridoxamine 5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD0_45_1080	GlcNAc-1,6-anhMurNAc-L-Ala--γ-D-Glu-DAP-D-Ala	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD_45_7224	N-acetyl-L-citrulline	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
FAD	FAD	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD0_45_1082	L-Ala-γ-D-Glu-DAP-D-Ala	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD0_45_1081	GlcNAc-1,6-anhMurNAc	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Cis__45-__Delta5__45-__dodecenoyl__45-__ACPs__124__	a cis-Δ5-dodecenoyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
TRANS__45__DELTA3-__45__CIS__45-__DELTA5__45-__DODECENOYL__45-__ACP	trans-Δ3-cis-Δ5-dodecenoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__209	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DIAMINO_-__45__OH__45-__PHOSPHORIBOSYLAMINO-__45__PYR	2,5-diamino-6-(ribosylamino)-4-(3H)-pyrimidinone 5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__GAMMA__45-__GLUTAMYL-CYSTEINE	L-γ-glutamylcysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GDP	GDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__1086	5-amino-6-(5'-phosphoribitylamino)uracil	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
APS	adenosine 5'-phosphosulfate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Damaged-__45__DNA__45-__Pyrimidine__124__	a damaged DNA pyrimidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
D__45-__SEDOHEPTULOSE_-__45__7__45__P	D-sedoheptulose-7-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DIHYDROFOLATE	7,8-dihydrofolate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__PRO__45_- _tRNAs__124__	tRNA _{Pro}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Acceptor_- _124__	an oxidized electron acceptor	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Charged__45_- _LYS__45__tRNAs_- _124__	L-lysyl-tRNA _{Lys}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
ILE	L-isoleucine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_2__45__PG	2-phosphoglycerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__tRNAs__45_- _with__45__N7_- _45__methyl__45_- _guanine__124__	a tRNA containing N7-methylguanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__General_- _45__rRNA__45_- _Substrates__124__	an rRNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
S__45_- _ADENOSYLMETHIONINAMINE	S-adenosyl-L-methioninamine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Protein_- _45__6__45__N_- _45__lipoyl__45_- _lysine__124__	a protein 6-N-(lipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
ARG	L-arginine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__DNA__45- __containing__- _45__abasic__45_- _Sites__124__	a DNA containing abasic site	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PROTOHEME	protoheme IX	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FORMALDEHYDE	formaldehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
N__45__SUCCINYL- __45__2__45_- _AMINO__45__6_- _45__KETOPIMELATE	N-succinyl-2-amino-6-ketopimelate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
BETA__45__HYDROXY- __45__CIS__45_- __DELTA5__45_- _DODECENOYL__45_- _ACP	β-hydroxy-cis-Δ5-dodecenoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
IMP	inosine-5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__tRNA__45_- _Containing__45_- _5MeAminoMe__45_- _2__45__ThioU__124-	tRNA containing 5-methylaminomethyl-2-thiouridylate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
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Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
C_45_0_45_P_32- _bond_32_3_38- _apos_59_32- _to_32_AP_32- _site_32_in_32- _DNA_32_is_32- _broken_46_32- _3_38_apos_59- _45_terminal- _32_unsaturated- _32_sugar_32- _and_32_a_32- _product_32- _with_32_a_32- _terminal_32_5- _38_apos_59_32- _45_phosphate	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
DIAMINONONANOATE	7,8-diaminopelargonate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
RNA	RNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ACETYL_45_COA	acetyl-CoA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_124_Charged_45- _TRP_45_tRNAs_- _124_	L-tryptophanyl-tRNA ^{trp}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
HIS	L-histidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
MANNITOL_45_1P	mannitol-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
NUC_45_5_45- _PHOSPHATE	a nucleoside-5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
LIPOAMIDE	lipoamide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
COPROPORPHYRINOGEN-III	coproporphyrinogen III	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Lipoylated-__45__domains__124__	lipoylated domain	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Charged__45__ASN__45__tRNAs__124__	L-asparaginyI-tRNAasn	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
DNA__32__with__32__uracil__32__cleaved__32__out__32__leaving__32__an__32__AP__32__site	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__N2__45__Methylguanine__45__containing__45__rRNAs__124__	rRNA containing N2-methylguanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
FORMYL__45__L__45__METHIONYL__45__PEPTIDE	formyl-L-methionyl peptide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
L__45__ASPARTATE	L-aspartate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
ASN	L-asparagine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
UBIQUINONE__45__8	ubiquinone-8	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Donor__45__H2__124__	a reduced electron acceptor	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
N_45_SUCCINYLLL- _45_2_45_6_45_- DIAMINOPIMELATE	N-succinyl-L,L-2,6-diaminopimelate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
OXYGEN_45_- MOLECULE	oxygen	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DIMETHYL_45_D_- _45_RIBITYL_45_- LUMAZINE	6,7-dimethyl-8-(1-D-ribityl)lumazine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_TRP_45_- tRNAs_124_	tRNA ^{trp}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_PHE_45_- tRNAs_124_	tRNA ^{phe}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_1_45_L_45_MYO_- _45_INOSITOL_45_- _1_45_P	D-myo-inositol (3)-monophosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
124- Ribonucleoside_- _45_Diphosphates- _124_	a ribonucleoside diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Protein_- _45_N_45_6_45_- _octanoyl_45_- lysines_124_	a protein-N-6-octanoyl-lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXYADENOSINE	deoxyadenosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FE_43_2	Fe ²⁺	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
..124_b_45_- Hydroxy_45_- cis_45_D5_45_- dodecenoyl_45_- ACPs_124_	a β-hydroxy cis Δ5-dodecenoyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
..124_UDP_- 45_N_45_- acetylmuramoyl_- 45_Tripeptide_- 124_	a UDP-N-acetylmuramoyl-tripeptide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PHE	L-phenylalanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
..124_Leader_45_- Sequences_124_	a leader sequence	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
D_45_RIBULOSE_- 45_1_45_P	D-ribulose-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEHYDROQUINATE	3-dehydroquate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ATP	ATP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LL_45_- DIAMINOPIMELATE	L,L-diaminopimelate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RIBOSE_45_5P	D-ribose-5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S_32_rRNA_32_- containing- 32_N2_45_- methyluridine	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
..124_tRNA_45_- Containing_45_- Queueine_124_	tRNA containing queueine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
D_45_ERYTHRO_45- _IMIDAZOLE_45_ _GLYCEROL_45_P	D-erythro-imidazole-glycerol-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PHOSPHORIBOSYL- _45_FORMIMINO- _45_AICAR_45_P	phosphoribosylformiminoAICAR-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DI_45_H_45- _OROTATE	dihydroorotate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_DNA_45- _Cyclobuta_45- _Dipyrimidines- _124_	a DNA cyclobutadipyrimidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NAD	NAD+	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_LYS_45- _tRNAs_124_	tRNAlys	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NADH_45_P_45- _OR_45_NOP	NAD(P)H	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Oxidized- _45_ferredoxins- _124_	an oxidized ferredoxin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
D_45_LACTATE	D-lactate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PHOSPHORIBOSYL- _45_ATP	phosphoribosyl-ATP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD_45_8199	a mismatched DNA base pair	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_ASP_45- _tRNAs_124_	tRNAasp	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
UDP__45__AA__45_-_GLUTAMATE	UDP-N-acetylmuramoyl-L-alanyl-D-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RNA__45__N	RNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CANAVANINE	canavanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RIBOSE__45__1__45_-_ARSENATE	ribose-1-arsenate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45_-_PHE__45__tRNAs_-_124__	L-phenylalanyl-tRNA ^{phe}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__L__45_-_methionyl__45_-_tRNA ^{fmet} __124__	L-methionyl-tRNA ^{fmet}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SUC	succinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
TYR	L-tyrosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ARSENATE	arsenate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
HOMO__45__CYS	L-homocysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__249	a sulfur donor	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__3__45__DEOXY__45__D__45_-_ARABINO__45_-_HEPTULOSONATE__45__7__45__P	3-deoxy-D-arabino-heptulosonate-7-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LYS	L-lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Reduced__45__flavodoxins_-_124__	a reduced flavodoxin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ADENYLOSUCC	adenylo-succinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DGMP	dGMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD_45_1301	tetrahydropteroyltri-L-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Charged__45-__ARG__45__tRNAs_-__124__	L-arginyl-tRNAarg	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD_45_1302	5-methyltetrahydropteroyltri-L-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PYRIDOXAL-__PHOSPHATE	pyridoxal 5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
DUMP	dUMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Protein__45-__Histidines__124-__	a protein histidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
NAD_45__P__45__OR-__45__NOP	NAD(P) +	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__4__45__CYTIDINE-__45__5__45_-__DIPHOSPHO__45-__2__45__C	4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
E_45__4__45_-__HYDROXY__45__3_-__45__METHYLBUT_-__45__2__45__EN__45-__1__45__YL__45_-__DIPH	(E)-4-hydroxy-3-methylbut 2-en-1-yl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
124- _Unsulfurated_- _45_Sulfur_45_- _Acceptors_124_- HYDROXY_45_- _METHYL_45_- _BUTENYL_45_DIP	an unsulfurated sulfur acceptor	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124_Cis_45_- _delta_45_3_45_- _decenoyl_45_- _ACPs_124_-	1-hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124_Amino_45_- _Acids_45_20_- _124_-	a cis-Δ3-decenoyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
L_45_CITRULLINE	a standard α amino acid	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
T_45_POLY- _45_C_45_- _UNDECAPRENYL_- _45_DIPHOSPHATE	di-trans,poly-cis-undecaprenyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124_Non_45_- _lipoylated_45_- _domains_124_-	a non-lipoylated apo domain	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
UNDECAPRENYL_45_- _DIPHOSPHATE	di-trans,poly-cis-undecaprenyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CIS_45_DELTA5_- _45_DODECENOYL_- _45_ACP	cis-Δ5-dodecenoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
ALLO_45_THR	allothreonine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_BCAA_45_- _dehydrogenase- _45_DH_45_- _lipoyl_124_ _2_45_- _DEHYDROPANTOATE	lipoamide acyltransferase (dihydrolipoyl)lysine	N6- cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_45_III	2-dehydropantoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UROPORPHYRINOGEN-	uroporphyrinogen-III	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C4	N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl- D-alanyl-D-alanine-diphosphoundecaprenol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C3	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C6	N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C5	N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
INDOLE	indole	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PROPIONYL_45_P	propionyl-P	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_3OH_45_4P_45_- _OH_45_ALPHA_45_- _KETOBUTYRATE	2-oxo-3-hydroxy-4-phosphobutanoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
OH_45_ACYL_45_- ACP	a (3R)-3-hydroxyacyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_ARG_45_- tRNAs_124_	tRNAarg	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
XANTHINE	xanthine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_2_45_- Hydroxy_45_- _carboxylates_- _124_	a 2-hydroxy carboxylate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
METHYLENE_45_THF	5,10-methylene-THF	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
N_45_ALPHA_45_- _ACETYLORNITHINE	N-acetyl-L-ornithine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C1	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptanedioate- D-alanyl-D-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PHOSPHORIBULOSYL- _45_FORMIMINO_- _45_AICAR_45_P	phosphoribulosylformimino-AICAR-P	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
N_45_ACETYL_45_- _GLUTAMYL_45_P	N-acetylglutamyl-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RIBOSE_45_1P	ribose-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
TRANS_45_D2_45_- _ENOYL_45_ACP	a trans-Δ2-enoyl-acyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
NADH	NADH	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CYS	L-cysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
AICAR	aminoimidazole carboxamide ribonucleotide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CARBOXYPHENYLAMINO- __45_- _DEOXYRIBULOSE_- _45__P	1-(o-carboxyphenylamino)-1'-deoxyribulose-5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ADENOSINE	adenosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__7046	S2-	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NADP	NADP+	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__N6__45_- _Methyladenine_- _45__containing_- _45__rRNAs__124__	rRNA containing N6-methyladenine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DIHYDROXY__45_- _ACETONE__45_- _PHOSPHATE __124_-	dihydroxy-acetone phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_Nucleoside__45_- _Triphosphates_- _124__	a nucleoside triphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
HYDROXYMETHYLBILANE	hydroxymethylbilane	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
T__45__POLY__45__C- __45__DECAPRENYL_- _45__DIPHOSPHATE	di-trans,poly-cis-decaprenyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACETYL__45__ACP	an acetyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
FORMYL_45_THF_45_GLU_45_N	an N10-formyl-tetrahydrofolate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
HISTIDINAL	histidinal	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_2_45_	S-(2-hydroxyacyl)glutathione	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
hydroxyacyl_45_					
glutathiones					
124					
_124_Trans_	a trans-Δ3-cis-Δ5-	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
45_D3_45_cis_	dodecenoyl-[acp]				
_45_D5_45_					
dodecenoyl_45_					
ACPs_124_					
_124_Peptides_	a peptide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
124					
DNA_32_with_32_	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_AP_32_40_					
_32_apyrimidinic_					
_32_site_41_					
_32_as_32_part_					
_32_of_32_base_					
_32_excision_					
_32_repair_32_					
process					
_124_Charged_45_	L-tyrosyl-tRNA _{tyr}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_TYR_45_tRNAs_					
124					
HOMO_45_SER	homoserine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Quinones__124__	a quinone	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2__45__PHOSPHO__45__4__45__CYTIDINE__45__5__45__DIPHOSPHO__45__2__45__C__45__MET	2-phospho-4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RIBULOSE__45__5P	D-ribulose-5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45__CYS__45__tRNAs__124__	L-cysteinyl-tRNA _{cys}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__DNA__45__with__45__Uracils__124__	a DNA with uracil	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__694	cob(I)yrinate a,c-diamide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXYGUANOSINE	deoxyguanosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
VAL	L-valine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__689	cob(II)yrinate a,c-diamide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACETYL SERINE	O-acetyl-L-serine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PUTRESCINE	putrescine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__PANTOATE	L-pantoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__MET__45__tRNAs__124__	tRNA _{met}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__ASPARTATE__45__SEMIALDEHYDE	L-aspartate-semialdehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
BETA__45__KETO__45-__CIS__45__DELTA5-__45__DODECENOYL_-__45__ACP	β-keto-cis-Δ5-dodecenoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
UDP	UDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PAP	adenosine-3',5'-bisphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
HCO3	HCO3-	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PORPHOBILINOGEN	porphobilinogen	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
TDP	dTDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__124__Purine__45_-__Bases__124__	a purine base	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
O__45_-__UREIDOHOMOSERINE	O-ureidohomoserine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
CPD0__45__1028	2-cis,6-trans,10-trans-geranylgeranyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
DIOH__45_-__ISOVALERATE	2,3-dihydroxy-isovalerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__3__45__DEHYDRO_-__45__SHIKIMATE	3-dehydro-shikimate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PHOSPHO__45__ENOL_-__45__PYRUVATE	phosphoenolpyruvate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PROTEIN__45_-__LIPOYLLYSINE	H-Gcv-protein-(lipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
DELTA3__45_-__ISOPENTENYL_-__45__PP	isopentenyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
OROTIDINE__45__5_- __45__PHOSPHATE	orotidine-5'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FRUCTOSE__45__16_- __45__DIPHOSPHATE	fructose-1,6-bisphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45_- __THR__45__tRNAs_- __124__	L-threonyl-tRNA ^{thr}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PHENYL__45_- __PYRUVATE	phenylpyruvate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ADENOSYL__45_- __HOMO__45__CYS	S-adenosyl-L-homocysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__b__45__Keto- __45__cis__45__D5_- __45__dodecenoyl_- __45__ACPs__124__	a & beta;-keto-cis-& Delta;5-dodecenoyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__ARGININO_- __45__SUCCINATE	L-arginino-succinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
MET	L-methionine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DIHYDROLIPOAMIDE	dihydrolipoamide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__469	N-acetyl-L-glutamate 5-semialdehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
THIAMINE__45__P	thiamine-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Ox__45_- __Thioredoxin__124_- __	an oxidized thioredoxin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Reduced__45_- __Quinones__124__	a hydroquinone	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GERANYL__45__PP	geranyl-diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DEPHOSPHO__45__COA	dephospho-CoA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__124__DNA__45_- _Adjacent__45_- _Pyrimidines__124-	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__					
PANTOTHENATE	pantothenate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__124__Deoxy__45_- _Ribonucleoside- __45_- _Triphosphates_- _124__	a 2'-deoxyribonucleoside triphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
__124__DNA__45_- __containing- __45__a__45_- _Apyrimidinic_- _45__Sites__124__	a DNA containing a apyrimidinic site	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
PROT__45__CYS	a protein L-cysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
ACET	acetate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
OROTATE	orotate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
GLC__45__6__45__P	β-D-glucose-6-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_5__45__METHYL__45_- __THF	5-methyl-THF	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
HS	hydrogen sulfide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
GLUCOSAMINE__45_- _1P	D-glucosamine 1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>
_2__45_- _OXOBUTANOATE	2-oxobutanoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	<input type="checkbox"/>	<input type="checkbox"/>

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Dihydro__45__Lipoyl__45__Proteins__124__	protein N6-(dihydrolipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
AMMONIA	ammonia	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CARBAMOYL__45__P	carbamoyl-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DGDP	dGDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DUDP	dUDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ERYTHROSE__45__4P	D-erythrose-4-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__General__45__Protein__45__Substrates__124__	a protein	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45__MET__45__tRNAs__124__	L-methionyl-tRNA ^{met}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__CYS__45__tRNAs__124__	tRNA ^{cys}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2__45__KETO__45__ISOVALERATE	2-keto-isovalerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45__HIS__45__tRNAs__124__	L-histidyl-tRNA ^{his}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45__ILE__45__tRNAs__124__	L-isoleucyl-tRNA ^{ile}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Protein__45__3__45__phospho__45__L__45__histidines__124__	a protein-Nπ-phospho-L-histidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DCDP	dCDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GAP	D-glyceraldehyde-3-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FRUCTOSE__45__6P	fructose-6-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2__45__ACETO__45__LACTATE	2-acetolactate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__ASN__45__tRNAs__124__	tRNAasn	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Lipoyl__45__Protein__124__	protein N6-(lipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Ubiquinol__124__	a ubiquinol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__GLN__45__tRNAs__124__	tRNAgln	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACETYL__45__GLU	N-acetyl-L-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DNA__32__with__32__uracil__32__due__32__to__32__misincorporation__32__or__32__deamination__32__of__32__cytosine__46__	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
N_45_ACETYL- _45_D_45_- _GLUCOSAMINE_- _45_1_45_P	N-acetyl-glucosamine-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_2_45_3_45_- _DIHYDRODIPICOLINATE	L-2,3-dihydrodipicolinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DADP	dADP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SPERMIDINE	spermidine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PROTOPORPHYRINOGEN	protoporphyrinogen IX	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Octanoyl_- _45_ACPs_124_- _124_Protein_- _45_6_45_N_45_- _octanoyl_45_- _lysine_124_- _2_45_-	an octanoyl-[acp] a protein 6-N-(octanoyl)lysine	cytoplasm cytoplasm	$\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$	\boxplus \boxplus	\boxplus \boxplus
_THIOURIDINE	2-thiouridine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD0_45_1065	aminopropylcadaverine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_2_45_AMINO_- _45_3_45_OXO_- _45_4_45_- _PHOSPHONOOXYBUTYRATE	(2S)-2-amino-3-oxo-4-phosphonooxybutanoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACETYL_45_P	acetylphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PANTOYL_45_- _LACTONE	pantoyl lactone	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD_45_564	S-ribosyl-L-homocysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GLYCERALD	glyceraldehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124_- _Acetoacetyl_- _45_ACPs__124__	an acetoacetyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PREPHENATE	prephenate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NICOTINAMIDE- _NUCLEOTIDE	nicotinamide mononucleotide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__LEU__45_- _tRNAs__124__	tRNA _{leu}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UDP__45_- _ACETYLMURAMOYL_- _45__ALA	UDP-N-acetylmuramoyl-L-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
URIDINE	uridine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PYRUVATE	pyruvate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CIS__45__DELTA3_- _45__DECENOYL__45_- _ACP	cis-Δ3-decenoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__7100	2-isopropyl-3-oxosuccinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LEU	L-leucine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__ALA__45_- _tRNAs__124__	tRNA _{ala}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Oxo__45_- _glutarate__45_- _dehydro__45_- _suc__45__DH__45_- _lipoyl__124__	dihydrolipoyltranssuccinylase N6-(S-succinyldihydrolipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__ORNITHINE	L-ornithine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
D_45_- _GLUCOSAMINE_- _45_6_45_P	D-glucosamine-6-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Charged_45_- _VAL_45_tRNAs_- _124_	L-valyl-tRNAval	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UNDECAPRENYL_45_- P	undecaprenyl phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L_45_GLUTAMATE_- _GAMMA_45_- _SEMIALDEHYDE	L-glutamate γ-semialdehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Charged_45_- _ALA_45_tRNAs_- _124_	L-alanyl-tRNAala	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Purine_45_- _Ribonucleosides_- _124_	a purine ribonucleoside	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ENZYME_45_S_45_- _SULFANYLCYSTEINE	a protein-S-sulfanylcysteine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SHIKIMATE	shikimate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
124- _Nucleoside_- _45_Diphosphates_- _124_	a nucleoside diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_UDP_45_- _NAcMur_45_- _Peptides_124_	a UDP-N-acetylmuramoyl-pentapeptide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
SIROHEME	siroheme	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
2_45_C_45_- METHYL_45_D_45_- ERYTHRITOL_45_- 4_45_PHOSPHATE	2-C-methyl-D-erythritol-4-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PHOSPHORIBOSYL- 45_FORMAMIDO- 45_CARBOXAMIDE	phosphoribosyl-formamido-carboxamide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PHOSPHORIBOSYL- 45_AMP	phosphoribosyl-AMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
TMP	dTMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
124_SER_45_- tRNAs_124_	tRNA ^{ser}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
G3P	3-phosphoglycerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
124_Peptides- 45_with_45_- Leader_45_- Sequence_124_	a peptide with a leader sequence	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
FRU	D-fructose	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
tRNA_32_with- 32_7_45_- aminomethyl- 45_7_45_- deazaguanine_32- at_32_position- 32_34	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DIHYDROLIPOYL-- _45_GCVH	H-Gcv-protein-(dihydrolipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_- Pyruvate__45_- _dehydrogenase_- _45_lipoate__124__ __124_GLY__45_- _tRNAs__124__	lipoate acetyltransferase N6- (lipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_GLY__45_- _tRNAs__124__	tRNAgly	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CARBAMYUL__45_L_- _45_ASPARTATE	N-carbamoyl-L-aspartate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__2961	6-phospho-D-gluconate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45_CANALINE	L-canaline	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__5725	tetrahydrofolate-L-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_Deoxy__45_- _Ribonucleoside_- _45_Diphosphates- __124__	a 2'-deoxyribonucleoside diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__5727	5,10-methenyl-tetrahydropteroyl-[- γ-Glu](n)	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_N__45_- _Substituted__45_- _Aminoacyl__45_- _tRNA__124__	N-substituted aminoacyl-tRNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__9451	isopropylmaleate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_Oxidized_- _45_flavodoxins_- _124__	an oxidized flavodoxin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
D_45_GLT	D-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LACTOSE	lactose	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CDP	CDP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UDP_45_N_45_- _ACETYL_45_D_45_- _GLUCOSAMINE	UDP-N-acetyl-D-glucosamine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACP	a holo-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UDP_45_N_45_- _ACETYLMURAMATE	UDP-N-acetylmuramate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GTP	GTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CANAVANINOSUCCINATE	canavaninosuccinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
INDOLE_45_3_45_- _GLYCEROL_45_P	indole-3-glycerol-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Protein_45_- _Dithiols_124_- _124_apo_45_- _ACP_124_- _2_45_D_45_- _THREO_45_- _HYDROXY_45_- _3_45_CARBOXY_- _45_ISOCAPROATE	a protein dithiol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
	an apo-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
	3-isopropylmalate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
METHYLENE_45_- _THF_45_GLU_45_- _N	a 5,10-methylene-tetrahydrofolate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CARBON_45_- _DIOXIDE	CO ₂	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
SULFATE	sulfate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Lysine__45__ __or__45__DAP__124__ UDP__45__ACETYL__ __45__CARBOXYVINYLYL__ __45__GLUCOSAMINE	an L-lysine or meso-2,6-diaminoheptanedioate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UDP__45__ACETYL__ __45__CARBOXYVINYLYL__ __45__GLUCOSAMINE	UDP-GlcNAc-enolpyruvate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Pi__124__ __124__tRNA__45__ __Containing__ __45__N1__45__ Methylguanine__ 124__	phosphate tRNA containing N1-methylguanine	cytoplasm cytoplasm	$\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$	\boxplus \boxplus	\boxplus \boxplus
__124__General__ __45__RNA__45__ Substrates__124__	an RNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FUM	fumarate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SUC__45__COA	succinyl-CoA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CADAVERINE	cadaverine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__ Folatepolyglutamate__ __45__n__124__ __124__Charged__45__ __GLN__45__tRNAs__ 124__	a folylpolyglutamate(n) L-glutaminyt-tRNA _{Gln}	cytoplasm cytoplasm	$\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$	\boxplus \boxplus	\boxplus \boxplus
D__45__ALANINE	D-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__4211	dimethylallyl-diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
THR	L-threonine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Protein- __45__Red__45__- Disulfides__124__	a protein with reduced sulfide groups	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
THF	tetrahydrofolate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
LACTOSE__45__6P	lactose 6'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
HISTIDINOL	histidinol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__tRNA__45__- Containing__45__- 6Isopentenyladenosine- __124__	tRNA containing 6-Isopentenyladenosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__HIS__45__- tRNAs__124__	tRNA _{his}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
5__45__- METHYLTHIOADENOSINE	S-methyl-5'-thioadenosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
3__45__P__45__- SERINE	3-phospho-serine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Alkyl__45__- 45__Hydro__45__- Peroxides__124__	an alkylhydroperoxide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DIHYDROSIROHYDROCHLORIN	chlorophyll	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACYL__45__ACP	an acyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UBIQUINOL__45__8	ubiquinol-8	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
INOSINE	inosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__VAL__45__- tRNAs__124__	tRNA _{val}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
..124_DNA_45- _With_45_G_45- _A_45_Mismatch_- _124_	DNA with G-A mismatch	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FARNESYL_45_PP	(E,E)-farnesyl diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CHORISMATE	chorismate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
MYO_45_INOSITOL	myo-inositol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L_45_BETA_45- _ASPARTYL_45_P	L-aspartyl-4-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
..124_N_45- _Substituted_45- _Amino_45_Acids_- _124_	an N-substituted amino acid	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ADP	ADP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
..124_Protein_45- _Disulfides_124-	a protein disulfide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UMP	UMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEAMIDO_45_NAD	deamido-NAD	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PROPIONYL_45_COA	propionyl-CoA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DNA_32_apurinic- _32_or_32_- _apyrimidinic- _32_40_AP_- 41_32_site_- _32_following_- _32_glycosidic- _32_bond_32- _cleavage_32- _during_32_- _repair_32_- _process	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
HYPOXANTHINE	hypoxanthine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_10_45_FORMYL_- 45_THF	10-formyl-tetrahydrofolate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
0_45_PHOSPHO_45- _L_45_HOMOSERINE	O-phospho-L-homoserine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SHIKIMATE_45_5P	shikimate-3-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
guanine_45_34_- _32_of_32_tRNA- _32_with_32_a_- _32_GU_40_N_41_- _32_anticodon	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_3_45_- ENOLPYRUVYL_45_- SHIKIMATE_45_5P	5-enolpyruvyl-shikimate-3-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PAPS	phosphoadenosine-5'-phosphosulfate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
SER	L-serine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD_45_9038	precorrin-1	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
124- _Ubiquinones_- _124_	a ubiquinone	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD_45_602	5-amino-6-(5'-phosphoribosylamino)uracil	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_1_45_AMINO_45_- _PROPAN_45_2_45_- _ONE_45_3_45_- _PHOSPHATE _124_-	1-amino-propan-2-one-3-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_Pyruvate_45_- _dehydrogenase_- _45_- _acetylDHLipoyl_- _124_	lipoate acetyltransferase N6-(S-acetyldihydrolipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
THIAMINE_45_- _PYROPHOSPHATE _124_Charged_45_- _GLY_45_-tRNAs_- _124_	thiamine diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Charged_45_- _GLY_45_-tRNAs_- _124_	glycyl-tRNAgly	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
D_45_6_45_P- _45_GLUCONO_- _45_DELTA_45_- _LACTONE	D-glucono-δ-lactone-6-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
_7_45_8_45_- _DIHYDROPTEROATE	7,8-dihydropteroate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DNA_45_N	DNAn	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_tRNA_45_- _Containing_45_- _Guanine_124_- GUANINE	tRNA containing guanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
AMINO_45_- _RIBOSYLAMINO_- _45_1H_45_3H_- _45_PYR_45_DIONE	guanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NIACINE	5-amino-6-ribitylamino-2,4(1H,3H)-pyrimidinedione	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S8	nicotinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
C_45_0_45_P_32_- _bond_32_3_38_- _apos_59_32_- _to_32_AP_32_- _site_32_in_32_- _DNA_32_intact	SO	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_2_45_KETO_45_- _3_45_METHYL_45_- _VALERATE	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GLUTATHIONE	2-keto-3-methyl-valerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Sugar_124_- _124_Charged_45_- _SER_45_tRNAs_- _124_-	glutathione	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
	a sugar	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
	L-seryl-tRNAser	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
OCTANOYL__45__ACP	octanoyl-ACP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Some__45__- _tRNA__124__	a tRNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__L__45__- _seryl__45__SEC__- _45__tRNAs__124__	L-seryl-tRNA ^{sec}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
NICOTINATE- _NUCLEOTIDE	nicotinate nucleotide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__Charged__45__- _ASP__45__tRNAs__- _124__	L-aspartyl-tRNA ^{asp}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
P__45__RIBOSYL- _45__4__45__- _SUCCCARB__45__- _AMINOIMIDAZOLE	5'-phosphoribosyl-4-(N-succinocarboxamide)-5-aminoimidazole	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
MESO__45__- _DIAMINOPIMELATE	meso-diaminopimelate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
DIHYDROXY__45__- _BUTANONE__45__P	3,4-dihydroxy-2-butanone-4-P	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__DNA__45__- _With__45__- _Mismatched__- _45__Adenine__124__	DNA with removed adenine mismatch leaving an AP site	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
WATER	H ₂ O	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
__124__- _Deoxynucleotides__- _124__	a deoxynucleotide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
DEOXY_45_RIBOSE- _45_5P	deoxyribose-5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_rRNAs_124_	rRNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Red_45_- _Thioredoxin_124_- _	a reduced thioredoxin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Charged_45_- _GLT_45_tRNAs_- _124_	L-glutamyl-tRNA ^{Glu}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
NACMUR	N-acetylmuramate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ALPHA_45_GLC_45_- _6_45_P	α-D-glucose 6-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_Charged_45_- _LEU_45_tRNAs_- _124_	L-leucyl-tRNA ^{Leu}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
D_45_ALA_45_D_- _45_ALA	D-alanyl-D-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DELTA1_45_- _PIPERIDEINE_- _45_2_45_6_45_- _DICARBOXYLATE	tetrahydrodipicolinate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
SIROHYDROCHLORIN	sirohydrochlorin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_124_GLT_45_- _tRNAs_124_	tRNA ^{Glu}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD_45_8259	nicotinate riboside	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S_45_LACTOYL_45_- _GLUTATHIONE	S-lactoyl-glutathione	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__N__45_- _formyl__45__L__45- __methionyl__45_- _tRNAfmet__124__	N-formyl-L-methionyl-tRNAfmet	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2K__45__4CH3__45_- _PENTANOATE	2-ketoisocaproate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PROTON	H+	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__4__45_- _PHOSPHONOOXY_- _45__THREONINE	4-(phosphonooxy)-threonine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2__45_- _KETOGLUTARATE	2-ketoglutarate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
XYLULOSE__45__5_- _45__PHOSPHATE	D-xylulose-5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GLYCEROL	glycerol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ACETALD	acetaldehyde	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Oxo__45_- _glutarate__45_- _dehydrogenase_- _45__lipoyl__124__	dihydrolipoyltranssuccinylase (lipoyl)lysine	N6- cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__2C__45__METH- __45__D__45_- _ERYTHRITOL__45_- _CYCLODIPHOSPHATE	2-C-methyl-D-erythritol-2,4-cyclodiphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FMNH2	FMNH2	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
GMP	GMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
HYDROGEN__45_-_PEROXIDE	H2O2	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FMN	FMN	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8537	tRNA pseudouridine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PPI	diphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__BCAA__45_-_dehydrogenase__45__lipoyl__124__	lipoamide acyltransferase N6-(lipoyl)lysine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
TRP	L-tryptophan	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CH33AD0	5'-deoxyadenosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8533	AP site on DNA created by glycosylase in repair process	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8532	AP site removed from DNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
B__45__KETOACYL__45__ACP	a & beta;-ketoacyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
RIBOFLAVIN	riboflavin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8538	tRNA uridine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
METHIONYL__45_-_PEPTIDE	methionyl peptide	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__SEC__45_-_tRNAs__124__	tRNAsec	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_-_Octanoylated__45__domains__124__	an octanoylated domain	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ANTHRANILATE	anthranilate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__HISTIDINOL__45__P	L-histidinol-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
UDP__45__AAGM__45_- _DIAMINOHEPTANEDIOATE	UDP-N-acetylmuramoyl-L- alananyl-D-glutamyl-meso-2,6- diaminoheptanedioate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
XANTHOSINE__45__5- __45__PHOSPHATE	xanthosine-5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
GLY	glycine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
GUANOSINE	guanosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CMP	CMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
ADENOSYL__45__P4	5',5'''-diadenosine tetraphosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
GLN	L-glutamine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_1__45__KETO- __45__2__45_- _METHYLVALERATE	2,3-dihydroxy-3-methylvalerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
GLT	L-glutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
PRPP	5-phosphoribosyl 1-pyrophosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124__THR__45_- _tRNAs__124__	tRNA ^{thr}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_124__TYR__45_- _tRNAs__124__	tRNA ^{tyr}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
_8__45__AMINO- __45__7__45_- _OXONONANOATE	7-keto-8-aminopelargonate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
CPD__45__8200	a properly matched DNA base pair	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes
L__45__ALPHA__45_- _ALANINE	L-alanine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxtimes	\boxtimes

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Protein- __45__Ox__45__- _Disulfides__124__	a protein with oxidized disulfide bonds	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
AMP	AMP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
UTP	UTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FORMATE	formate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXY__45__RIBOSE- __45__1P	deoxyribose-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PRO	L-proline	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DUTP	dUTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
FRU1P	fructose-1-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_2__45__ACETO__45__- _2__45__HYDROXY__- _45__BUTYRATE	2-aceto-2-hydroxy-butyrate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Sulfurated- __45__Sulfur__45__- _Acceptors__124__	a sulfurated sulfur donor	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
PANTETHEINE__45__P	pantetheine 4'-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
MALONYL__45__ACP	a malonyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DETHIOBIOTIN	dethiobiotin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DPG	1,3-diphosphateglycerate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXYXYLULOSE__- _45__5P	1-deoxy-D-xylulose 5-phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
BIOTIN	biotin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CO__45__A	coenzyme A	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CARDIOLIPIN	cardiolipin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Sugar__45__ _Phosphate__124__	a sugar phosphate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CTP	CTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
THF__45__GLU__45__N __124__	a tetrahydrofolate polyglutamate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_Peptidoglycans__ _124__	a peptidoglycan	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S__45__ADENOSYL__ _45__4__45__ _METHYLTHIO__ _45__2__45__ _OXOBUTANOATE	S-adenosyl-4-methylthio-2-oxobutanoate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Prenyl__45__ _tRNAs__124__	prenyl-tRNA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
_3__45__CARBOXY__ _45__3__45__ _HYDROXY__45__ _ISOCAPROATE	2-isopropylmalate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DGTP	dGTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__5662	9-mercaptodethiobiotin	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__ILE__45__ _tRNAs__124__	tRNA _{ile}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
ADENINE	adenine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
tRNA__32__with__32__ __epoxyqueuosine__ __32__at__32__ _position__32__34	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
CPD__45__7695	N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124_- _Pyruvate__45_- _dehydrogenase- __45_- _dihydrolipoate_- _124__ _3__45__P__45_- _HYDROXYPYRUVATE _QUEUINE _IMIDAZOLE__45_- _ACETOL__45__P _S03 _SUPER__45__OXIDE _7__45_- _AMINOMETHYL- __45__7__45_- _DEAZAGUANINE _5__45__10__45_- _METHENYL__45__THF __124__Alcohols_- _124__	lipoate acetyltransferase (dihydrolipoyl)lysine 3-phospho-hydroxypyruvate queuine imidazole acetol-phosphate sulfite O2- 7-aminomethyl-7-deazaguanine 5,10-methenyltetrahydrofolate an alcohol	N6- cytoplasm cytoplasm cytoplasm cytoplasm cytoplasm cytoplasm cytoplasm	$\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$ $\text{mol} \cdot \text{l}^{-1}$	\boxplus \boxplus \boxplus \boxplus \boxplus \boxplus	\boxplus \boxplus \boxplus \boxplus \boxplus \boxplus

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
__124__Saturated- __45__Fatty__45__- _Acyl__45__ACPs_- _124__	a 2,3,4-saturated fatty acyl-[acp]	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S__32__rRNA	NA	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
L__45__1__45__- _PHOSPHATIDYL__45__- _GLYCEROL	an L-1-phosphatidyl-glycerol	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__All__45__- _ACPs__124__	all acyl carrier proteins	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
S__45__- _ADENOSYLMETHIONINE	S-adenosyl-L-methionine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXYINOSINE	deoxyinosine	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
__124__Charged__45__- _PRO__45__tRNAs_- _124__	L-prolyl-tRNA _{pro}	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8624	peptidylproline (ω = 180)	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
CPD__45__8625	peptidylproline (ω = 0)	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DCTP	dCTP	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
N__45__5__45__- _PHOSPHORIBOSYL_- _45__ANTHRANILATE	N-(5'-phosphoribosyl)-anthranilate	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus
DEOXYNUCLEOTIDESM	(deoxynucleotides)(m)	cytoplasm	$\text{mol} \cdot \text{l}^{-1}$	\boxplus	\boxplus

5. Reactions

This model contains 336 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by one or more modifiers, the identifiers of the modifier species are written above the reaction arrow.

Table 4: Overview of all reactions

Nº	Id	Name	Reaction Equation	SBO
1	RXN0_45_949	NA	2 CPD_45_7046 2 S_45_ADENOSYLMETHIONINE _124_Octanoylated_45_domains_124_ \longrightarrow _124_Lipoylated_45_domains_124_ 2 MET + 2 CH33ADO	+
2	INORGPYROPHOSPHAT_45_RXN	Inorganic pyrophosphatase	PPI + WATER \rightleftharpoons 2 _124_Pi_124_	
3	DEOXYADENPHOSPHORNA_45_RXN	NA	_124_Pi_124_ + DEOXYADENOSINE \longrightarrow DEOXY_45_RIBOSE_45_1P+ ADENINE	
4	RXN_45_22	NA	CANAVANINOSUCCINATE \longrightarrow CANAVANINE + FUM	
5	RXN0_45_1342	NA	S_45_ADENOSYLMETHIONINE + tRNA_32_with_32_7_45_aminomethyl_45_7_45_deazaguanine_32_at_32_position_32_34 MET+tRNA_32_with_32_epoxyqueuosine_32_at_32_position_32_34	
6	ACETOLACTREDUCTOIK_45_RXN	6-keto-1-acid reductoisomerase	PROTON + NADPH + _2_45_ACETO_45_LACTATE \longrightarrow NADP + DIOH_45_ISOVALERATE	
7	_6PGLUCONOLACT-_45_RXN	6-phosphogluconolactonase	D_45_6_45_P_45_GLUCONO_45_DELTA_45_LACTONE+ WATER \longrightarrow CPD_45_2961	
8	CHORISMATEMUT-_45_RXN	Chorismate mutase	CHORISMATE \longrightarrow PREPHENATE	

Nº	Id	Name	Reaction Equation	SBO
9	TRNA_45_- PSEUDOURIDINE- _45_SYNTHASE_- _45_I_45_RXN	tRNA-pseudouridine synthase I	CPD_45_8538 \rightleftharpoons CPD_45_8537	
10	DEPHOSPHOCOAKIN- _45_RXN	Dephospho-CoA kinase	ATP + DEPHOSPHO_45_COA \longrightarrow CO_45_A + ADP	
11	_1_46_11_46_- _1_46_15_45_- RXN	Peroxiredoxin	2 PROT_45_CYS + _124_Alkyl_45_Hydro_45_Peroxides_124_ \rightleftharpoons _124_Protein_45_Dis _124_Alcohols_124_ + WATER	
12	PGLUCISOM_45_- RXN	Glucose-6-phosphate isomerase	GLC_45_6_45_P \rightleftharpoons FRUCTOSE_45_6P	
13	RXN0_45_947	NA	_124_Non_45_lipoylated_45_domains_124_+ OCTANOYL_45_ACP + _124-Octanoyl_45_ACPs_124_ \longrightarrow ACP + _124-Octanoylated_45_domains_124_	
14	DIHYDROFOLATESYNTH- _45_RXN	Dihydrofolate synthetase	ATP+GLT+_7_45_8_45_DIHYDROPTEROATE \longrightarrow _124_Pi_124_+ DIHYDROFOLATE + ADP	
15	HOMOCYSMET_45_- _RXN	5-methyltetrahydropteroyltriglutamate- homocysteine S-methyltransferase	HOMO_45_CYS + CPD_45_1302 \longrightarrow MET + CPD_45_1301	
16	F16ALDOLASE_- _45_RXN	Fructose-bisphosphate aldolase	FRUCTOSE_45_16_45_DIPHOSPHATE \rightleftharpoons GAP + DIHYDROXY_45_ACETONE_45_PHOSPHATE	
17	_2_46_3_46_1_- _46_181_45_- RXN	Lipoyl(octanoyl) transferase	_124_General_45_Protein_45_Substrates_124_+ OCTANOYL_45_ACP + _124-Octanoyl_45_ACPs_124_ \rightleftharpoons _124_Protein_45_N_45_6_45_oct ACP	
18	UDPREDUCT_45_- _RXN	NA	UDP+_124_Red_45_Thioredoxin_124_ \longrightarrow DUDP+ WATER + _124_Ox_45_Thioredoxin_124_	

Nº	Id	Name	Reaction Equation	SBO
19	METHYLENETHFDEHYDRO- _45_NADP_45_- _RXN	Methylenetetrahydrofolate dehydroge- nase (NADP+)	METHYLENE_45_THF + NADP \rightleftharpoons NADPH + _5_45_10_45_METHENYL_45_THF	
20	PRAISOM_45_- _RXN	Phosphoribosylanthranilate isomerase	N_45_5_45_PHOSPHORIBOSYL_45_ANTHRANILATE \longrightarrow CARBOXYPHENYLAMINO_	
21	_1_46_8_46_4- _46_8_45_RXN	Phosphoadenylyl-sulfate reductase (thioredoxin)	_124_Red_45_Thioredoxin_124_ + PAPS \longrightarrow S03+_124_0x_45_Thioredoxin_124_+ PAP	
22	DISULFOXRED_- _45_RXN	NA	_124_Protein_45_Red_45_Disulfides_124_ \rightleftharpoons _124_Protein_45_0x_	
23	RIBULP3EPIM_- _45_RXN	ribulose phosphate 3-epimerase	RIBULOSE_45_5P \rightleftharpoons XYLULOSE_45_5_45_PHOSPHATE	
24	RRNA_45_- _ADENINE_45_- _N6_45_45_- _METHYLTRANSFERASE_- _45_RXN	rRNA (adenine-N6-)-methyltransferase	_124_rRNAs_124_ + _124_General_45_rRNA_45_Substrates_124_+ S_45_ADENOSYLMETHIONINE \rightleftharpoons ADENOSYL_45_HOMO_45_CYS+ _124_N6_45_Methyladenine_45_containing_45_rRNAs_124_	
25	GUANPHOSPHOR_- _45_RXN	Guanosine phosphorylase	_124_Pi_124_ + GUANOSINE \rightleftharpoons GUANINE + RIBOSE_45_1P	
26	GLYCINE_45_- _45_TRNA_45_- _LIGASE_45_RXN	Glycine-tRNA ligase	ATP + _124_GLY_45_tRNAs_124_ + GLY \longrightarrow _124_Charged_45_GLY_45_tRNAs_124_+ PPI + AMP	
27	GLUTRACE_45_- _RXN	Glutamate racemase	GLT \longrightarrow D_45_GLT	
28	RIBOFLAVINKIN_- _45_RXN	Riboflavin kinase	ATP + RIBOFLAVIN \longrightarrow ADP + FMN	
29	_1_46_6_46_- _99_46_5_45_- _RXN	NA	_124_Acceptor_124_ + NADH + PROTON \rightleftharpoons NAD + _124_Donor_45_H2_124_	

Nº	Id	Name	Reaction Equation	SBO
30	_3_45_- _DEHYDROQUINATE_- _45_- _DEHYDRATASE_- _45_ RXN	3-dehydroquate dehydratase	DEHYDROQUINATE \longrightarrow _3_45_ DEHYDRO_45_ SHIKIMATE + WATER	
31	RXN_45_10	NA	L_45_ ASPARTATE + ATP + O_45_ UREIDOHOMOSERINE \longrightarrow PPI + AMP + CANAVANINOSUCCINATE	
32	SIROHEME_45_- FERROCHELAT_- _45_ RXN	Sirohydrochlorin ferrochelata	FE_43_2 + SIROHYDROCHLORIN \longrightarrow 2 PROTON + SIROHEME	
33	_1_46_5_46_1_- _46_20_45_ RXN	Methylenetetrahydrofolate reductase (NADPH)	NADH_45_P_45_OR_45_NOP + METHYLENE_45_THF + PROTON \longrightarrow NAD_45_P_45_OR_45_NOP + _5_45_METHYL_45_THF	
34	DIHYDROOROTOX_- _45_ RXN	Dihydroorotate oxidase	OXYGEN_45_MOLECULE + DI_45_H_45_OROTATE \rightleftharpoons HYDROGEN_45_PEROXIDE + OROTATE	
35	CHORISMATE_45_- _SYNTHASE_45_- _RXN	Chorismate synthase	_3_45_ENOLPYRUVYL_45_SHIKIMATE_45_5P \longrightarrow _124_Pi_124_ + CHORISMATE	
36	PHOSACETYLTRANS_- _45_ RXN	Phosphate acetyltransferase	_124_Pi_124_ + ACETYL_45_COA \rightleftharpoons CO_45_A + ACETYL_45_P	
37	PROPKIN_45_- _RXN	NA	PROPIONYL_45_P + ADP \longrightarrow PROPIONATE + ATP	
38	CDPREDUCT_45_- _RXN	NA	CDP + _124_Red_45_Thioredoxin_124_ \longrightarrow _124_Ox_45_Thioredoxin_124_ + WATER + DCDP	
39	PANTEPADENYLYLTRANS_- _45_ RXN	Pantetheine-phosphate adenylyltransferase	ATP + PANTETHEINE_45_P \longrightarrow PPI + DEPHOSPHO_45_COA	

Nº	Id	Name	Reaction Equation	SBO
40	THREONINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Threonine-tRNA ligase	_124_THR_45_tRNAs_124_ THR + ATP \longrightarrow AMP + PPI + _124_Charged_45_THR_45_tRNAs_124_	+
41	_3_46_4_46_- _21_46_89_45_- RXN	Signal peptidase I	_124_Peptides_45_with_45_Leader_45_Sequence_124_ \rightleftharpoons _124_Lea	
42	_2_46_8_46_1_- _46_8_45_RXN	Lipoyl synthase	2 S8+_124_Protein_45_6_45_N_45_octanoyl_45_lysine_124_+ 2 S_45_ADENOSYLMETHIONINE \rightleftharpoons _124_Protein_45_6_45_N_45_lipoyl_	
43	DECAPCISTRANSFER-di-trans-poly-cis-decaprenylcistransferase _45_RXN		DELTA3_45_ISOPENTENYL_45_PP + T_45_POLY_45_C_45_DECAPRENYL_45_DIPHOSPHATE \rightleftharpoons PPI+ T_45_POLY_45_C_45_UNDECAPRENYL_45_DIPHOSPHATE	
44	GPPSYN_45_RXN	Dimethylallyltransferase	CPD_45_4211+DELTA3_45_ISOPENTENYL_45_PP \longrightarrow PPI+ GERANYL_45_PP	
45	ORNCARBAMTRANSFEROrnithine carbamoyltransferase _45_RXN		CARBAMOYL_45_P + L_45_ORNITHINE \rightleftharpoons _124_Pi_124_ + L_45_CITRULLINE	
46	PREPHENATEDEHYDRATPrephenate dehydratase _45_RXN		PREPHENATE \longrightarrow CARBON_45_DIOXIDE + PHENYL_45_PYRUVATE + WATER	
47	ARGSUCCINSYN_- _45_RXN	argininosuccinate synthetase	ATP + L_45_CITRULLINE + L_45_ASPARTATE \longrightarrow AMP + PPI + L_45_ARGININO_45_SUCCINATE	
48	RXN0_45_1321	NA	_7_45_AMINOMETHYL_45_7_45_DEAZAGUANINE+ guanine_45_34_32_of_32_tRNA_32_with_32_a_32_GU_40_N_41_32_ tRNA_32_with_32_7_45_aminomethyl_45_7_45_deazaguanine_32_at_	
49	TRANSALDOL_45_- _RXN	Transaldolase	GAP+D_45_SEDOHEPTULOSE_45_7_45_P \rightleftharpoons FRUCTOSE_45_6P+ ERYTHROSE_45_4P	
50	INOPHOSPHOR_- _45_RXN	NA	_124_Pi_124_ + INOSINE \longrightarrow RIBOSE_45_1P + HYPOXANTHINE	

Nº	Id	Name	Reaction Equation	SBO
51	RXN_45_6102	NA	ATP + GLT + THF \longrightarrow ADP + _124_Pi_124_ + CPD_45_5725	
52	RXN0_45_308	NA	CYS+PROT_45_CYS \longrightarrow L_45_ALPHA_45_ALANINE+ ENZYME_45_S_45_SULFANYLCYSTEINE	
53	TRIOSEPISOMERIZATION_45_RXN	Triosephosphate isomerase	GAP \rightleftharpoons DIHYDROXY_45_ACETONE_45_PHOSPHATE	
54	QUEUOSINE-_45_TRNA_45-_RIBOSYLTRANSFERASE-_45_RXN	Queuine tRNA-ribosyltransferase	QUEUINE+_124_tRNA_45_Containing_45_Guanine_124_ \rightleftharpoons GUANINE+_124_tRNA_45_Containing_45_Queuine_124_	
55	RXN0_45_5225	NA	CPD0_45_1080 + WATER \rightleftharpoons CPD0_45_1082 + CPD0_45_1081	
56	RXN0_45_302	2-C-methyl-D-erythritol cyclodiphosphate synthase	2_45_PHOSPHO_45_4_45_CYTIDINE_45_5_45_DIPHOSPHO_45_2_45_C_45_CMP	2,4-
57	SUCCDIAMINOPIMDESAC_45_RXN	Succinyl-diaminopimelate desuccinylase	WATER+N_45_SUCCINYLLL_45_2_45_6_45_DIAMINOPIMELATE \longrightarrow LL_45_D_SUC	
58	RXN_45_4543	NA	_124_Some_45_tRNA_124_ + CPD_45_4211 \longrightarrow _124_Prenyl_45_tRNAs_124_+ PPI	
59	ATPPHOSPHORIBOSYLATION_45_RXN	ATP-phosphoribosyltransferase	PRPP + ATP \longrightarrow PHOSPHORIBOSYL_45_ATP + PPI	
60	PSERTRANSAMPYR-_45_RXN	NA	_3OH_45_4P_45_OH_45_ALPHA_45_KETOBUTYRATE+ GLT \longrightarrow _4_45_PHOSPHONOOXY_45_THREONINE+ _2_45_KETOGLUTARATE	
61	FADSYN_45_RXN	FMN adenylyltransferase	FMN + ATP \longrightarrow PPI + FAD	
62	_3_46_5_46_1-_46_28_45_RXN	N-acetylmuramoyl-L-alanine amidase	WATER+_124_Peptidoglycans_124_ \rightleftharpoons _124_Peptides_124_+ NACMUR	

Nº	Id	Name	Reaction Equation	SBO
63	PHENYLALANINE_- _45___45__TRNA_- _45__LIGASE_45_- __RXN	Phenylalanine-tRNA ligase	__124__PHE__45__tRNAs__124__ PHE + ATP \longrightarrow AMP + PPI + __124__Charged__45__PHE__45__tRNAs__124__	+
64	ADENPHOSPHOR_- _45__RXN	NA	ADENOSINE+__124__Pi__124__ \rightleftharpoons RIBOSE__45__1P+ ADENINE	
65	VALINE__45___- _45__TRNA__45_- __LIGASE_45__RXN	Valine-tRNA ligase	__124__VAL__45__tRNAs__124__ VAL + ATP \longrightarrow AMP + PPI + __124__Charged__45__VAL__45__tRNAs__124__	+
66	LACTOSEPHOSPHO_- _45__RXN	Protein-N(PI)-phosphohistidine-sugar phosphotransferase	LACTOSE+__124__Protein__45__3__45__phospho__45__L__45__histidines__124__ __124__Protein__45__Histidines__124__	
67	DIHYDRODIPICSYN_- __45__RXN	dihydrodipicolinate synthase	L__45__ASPARTATE__45__SEMIALDEHYDE + PYRUVATE \longrightarrow 2 WATER + __2__45__3__45__DIHYDRODIPICOLINATE	+
68	PEPDEPHOS__45_- __RXN	Pyruvate kinase	ADP+PHOSPHO__45__ENOL__45__PYRUVATE \longrightarrow ATP+ PYRUVATE	
69	DIMETHUROPORDEHYDROG- __45__RXN	NA	NAD + DIHYDROSIROHYDROCHLORIN \longrightarrow NADH + SIROHYDROCHLORIN	
70	RXN0__45__5217	NA	CADAVERINE+S__45__ADENOSYLMETHIONINAMINE \longrightarrow _5__45__METHYLTHIOADENOSINE CPD0__45__1065	
71	GLUTAMINE__45_- ___45__TRNA__45_- __LIGASE_45__RXN	Glutamine-tRNA ligase	ATP+GLN+__124__GLN__45__tRNAs__124__ \longrightarrow __124__Charged__45__GLN__45__tRNA__124__ AMP + PPI	
72	OROTPDECARB_- _45__RXN	Orotidine-5'-phosphate decarboxylase	OROTIDINE__45__5__45__PHOSPHATE \longrightarrow UMP + CARBON__45__DIOXIDE	
73	NADH__45_- __DEHYDROGENASE_- __45__QUINONE_- _45__RXN	NADH dehydrogenase (quinone)	2 NADH+__124__Quinones__124__ \rightleftharpoons __124__Reduced__45__Quinones__124__+ 2 NAD	

Nº	Id	Name	Reaction Equation	SBO
74	RXN0_45_2023	NA	URIDINE + CYS + ATP \rightleftharpoons L_45_ALPHA_45_ALANINE + _2_45_THIOURIDINE + AMP + PPI	
75	AICARSYN_45_- _RXN	Adenylosuccinate lyase	P_45_RIBOSYL_45_4_45_SUCCCARB_45_AMINOIMIDAZOLE \longrightarrow AICAR + FUM	
76	DIHYDROOROT_- _45_RXN	Dihydroorotase	CARBAMYUL_45_L_45_ASPARTATE \longrightarrow WATER + DI_45_H_45_OROTATE	
77	PHOSNACMURPENTATRN_45_- _RXN	Phospho-N-acetylmuramoyl- pentapeptide-transferase	UNDECAPRENYL_45_P + C1 \rightleftharpoons C5 + UMP	
78	GLU6PDEHYDROG_- _45_RXN	Glucose-6-phosphate 1-dehydrogenase	NADP + GLC_45_6_45_P \longrightarrow PROTON + NADPH + D_45_6_45_P_45_GLUCONO_45_DELTA_45_LACTONE	
79	HISTIDINE_45_- _45_TRNA_45_- _LIGASE_45_RXN	Histidine-tRNA ligase	HIS + _124_HIS_45_tRNAs_124_ + ATP \longrightarrow AMP + PPI + _124_Charged_45_HIS_45_tRNAs_124_	
80	IMPCYCLOHYDROLASEHMP_45_- _RXN	HMP cyclohydrolase	PHOSPHORIBOSYL_45_FORMAMIDO_45_CARBOXAMIDE \longrightarrow WATER + IMP	
81	RXN0_45_2601	NA	_124_Damaged_45_DNA_45_Pyrimidine_124_ \rightleftharpoons _124_DNA_45_contai DNA_32_with_32_AP_32_40_32_apyrimidinic_32_site_41_32_as	
82	HYPXPTRIBOSYLTRAN_45_- _RXN	NA	HYPOXANTHINE + PRPP \rightleftharpoons PPI + IMP	
83	RXN_45_9	NA	L_45_CANALINE + CARBAMOYL_45_P \longrightarrow O_45_UREIDOHOMOSERINE + _124_Pi_124_	
84	UMPKI_45_RXN	NA	UMP + ATP \longrightarrow UDP + ADP	
85	ASPARTATEKIN_- _45_RXN	Aspartate kinase	L_45_ASPARTATE + ATP \longrightarrow ADP + L_45_BETA_45_ASPARTYL_45_P	
86	PNP_45_RXN	Purine-nucleoside phosphorylase	_124_Purine_45_Ribonucleosides_124_ + _124_Pi_124_ \rightleftharpoons RIBOSE_45_1P + _124_Purine_45_Bases_124_	

Nº	Id	Name	Reaction Equation	SBO
87	S_45_- _ADENMETSYN- _45_RXN	Methionine adenosyltransferase	ATP + WATER + MET \longrightarrow PPI + S_45_ADENOSYLMETHIONINE + _124_Pi_124_	
88	HISTALDEHYD_- _45_RXN	Histidinol dehydrogenase	NAD + WATER + HISTIDINAL \longrightarrow HIS + NADH	
89	NAD_45_SYNTH- _45_NH3_45_- _RXN	NAD(+) synthetase	DEAMIDO_45_NAD + AMMONIA + ATP \longrightarrow PPI + AMP + NAD	
90	GLUTATHIONE_- _45_SYN_45_- _RXN	glutathione synthetase	L_45_GAMMA_45_GLUTAMYLCYSTEINE + ATP + GLY \longrightarrow GLUTATHIONE + _124_Pi_124_ + ADP	
91	GTP_45_- _CYCLOHYDRO- _45_II_45_RXN	GTP cyclohydrolase II	GTP+3 WATER \longrightarrow DIAMINO_45_OH_45_PHOSPHORIBOSYLAMINO_45_PYR+ FORMATE + PPI	
92	ADENYLYLSULFKIN- _45_RXN	Adenylylsulfate kinase	ATP + APS \longrightarrow ADP + PAPS	
93	HOMOSERDEHYDROG- _45_RXN	Homoserine dehydrogenase	PROTON+L_45_ASPARTATE_45_SEMIALDEHYDE+ NADH_45_P_45_OR_45_NOP \longrightarrow NAD_45_P_45_OR_45_NOP+ HOMO_45_SER	
94	UDP_45_- _NACMURALA_- _45_GLU_45_- _LIG_45_RXN	UDP-N-acetylmuramoylalanine-D- glutamate ligase	D_45_GLT+UDP_45_ACETYLMURAMOYL_45_ALA+ ATP \longrightarrow ADP + _124_Pi_124_ + UDP_45_AA_45_GLUTAMATE	
95	NADH_45_- _DEHYDROG_45_- _A_45_RXN	NADH dehydrogenase (ubiquinone)	_124_Ubiquinones_124_ + PROTON + NADH \rightleftharpoons NAD + _124_Ubiquinols_124_	
96	RXN_45_8631	NA	FRU1P \rightleftharpoons DIHYDROXY_45_ACETONE_45_PHOSPHATE+ GLYCERALD	

Nº	Id	Name	Reaction Equation	SBO
97	RRNA_45_- _GUANINE_45_- _N2_45_45_- _METHYLTRANSFERASE- _45_RXN	rRNA (guanine-N2-)-methyltransferase	S_45_ADENOSYLMETHIONINE + _124_rRNAs_124_ \rightleftharpoons ADENOSYL_45_HOMO_45_CYS+ _124_N2_45_Methylguanine_45_containing_45_rRNAs_124_	
98	DNA_45_- _DIRECTED_- _45_RNA_45_- _POLYMERASE_- _45_RXN	DNA-directed RNA polymerase	RNA_45_N+_124_Nucleoside_45_Triphosphates_124_ \rightleftharpoons RNA_45_N+ PPI	
99	THYMIDYLATESYN- _45_RXN	Thymidylate synthase	DUMP + METHYLENE_45_THF \rightleftharpoons TMP + DIHYDROFOLATE	
100	TRYPTOPHAN_45_- _45_TRNA_45_- _LIGASE_45_- _RXN	Tryptophan-tRNA ligase	_124_TRP_45_tRNAs_124_ + TRP + ATP \longrightarrow _124_Charged_45_TRP_45_tRNAs_124_+ AMP + PPI	
101	ARGININE_45_- _45_TRNA_45_- _LIGASE_45_RXN	Arginine-tRNA ligase	ARG + _124_ARG_45_tRNAs_124_ + ATP \longrightarrow PPI+_124_Charged_45_ARG_45_tRNAs_124_+ AMP	
102	TRNA_45_- _ADENYLYLTRANSFERASE- _45_RXN	tRNA adenylyltransferase	ATP + _124_Some_45_tRNA_124_ \rightleftharpoons PPI + _124_Some_45_tRNA_124_	
103	ENOYL_45_ACP_- _45_REDUCT_45_- _NADH_45_RXN	Enoyl-[acyl-carrier protein] reductase (NADH)	TRANS_45_D2_45_ENOYL_45_ACP + NADH \longrightarrow NAD+_124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_+ ACYL_45_ACP	
104	CARDIOLIPSYN_- _45_RXN	NA	2 L_45_1_45_PHOSPHATIDYL_45_GLYCEROL \longrightarrow CARDIOLIPIN+ GLYCEROL	

Nº	Id	Name	Reaction Equation	SBO
105	GLURS_45_RXN	Glutamate-tRNA ligase	ATP + _124_GLT_45_tRNAs_124_ + GLT \longrightarrow PPI + AMP + _124_Charged_45_GLT_45_tRNAs_124_	
106	_2_46_7_46_1- _46_69_45_RXN	Protein-N(PI)-phosphohistidine-sugar phosphotransferase	_124_Protein_45_3_45_phospho_45_L_45_histidines_124_+ _124_Sugar_124_ \rightleftharpoons _124_Protein_45_Histidines_124_+ _124_Sugar_45_Phosphate_124_	
107	GMP_45_- _REDUCT_45_RXN	GMP reductase	IMP + AMMONIA + NADP \rightleftharpoons NADPH + GMP	
108	TRNA_45_- _CYTIDYLYLTRANSFERASE- _45_RXN	tRNA cytidylyltransferase	_124_Some_45_tRNA_124_ + CTP \rightleftharpoons PPI + _124_Some_45_tRNA_124_	
109	RIBONUCLEOSIDE- _45_DIP_45_- _REDUCTI_45_- _RXN	Ribonucleoside-diphosphate reductase	_124_Ox_45_Thioredoxin_124_ + _124_Deoxy_45_Ribonucleoside_45_Diphosphates_124_+ WATER \rightleftharpoons _124_Ribonucleoside_45_Diphosphates_124_+ _124_Red_45_Thioredoxin_124_	
110	RXN0_45_2625	NA	CPD_45_8199 \rightleftharpoons CPD_45_8200	
111	RXN0_45_1	NA	WATER+_124_Deoxy_45_Ribonucleoside_45_Diphosphates_124_+ _124_Acceptor_124_ \rightleftharpoons _124_Ribonucleoside_45_Diphosphates_124_+ _124_Donor_45_H2_124_	
112	GLUTAMIDOTRANS- _45_RXN	NA	PHOSPHORIBULOSYL_45_FORMIMINO_45_AICAR_45_P+ GLN \longrightarrow D_45_ERYTHRO_45_IMIDAZOLE_45_GLYCEROL_45_P+ GLT + AICAR	
113	_3_45_- _DEHYDROQUINATE- _45_SYNTHASE_- _45_RXN	3-dehydroquinate synthase	_3_45_DEOXY_45_D_45_ARABINO_45_HEPTULOSONATE_45_7_45_P \longrightarrow DEH _124_Pi_124_	
114	TRNA_45_- _ISOPENTENYLTRANSFERASE- _45_RXN	tRNA isopentenyltransferase	DELTA3_45_ISOPENTENYL_45_PP + _124_Some_45_tRNA_124_ \rightleftharpoons _124_tRNA_45_Containing_45_6Isopen PPI	

Nº	Id	Name	Reaction Equation	SBO
115	HEMN_45_RXN	NA	2 S_45_ADENOSYLMETHIONINE + COPROPORPHYRINOGEN_III → PROTOPORPHYRINOGEN + 2 CH33ADO + 2 CARBON_45_DIOXIDE + 2 MET	
116	NICOTINATEPRIBOSYLTRANSFERASE_45_RXN	Nicotinate phosphoribosyltransferase	PRPP + NIACINE → PPI + NICOTINATE_NUCLEOTIDE	
117	_3_46_4_46_- _11_46_1_45_- RXN	Leucyl aminopeptidase	WATER+_124_Peptides_124_ → _124_Peptides_124_+ _124_Amino_45_Acids_45_20_124_	
118	PRTRANS_45_- RXN	Anthranilate phosphoribosyltransferase	PRPP + ANTHRANILATE → PPI + N_45_5_45_PHOSPHORIBOSYL_45_ANTHRANILATE	
119	RXN_45_8629	NA	NAD + DIHYDROLIPOYL_45_GCVH → NADH + PROTON + PROTEIN_45_LIPOYLLYSINE	
120	RIBOFLAVIN_45_- _SYN_45_RXN	Riboflavin synthase	2 DIMETHYL_45_D_45_RIBITYL_45_LUMAZINE → AMINO_45_RIBOSYLAMINO RIBOFLAVIN	
121	DIHYDROPICRED_- _45_RXN	Dihydrodipicolinate reductase	PROTON+_2_45_3_45_DIHYDRODIPICOLINATE+ NADH_45_P_45_OR_45_NOP → DELTA1_45_PIPERIDEINE_45_2_45_6_45_	
122	_3_45_OXOACYL_- _45_ACP_45_- _SYNTH_45_- _BASE_45_RXN	3-oxoacyl-[acyl-carrier protein] synthase	MALONYL_45_ACP + ACETYL_45_ACP → CARBON_45_DIOXIDE + _124_A11_45_ACPs_124_ + _124_Acetoacetyl_45_ACPs_124_	
123	RXN_45_8447	NA	PROTON+_2_45_AMINO_45_3_45_OXO_45_4_45_PHOSPHONOOXYBUTYRATE + CARBON_45_DIOXIDE	
124	NAG1P_45_- _URIDYLTRANS_- _45_RXN	UDP-N-acetylglucosamine pyrophosphorylase	UTP+N_45_ACETYL_45_D_45_GLUCOSAMINE_45_1_45_P → PPI+ UDP_45_N_45_ACETYL_45_D_45_GLUCOSAMINE	

Nº	Id	Name	Reaction Equation	SBO
125	ISOLEUCINE_45- _45_TRNA_45- _LIGASE_45- _RXN	Isoleucine-tRNA ligase	ILE+ATP+_124_ILE_45_tRNAs_124_ → PPI+ _124_Charged_45_ILE_45_tRNAs_124_ + AMP	
126	METHIONINE_45- _45_TRNA_45- _LIGASE_45- _RXN	Methionine-tRNA ligase	MET+ATP+_124_MET_45_tRNAs_124_ → _124_Charged_45_MET_45_tRN PPI + AMP	
127	RXN0_45_2921	NA	ATP+GLT+METHYLENE_45_THF_45_GLU_45_N → _124_Pi_124_+ METHYLENE_45_THF_45_GLU_45_N + ADP	
128	_6_46_3_46_2- _46_10_45_RXN	UDP-N-acetylmuramoylalanine-D- glutamyl-lysine-D-alanyl-D-alanine ligase	CPD_45_209 + ATP + D_45_ALA_45_D_45_ALA → ADP + C3 + _124_Pi_124_	
129	IGPSYN_45_RXN	indole-3-glycerol-phosphate synthase	CARBOXYPHENYLAMINO_45_DEOXYRIBULOSE_45_P → INDOLE_45_3_45_GLY CARBON_45_DIOXIDE + WATER	
130	MYO_45- _INOSITOL_45- _10R_45_4_45- _MONOPHOSPHATASE- _45_RXN	Myo-inositol-1(or 4)-monophosphatase	_1_45_L_45_MYO_45_INOSITOL_45_1_45_P+ WATER → _124_Pi_124_ + MYO_45_INOSITOL	
131	_2_46_1_46_1- _46_61_45_RXN	tRNA (5-methylaminomethyl-2- thiouridylate)-methyltransferase	_124_Some_45_tRNA_124_ + S_45_ADENOSYLMETHIONINE ⇌ ADENOSYL_45_HOMO_45_CYS+ _124_tRNA_45_Containing_45_5MeAminoMe_45_2_45_ThioU_124_	
132	ADENOSYLHOMOCYSTEINE- _45- _NUCLEOSIDASE_- _45_RXN	Adenosylhomocysteine nucleosidase	WATER+ADENOSYL_45_HOMO_45_CYS ⇌ CPD_45_564+ ADENINE	
133	ACETATEKIN_45- _RXN	Acetate kinase	ATP + ACET ⇌ ACETYL_45_P + ADP	

Nº	Id	Name	Reaction Equation	SBO
134	FMNREDUCT_45_-RXN	NAD(P)H dehydrogenase (FMN)	NADH_45_P_45_OR_45_NOP FMN + PROTON \longrightarrow FMNH2	+ +
135	_3_45_OXOACYL-_45_ACP_45_-SYNTH_45_RXN	3-oxoacyl-[acyl-carrier protein] synthase	NAD_45_P_45_OR_45_NOP _124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_+ MALONYL_45_ACP ACYL_45_ACP \longrightarrow B_45_KETOACYL_45_ACP + ACP + CARBON_45_DIOXIDE	+ +
136	_3_46_6_46_1-_46_41_45_RXN	Bis(5'-nucleosyl)-tetraphosphatase (symmetrical)	WATER + ADENOSYL_45_P4 \rightleftharpoons 2 ADP	
137	DTMPKI_45_RXN	Thymidylate kinase	TMP + ATP \longrightarrow ADP + TDP	
138	THI_45_P_45_-KIN_45_RXN	Thiamine-phosphate kinase	ATP + THIAMINE_45_P \longrightarrow ADP + THIAMINE_45_PYROPHOSPHATE	+
139	_5_46_4_46_2-_46_10_45_RXN	Phosphoglucosamine mutase	D_45_GLUCOSAMINE_45_6_45_P \longrightarrow GLUCOSAMINE_45_1P	
140	RXN0_45_5180	NA	DELTA3_45_ISOPENTENYL_45_PP FARNESYL_45_PP \longrightarrow PPI + CPD0_45_1028	+ +
141	DEOXYGUANPHOSPHORNA_45_RXN		DEOXYGUANOSINE _124_Pi_124_ \rightleftharpoons DEOXY_45_RIBOSE_45_1P+ GUANINE	+ +
142	ASPCARBTRANS-_45_RXN	Aspartate carbamoyltransferase	CARBAMOYL_45_P L_45_ASPARTATE \longrightarrow _124_Pi_124_+ CARBAMYUL_45_L_45_ASPARTATE	+ +
143	GUANPRIBOSYLTRAN-NA_45_RXN		PRPP + GUANINE \longrightarrow PPI + GMP	
144	DIHYDROXYMETVALDEHYDE_45_RXN	Dihydroxy-acid dehydratase	_1_45_KETO_45_2_45_METHYLVALERATE \longrightarrow _2_45_KETO_45_3_45_METHYL WATER	

Nº	Id	Name	Reaction Equation	SBO
145	TRNA__45_- _GUANINE__45_- _N1__45____45_- _METHYLTRANSFERASE- __45__RXN	tRNA (guanine-N1-)-methyltransferase	S__45__ADENOSYLMETHIONINE __124__Some__45__tRNA__124__ \rightleftharpoons __124__tRNA__45__Containing__45__N1__45__ADENOSYL__45__HOMO__45__CYS	+
146	DNA__45_- _DIRECTED_- _45__DNA__45_- _POLYMERASE_- _45__RXN	DNA-directed DNA polymerase	DNA__45__N+__124__Deoxy__45__Ribonucleoside__45__Triphosphates__124__ \rightleftharpoons PPI	
147	RXN__45__8442	NA	NIACINE+D__45__RIBULOSE__45__1__45__P \longrightarrow __124__Pi__124__+ CPD__45__8259	
148	ARGSUCCINLYA_- _45__RXN	Argininosuccinate lyase	L__45__ARGININO__45__SUCCINATE \longrightarrow ARG + FUM	
149	HISTAMINOTRANS- __45__RXN	Histidinol-phosphate aminotransferase	GLT+IMIDAZOLE__45__ACETOL__45__P \longrightarrow L__45__HISTIDINOL__45__P+ __2__45__KETOGLUTARATE	
150	UDP__45_- _NACMURALGLDAPLIG- __45__RXN	UDP-N-acetylmuramoylalanyl-D-glutamate-2,6-diaminopimelate ligase	ATP + MESO__45__DIAMINOPIMELATE + UDP__45__AA__45__GLUTAMATE \rightleftharpoons ADP __124__Pi__124__ + UDP__45__AAGM__45__DIAMINOHEPTANEDIOATE	+
151	DEOXYINOPHOSPHOR-NA __45__RXN		__124__Pi__124__ + DEOXYINOSINE \rightleftharpoons DEOXY__45__RIBOSE__45__1P+ HYPOXANTHINE	+
152	ACETOHHBUTSYN_- _45__RXN	Acetolactate synthase	__2__45__OXOBUTANOATE + PYRUVATE \longrightarrow __2__45__ACETO__45__2__45__HYDROXY__45__BUTYRATE+ CARBON__45__DIOXIDE	+
153	UDPNACETYLGLUCOSAMINE- __45__RXN	UDP-N-acetylglucosamine-6-phosphate carboxyvinyltransferase	1- UDP__45__N__45__ACETYL__45__D__45__GLUCOSAMINE+ PHOSPHO__45__ENOL__45__PYRUVATE \longrightarrow __124__Pi__124__+ UDP__45__ACETYL__45__CARBOXYVINYL__45__GLUCOSAMINE	

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154	ADENYL_45_- KIN_45_RXN	Adenylate kinase	$ATP + AMP \longrightarrow 2 ADP$	
155	GLYOXII_45_- RXN	Hydroxyacylglutathione hydrolase	$WATER + S_45_LACTOYL_45_GLUTATHIONE \longrightarrow GLUTATHIONE + D_45_LACTATE$	
156	PPENTOMUT_45_- RXN	Phosphopentomutase	$RIBOSE_45_1P \rightleftharpoons RIBOSE_45_5P$	
157	NACGLCTrans_45_- RXN	Undecaprenyldiphospho- muramoylpentapeptide β-N- acetyl- glucosaminyltransferase	$UDP_45_N_45_ACETYL_45_D_45_GLUCOSAMINE + C5 \rightleftharpoons UDP + C6$	
158	CARBPSYN_45_- RXN	carbamoyl-phosphate synthetase (glutamine-hydrolysing)	$WATER + 2 ATP + GLN + HCO_3 \longrightarrow GLT + 2 ADP + CARBAMOYL_45_P + _{124}Pi_{124_}$	
159	DXS_45_RXN	NA	$PYRUVATE + GAP \longrightarrow CARBON_45_DIOXIDE + DEOXYXYLULOSE_45_5P$	
160	L_45_GLN_45_- FRUCT_45_- 6_45_P_45_- AMINOTrans_45_- RXN	Glucosamine-fructose-6-phosphate aminotransferase (isomerizing)	$GLN + FRUCTOSE_45_6P \longrightarrow GLT + D_45_GLUCOSAMINE_45_6_45_P$	
161	_3_45_- ISOPROPYLMALDEHYDROG- _45_RXN	3-isopropylmalate dehydrogenase	$NAD + _2_45_D_45_THREO_45_HYDROXY_45_3_45_CARBOXY_45_ISOCAPROATE + PROTON \rightleftharpoons NADH$	
162	SERINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Serine-tRNA ligase	$SER + _{124}SER_45_tRNAs_{124_} + ATP \longrightarrow PPI + AMP + _{124}Charged_45_SER_45_tRNAs_{124_}$	
163	HEMEOSYN_45_- RXN	heme o biosynthesis	$FARNESYL_45_PP + WATER \rightleftharpoons PPI + HEME_O$	
164	GLUTCYSLIG_45_- RXN	Glutamate-cysteine ligase	$GLT + ATP + CYS \longrightarrow _{124}Pi_{124_} + L_45_GAMMA_45_GLUTAMYL CYSTEINE + ADP$	

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165	GLYOHMETRANS_- _45_RXN	glycine hydroxymethyltransferase	SER + THF \rightleftharpoons METHYLENE_45_THF + WATER + GLY	
166	ACETYLORNTRANSAM_- _45_RXN	Acetylornithine aminotransferase	GLT+CPD_45_469 \longrightarrow N_45_ALPHA_45_ACETYLORNITHINE+_2_45_KETOGLUTARATE	
167	ACETYLGLUTKIN_- _45_RXN	Acetylglutamate kinase	ACETYL_45_GLU + ATP \longrightarrow N_45_ACETYL_45_GLUTAMYL_45_P + ADP	
168	RXN_45_7562	Acetylornithine aminotransferase	L_45_ORNITHINE + _2_45_KETOGLUTARATE \rightleftharpoons L_45_GLUTAMATE_GAMMA_45_SEMIALDEHYDE+GLT	
169	RXN_45_7800	NA	CPD_45_7100 \longrightarrow _2K_45_4CH3_45_PENTANOATE+CARBON_45_DIOXIDE	
170	_4_46_2_46_- _99_46_18_45_- RXN	DNA-(apurinic or apyrimidinic site) lyase	C_45_0_45_P_32_bond_32_3_38_apos_59_32_to_32_AP_32_site_32_124_DNA_45_containing_45_abasic_45_Sites_124_ \rightleftharpoons C_45_0_45_P_32_bond_32_3_38_apos_59_32_to_32_AP_32_site_32_124_DNA_45_containing_45_abasic_45_Sites_124_	
171	CYSTEINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Cysteine-tRNA ligase	_124_CYS_45_tRNAs_124_ + CYS + ATP \longrightarrow AMP + _124_Charged_45_CYS_45_tRNAs_124_ + PPI	
172	_2_46_7_46_3_- _46_9_45_RXN	Phosphoenolpyruvate-protein phosphatase	_124_Protein_45_Histidines_124_ + PHOSPHO_45_ENOL_45_PYRUVATE \rightleftharpoons PYRUVATE+_124_Protein_45_3_45_phospho_45_L_45_histidines_124_	
173	_1_46_17_46_- _1_46_2_45_- RXN	4-hydroxy-3-methylbut-2-enyl phosphate reductase	DELTA3_45_ISOPENTENYL_45_PP + WATER + NAD_45_P_45_OR_45_NOP \rightleftharpoons E_45_4_45_HYDROXY_45_3_45_METHYLBUT-2-ENYL_45_P_45_OR_45_NOP	
174	AMPSYN_45_RXN	Adenylosuccinate lyase	ADENYLOSUCC \longrightarrow FUM + AMP	
175	RXN_45_8675	Uroporphyrinogen-III methyltransferase	C-S_45_ADENOSYLMETHIONINE + CPD_45_9038 \longrightarrow ADENOSYL_45_HOMO_45_CYS+DIHYDROSIROHYDROCHLORIN	

Nº	Id	Name	Reaction Equation	SBO
176	ALANINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Alanine-tRNA ligase	L_45_ALPHA_45_ALANINE _124_ALA_45_tRNAs_124_ + ATP → AMP + _124_Charged_45_ALA_45_tRNAs_124_ + PPI	+
177	RXN0_45_1134	Pyruvate dehydrogenase (lipoamide)	PYRUVATE+_124_Pyruvate_45_dehydrogenase_45_lipoate_124_ → _1 CARBON_45_DIOXIDE	
178	RXN0_45_1133	Dihydrolipoamide S-acetyltransferase	_124_Pyruvate_45_dehydrogenase_45_acetylDHlipoyl_124_+ CO_45_A → ACETYL_45_COA +	
179	RXN0_45_1132	NA	_124_Pyruvate_45_dehydrogenase_45_dihydrolipoate_124_ _124_Pyruvate_45_dehydrogenase_45_dihydrolipoate_124_+ NAD → PROTON + _124_Pyruvate_45_dehydrogenase_45_lipoate_124_+ NADH	
180	TYROSINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Tyrosine-tRNA ligase	ATP + _124_TYR_45_tRNAs_124_ + TYR → PPI + AMP + _124_Charged_45_TYR_45_tRNAs_124_	
181	RXN0_45_5199	NA	_124_Pi_124_ + GUANOSINE ⇌ RIBOSE_45_1P + GUANINE	
182	FLAVONADPREDUCT- _45_RXN	Ferredoxin-NADP(+) reductase	NADP+_124_Reduced_45_flavodoxins_124_ ⇌ NADPH+ _124_Oxidized_45_flavodoxins_124_ + PROTON	
183	TETHYDPICSUCC_- _45_RXN	2,3,4,5-tetrahydropyridine-2-carboxylate N-succinyltransferase	SUC_45_COA+DELTA1_45_PIPERIDEINE_45_2_45_6_45_DICARBOXYLATE+ WATER → CO_45_A + N_45_SUCCINYL_45_2_45_AMINO_45_6_45_KETOPIMELATE	
184	_3_45_OXOACYL- _45_ACP_45_- REDUCT_45_RXN	3-oxoacyl-[acyl-carrier protein] reductase	NADPH + B_45_KETOACYL_45_ACP → NADP + OH_45_ACYL_45_ACP	
185	DIHYDROFOLATEREDUC- _45_RXN	Dihydrofolate reductase	DIHYDROFOLATE + NADPH → NADP + THF	

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186	THRESYN_45_- RXN	Threonine synthase	0_45_PHOSPHO_45_L_45_HOMOSERINE + WATER \longrightarrow THR + _124_Pi_124_	
187	_2_46_7_46_7- _46_60_45_RXN	2-C-methyl-D-erythritol cytidyltransferase	4-phosphate _2_45_C_45_METHYL_45_D_45_ERYTHRITOL_45_4_45_PHOSPHATE+ CTP \longrightarrow _4_45_CYTIDINE_45_5_45_DIPHOSPHO_45_2_45_C+ PPI	
188	DCTP_45_DEAM_- 45_RXN	dCTP deaminase	WATER + DCTP \longrightarrow DUTP + AMMONIA	
189	MALONYL_45_- ACPDECARBOX_- 45_RXN	NA	MALONYL_45_ACP \longrightarrow CARBON_45_DIOXIDE + ACETYL_45_ACP	
190	HOLO_45_ACP_- 45_SYNTH_45_- RXN	Holo-[acyl-carrier protein] synthase	CO_45_A+_124_apo_45_ACP_124_ \longrightarrow ACP+ PAP	
191	RIBOFLAVINSYNDEAMNA _45_RXN		WATER+DIAMINO_45_OH_45_PHOSPHORIBOSYLAMINO_45_PYR \longrightarrow CPD_45_60_45_+ AMMONIA	
192	RXN0_45_1147	NA	CO_45_A+_124_Oxo_45_glutarate_45_dehydro_45_suc_45_DH_45_li_45_+ _124_Oxo_45_glutarate_45_dehydrogenase_45_DH_45_lipoyl_124_	
193	TRYPSYN_45_- RXN	Tryptophan synthase	INDOLE_45_3_45_GLYCEROL_45_P + SER \rightleftharpoons TRP + GAP + WATER	
194	DUTP_45_- PYROP_45_RXN	dUTP pyrophosphatase	WATER + DUTP \longrightarrow PPI + DUMP	
195	RXN_45_7958	NA	ATP + PROPIONATE \rightleftharpoons PROPIONYL_45_P + ADP	
196	RXN_45_5985	NA	CPD_45_5662 \longrightarrow BIOTIN	
197	RXN_45_5984	NA	CPD_45_249+_124_Sulfurated_45_Sulfur_45_Acceptors_124_+ DETHIOBIOTIN \longrightarrow _124_Unsulfurated_45_Sulfur_45_Acceptors_124_+ CPD_45_5662	
198	RXN_45_2881	NA	FORMALDEHYDE + THF \longrightarrow WATER + METHYLENE_45_THF	

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199	METHIONYL- _45_TRNA_45- FORMYLTRANSFERASE- _45_RXN	Methionyl-tRNA formyltransferase	$\text{L_45_methionyl_45_tRNAfmet_124_} + \text{FORMYL_45_THF} \rightleftharpoons \text{L_45_methionyl_45_tRNAfmet_124_} + \text{THF}$	
200	DAHPSYN_45- _RXN	2-dehydro-3-deoxyphosphoheptonate aldolase	$\text{ERYTHROSE_45_4P} + \text{WATER} \rightarrow \text{PHOSPHO_45_ENOL_45_PYRUVATE} + \text{Pi_124_}$ $\text{D_45_ARABINO_45_HEPTULOSONATE_45_7_45_P}$	
201	ADENYLOSUCCINATE-adenylosuccinate synthetase _45_SYNTHASE- _45_RXN		$\text{GTP} + \text{IMP} + \text{L_45_ASPARTATE} \rightarrow \text{GDP} + \text{Pi_124_} + \text{ADENYLOSUCC}$	
202	RXN0_45_2661	NA	$\text{DNA_45_With_45_G_45_A_45_Mismatch_124_} \rightleftharpoons \text{DNA_45_}$	
203	HISTPRATPHYD- _45_RXN	Phosphoribosyl-ATP pyrophosphatase	$\text{PHOSPHORIBOSYL_45_ATP} + \text{WATER} \rightarrow \text{PPI} + \text{PHOSPHORIBOSYL_45_AMP}$	
204	RXN_45_6182	NA	$\text{ALPHA_45_GLC_45_6_45_P} \rightarrow \text{FRUCTOSE_45_6P}$	
205	RXN0_45_2141	NA	$\text{CIS_45_DELTA3_45_DECENOYL_45_ACP} + \text{MALONYL_45_ACP} \rightarrow \text{Cis_45_delta_45_3_45_decenoyl_45_ACPs_124_} + \text{ACP} + \text{CARBON_45_DIOXIDE}$ $\text{b_45_Keto_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_} + \text{BETA_45_KETO_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP}$	
206	_1_46_18_46- _1_46_2_45- _RXN	Ferredoxin-NADP(+) reductase	$\text{Reduced_45_ferredoxins_124_} + \text{NADP} \rightarrow \text{PROTON} + \text{NADPH} + \text{Oxidized_45_ferredoxins_124_}$	
207	RXN0_45_2142	NA	$\text{NADPH} + \text{b_45_Keto_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_} + \text{BETA_45_KETO_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP} \rightarrow \text{b_45_Keto_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_} + \text{BETA_45_HYDROXY_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP} + \text{NADP}$	

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208	RXN0_45_2145	NA	TRANS_45_DELTA3_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP+ NADPH+_124_Trans_45_D3_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_	
209	DETHIOBIOTIN- _45_SYN_45_ RXN	dethiobiotin synthetase	NADP+_124_Cis_45_Delta5_45_dodecenoyl_45_ACPs_124_ DIAMINONONANOATE + ATP + CARBON_45_DIOXIDE → ADP + _124_Pi_124_ + DETHIOBIOTIN	
210	ENOYL_45_ACP_- _45_REDUCT_45_ _NADPH_45_RXN	Enoyl-[acyl-carrier protein] reductase (NADPH, B-specific)	NADPH+TRANS_45_D2_45_ENOYL_45_ACP → _124_Saturated_45_Fatty_	
211	MANNPDEHYDROG_- _45_RXN	Mannitol-1-phosphate 5-dehydrogenase	ACYL_45_ACP + NADP	
212	CYT_45_ _UBIQUINOL_45_ _OXID_45_RXN	NA	MANNITOL_45_1P + NAD → NADH + FRUCTOSE_45_6P	
213	IMIDPHOSDEHYD_- _45_RXN	Imidazoleglycerol-phosphate dehydratase	2 UBIQUINOL_45_8 + OXYGEN_45_MOLECULE ⇌ 2 WATER + 2 UBIQUINONE_45_8	
214	ASPARTATE_45_ _SEMIALDEHYDE- _45_ _DEHYDROGENASE- _45_RXN	Aspartate-semialdehyde dehydrogenase	D_45_ERYTHRO_45_IMIDAZOLE_45_GLYCEROL_45_P → WATER+ IMIDAZOLE_45_ACETOL_45_P	
215	RXN_45_6282	NA	L_45_BETA_45_ASPARTYL_45_P + NADPH → _124_Pi_124_ + L_45_ASPARTATE_45_SEMIALDEHYDE + NADP	
216	DIAMINOPIMDECARB- _45_RXN	Diaminopimelate decarboxylase	CPD_45_5727+WATER → FORMYL_45_THF_45_GLU_45_N	
217	PRPPSYN_45_ RXN	ribose-phosphate diphosphokinase	MESO_45_DIAMINOPIMELATE → LYS + CARBON_45_DIOXIDE	
			ATP + RIBOSE_45_5P → AMP + PRPP	

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218	DEOXYRIBODIPYRIMIDINE- __45_- PHOTOLYASE- __45_RXN	Deoxyribodipyrimidine photolyase	__124_DNA__45_Cyclobuta__45_Dipyrimidines__124__ \rightleftharpoons __124_DNA__45_A	
219	RXNO__45_385	NA	WATER + DGTP \rightleftharpoons DGMP + PPI	
220	FPPSYN__45_RXN	geranyltranstransferase	DELTA3__45_ISOPENTENYL__45_PP + GERANYL__45_PP \rightleftharpoons FARNESYL__45_PP + PPI	
221	RXN__45_8001	NA	HISTIDINOL + 2 NAD \rightleftharpoons HIS + 2 PROTON + 2 NADH	
222	PANTOATE__45_- __BETA__45_- ALANINE__45_- LIG__45_RXN	Pantoate-β-alanine ligase	L__45_PANTOATE + B__45_ALANINE + ATP \longrightarrow PPI + PANTOTHENATE + AMP	
223	DAPASYN__45_- RXN	Adenosylmethionine-8-amino-7-oxononanoate aminotransferase	S__45_ADENOSYLMETHIONINE + __8__45_AMINO__45_7__45_OXONONANOATE \longrightarrow S__45_ADENOSYL__45_4__45_MET	
224	ACSERLY__45_- RXN	Cysteine synthase	DIAMINONONANOATE HS + ACETYLSERINE \longrightarrow ACET + CYS	
225	XANPRIBOSYLTRAN- __45_RXN	Xanthine-guanine phosphoribosyltrans-ferase	PRPP + XANTHINE \longrightarrow PPI + XANTHOSINE__45_5__45_PHOSPHATE	
226	RIB5PISOM__45_- RXN	Ribose 5-phosphate epimerase	RIBOSE__45_5P \rightleftharpoons RIBULOSE__45_5P	
227	THIOREDOXIN_- __45_REDUCT__45_- __NADPH__45_RXN	Thioredoxin reductase (NADPH)	NADP+__124_Red__45_Thioredoxin__124__ \longrightarrow PROTON+ __124_Ox__45_Thioredoxin__124__ + NADPH	
228	2__46_8__46_1- __46_6__45_RXN	biotin synthase	2 S__45_ADENOSYLMETHIONINE + DETHIOBIOTIN + __124_Sulfurated__45_Sulfur__45_Acceptors__124__ + CPD__45_249 \longrightarrow __124_Unsulfurated__45_Sulfur__45_Acceptors__124__ + BIOTIN + 2 MET + 2 CH33ADO	

Nº	Id	Name	Reaction Equation	SBO
229	RXN_45_3341	NA	$\text{NAD} + \text{CPD_45_2961} \longrightarrow \text{CARBON_45_DIOXIDE} + \text{RIBULOSE_45_5P} + \text{NADH}$	
230	SERINE_45_0_45_ACETTRAN_45_RXN	Serine O-acetyltransferase	$\text{SER} + \text{ACETYL_45_COA} \longrightarrow \text{CO_45_A} + \text{ACETYL SERINE}$	
231	HISTOLDEHYD_45_RXN	Histidinol dehydrogenase	$\text{HISTIDINOL} + \text{NAD} \longrightarrow \text{HISTIDINAL} + \text{NADH}$	
232	RIBOFLAVINSYNREDUN_45_RXN	NA	$\text{CPD_45_602} + \text{NADPH} + \text{PROTON} \longrightarrow \text{CPD_45_1086} + \text{NADP}$	
233	RXN_45_3742	NA	$\text{ATP} + \text{GLT} + \text{124_Folatepolyglutamate_45_n_124_} \longrightarrow \text{ADP} + \text{124_Pi_124_} + \text{124_Folatepolyglutamate_45_n_124_}$	
234	RXN0_45_3161	NA	$\text{S_32_rRNA} + \text{S_45_ADENOSYLMETHIONINE} \rightleftharpoons \text{ADENOSYL_45_HOMO_45_CYS} + \text{S_32_rRNA_32_containing_32_N2_45_methyluridine}$	
235	SHIKIMATE_45_KINASE_45_RXN	shikimate-kinase	$\text{SHIKIMATE} + \text{ATP} \longrightarrow \text{ADP} + \text{SHIKIMATE_45_5P}$	
236	METHENYLTHFCYCLOH_45_RXN	Methenyltetrahydrofolate cyclohydrolase	$\text{5_45_10_45_METHENYL_45_THF} + \text{WATER} \rightleftharpoons \text{10_45_FORMYL_45_THF}$	
237	PSERTRANSAM_45_RXN	Phosphoserine aminotransferase	$\text{GLT} + \text{3_45_P_45_HYDROXYPYRUVATE} \longrightarrow \text{3_45_P_45_SERINE} + \text{2_45_KETOGLUTARATE}$	
238	D_45_PPENTOMUT_45_RXN	Phosphopentomutase	$\text{DEOXY_45_RIBOSE_45_1P} \longrightarrow \text{DEOXY_45_RIBOSE_45_5P}$	
239	HYPOXANPRIBOSYLTRAN_45_RXN	Hypo xanthine phosphoribosyltransferase	$\text{PRPP} + \text{HYPOXANTHINE} \longrightarrow \text{IMP} + \text{PPI}$	
240	PHOSGLYPHOS_45_RXN	Phosphoglycerate kinase	$\text{G3P} + \text{ATP} \rightleftharpoons \text{DPG} + \text{ADP}$	

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241	PROLINE_45_- _45_TRNA_45_- LIGASE_45_RXN	Proline-tRNA ligase	ATP + _124_PRO_45_tRNAs_124_ + PRO → _124_Charged_45_PRO_45_tRNAs_124_+ AMP + PPI	
242	ASPARTATE_45_- _45_TRNA_45_- LIGASE_45_RXN	Aspartate-tRNA ligase	_124_ASP_45_tRNAs_124_ + ATP + L_45_ASPARTATE → _124_Charged_45_ASP_45_tRNAs_124_+ PPI + AMP	
243	_2PGADEHYDRAT_- _45_RXN	Phosphopyruvate hydratase	_2_45_PG ⇌ WATER + PHOSPHO_45_ENOL_45_PYRUVATE	
244	RXN0_45_2161	NA	ATP + _124_SEC_45_tRNAs_124_ + SER → AMP + PPI + _124_L_45_seryl_45_SEC_45_tRNAs_124_	
245	_6PGLUCONDEHYDROG _45_RXN	Phosphogluconate dehydrogenase (decarboxylating)	NAD_45_P_45_OR_45_NOP + CPD_45_2961 → CARBON_45_DIOXIDE + NADH_45_P_45_OR_45_NOP + RIBULOSE_45_5P	
246	GMKALT_45_RXN	T2-induced deoxynucleotide kinase	DGMP + ATP ⇌ ADP + DGDP	
247	CTPSYN_45_RXN	CTP synthetase	ATP + WATER + GLN + UTP → ADP + GLT + _124_Pi_124_ + CTP	
248	AMINOCYL_45_- _TRNA_45_- HYDROLASE_45_- RXN	Aminoacyl-tRNA hydrolase	WATER+_124_N_45_Substituted_45_Aminoacyl_45_tRNA_124_ ⇌ _12 _124_Some_45_tRNA_124_	
249	RXN_45_6401	NA	PANTOYL_45_LACTONE + B_45_ALANINE → PANTOTHENATE	
250	RXN_45_7933	NA	WATER+CPD_45_7224 → L_45_CITRULLINE+ ACET	
251	ACETYLORNDEACET_- _45_RXN	Acetylornithine deacetylase	WATER+N_45_ALPHA_45_ACETYLORNITHINE → ACET+ L_45_ORNITHINE	

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252	UROPORIIIMETHYLTRMSA- _45_RXN	NA	UROPORPHYRINOGEN_45_III + S_45_ADENOSYLMETHIONINE \longrightarrow CPD_45_9038 + ADENOSYL_45_HOMO_45_CYS	
253	NAD_45_SYNTH- _45_GLN_45_- _RXN	NAD(+) synthetase (glutamine- hydrolysing)	GLN + WATER + ATP + DEAMIDO_45_NAD \longrightarrow NAD + AMP + GLT + PPI	
254	HISTIDPHOS_45- _RXN	Histidinol-phosphatase	L_45_HISTIDINOL_45_P + WATER \longrightarrow _124_Pi_124_ + HISTIDINOL	
255	_1TRANSKETO_- _45_RXN	Transketolase	XYLULOSE_45_5_45_PHOSPHATE + RIBOSE_45_5P \rightleftharpoons GAP + D_45_SEDOHEPTULOSE_45_7_45_P	
256	FORMYLTHFGLUSYNTHNA _45_RXN	NA	GLT + FORMYL_45_THF_45_GLU_45_N + ATP \longrightarrow FORMYL_45_THF_45_GLU_45_N + _124_Pi_124_ + ADP	
257	NAD_45_KIN_- _45_RXN	NAD(+) kinase	ATP + NAD \longrightarrow ADP + NADP	
258	RXN_45_7001	NA	_124_Purine_45_Ribonucleosides_124_ + ARSENATE \longrightarrow RIBOSE_45_1_45_ARSENATE + _124_Purine_45_Bases_124_	
259	RXN_45_8972	UDP-N-acetylmuramoylalanyl-D- glutamate-2,6-diaminopimelate ligase	UDP_45_AA_45_GLUTAMATE + ATP + _124_Lysine_45_or_45_DAP_124_ \longrightarrow _124_UDP_45_N_45_acetylmura _124_Pi_124_ + ADP	
260	UDP_45_- _NACMURALGLDAPAALG- _45_RXN	UDP-N-acetylmuramoylalanyl-D- glutamyl-2,6-diaminopimelate-D-alanyl- D-alanine ligase	UDP_45_AAGM_45_DIAMINOHEPTANEDIOATE + D_45_ALA_45_D_45_ALA + ATP \rightleftharpoons _124_Pi_124_ + C1 + ADP	
261	RXNO_45_5234	NA	ALLO_45_THR \rightleftharpoons GLY + ACETALD	
262	GUANYL_45_- _KIN_45_RXN	Guanylate kinase	GMP + ATP \longrightarrow ADP + GDP	

Nº	Id	Name	Reaction Equation	SBO
263	RXN_45_8973	UDP-N-acetylmuramoylalanyl-D-glutamyl-2,6-diaminopimelate-D-alanyl-D-alanine ligase	ATP+_124_UDP_45_N_45_acetylmuramoyl_45_Tripeptide_124_+ D_45_ALA_45_D_45_ALA → _124_UDP_45_NAcMur_45_Peptides_124_+ _124_Pi_124_ + ADP	
264	RXN_45_8976	Undecaprenyldiphospho-muramoylpentapeptide β-N- acetyl-glucosaminyltransferase	C4+UDP_45_N_45_ACETYL_45_D_45_GLUCOSAMINE → CPD_45_7695+ UDP	
265	RXN_45_8975	Phospho-N-acetylmuramoyl-pentapeptide-transferase	UNDECAPRENYL_45_P + C3 → UMP + C4	
266	_2_46_7_46_7- _46_8_45_RXN	Polyribonucleotide nucleotidyltransferase	_124_General_45_RNA_45_Substrates_124_+ _124_Pi_124_ + RNA ⇌ _124_Nucleoside_45_Diphosphates_124_+ RNA+_124_General_45_RNA_45_Substrates_124_	
267	_3_46_5_46_1- _46_88_45_RXN	Peptide deformylase	WATER+FORMYL_45_L_45_METHIONYL_45_PEPTIDE ⇌ FORMATE+ METHIONYL_45_PEPTIDE	
268	SPERMIDINESYN_- _45_RXN	Spermidine synthase	S_45_ADENOSYLMETHIONINAMINE + PUTRESCINE → _5_45_METHYLTHIOADENOSINE+ SPERMIDINE	
269	UNDECAPRENYL_- _45_- _DIPHOSPHATASE_- _45_RXN	Undecaprenyl-diphosphatase	UNDECAPRENYL_45_DIPHOSPHATE + WATER → _124_Pi_124_ + UNDECAPRENYL_45_P	
270	ASPARAGINE_45- _45_TRNA_45- _LIGASE_45_- _RXN	Asparagine-tRNA ligase	ASN+ATP+_124_ASN_45_tRNAs_124_ → PPI+ AMP+_124_Charged_45_ASN_45_tRNAs_124_	
271	RXN0_45_5240	NA	D_45_ALANINE + PYRIDOXAL PHOSPHATE ⇌ PYRIDOXAMINE_45_5P+ PYRUVATE	

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272	SUCCINYLDIAMINOPIRUVATE- _45_RXN	trans-4-diaminopimelate ferase	aminotrans- GLT+N_45_SUCCINYLL_45_2_45_AMINO_45_6_45_KETOPIMELATE → 2_45_N_45_SUCCINYLL_45_2_45_6_45_DIAMINOPIMELATE	
273	ACETOLACTSYN_- _45_RXN	Acetolactate synthase	2 PYRUVATE → CARBON_45_DIOXIDE + 2_45_ACETO_45_LACTATE	
274	DIOHBUTANONEPSYN-NA _45_RXN		RIBULOSE_45_5P → FORMATE + DIHYDROXY_45_BUTANONE_45_P	
275	HOMOSERKIN_45- _RXN	Homoserine kinase	HOMO_45_SER+ATP → 0_45_PHOSPHO_45_L_45_HOMOSERINE+ ADP	
276	ACETOHBUTREDUCTOKSOM- _45_RXN	3-keto-acid reductoisomerase	NADPH+2_45_ACETO_45_2_45_HYDROXY_45_BUTYRATE → NADP+ _1_45_KETO_45_2_45_METHYLVALERATE	
277	_3PGAREARR_45- _RXN	Phosphoglycerate mutase	G3P ⇌ 2_45_PG	
278	RXN_45_7719	NA	NAD+_124_BCAA_45_dehydrogenase_45_DH_45_lipoyl_124_ → PROTON _124_BCAA_45_dehydrogenase_45_lipoyl_124_+ NADH	
279	N_45_- _ACETYLGLUTPREDUCTase _45_RXN	N-acetyl-γ-glutamyl-phosphate reductase	NADPH+N_45_ACETYL_45_GLUTAMYL_45_P → _124_Pi_124_+ NADP + CPD_45_469	
280	RXN_45_7716	NA	NAD+_124_Oxo_45_glutarate_45_dehydrogenase_45_DH_45_lipoyl_124_ → _124_Oxo_45_glutarate_45_dehydrogenase_45_lipoyl_124_+ PROTON	
281	TRNA_45_- _GUANINE_45_- _N7_45_45_- _METHYLTRANSFERASE- _45_RXN	tRNA (guanine-N7-)-methyltransferase	S_45_ADENOSYLMETHIONINE + _124_Some_45_tRNA_124_ ⇌ ADENOSYL_45_HOMO_45_CYS+ _124_tRNAs_45_with_45_N7_45_methyl_45_guanine_124_	
282	RXN0_45_2381	NA	INDOLE_45_3_45_GLYCEROL_45_P → GAP + INDOLE	

Nº	Id	Name	Reaction Equation	SBO
283	SHIKIMATE_- _45_5_45_- _DEHYDROGENASE- _45_RXN	Shikimate 5-dehydrogenase	_3_45_DEHYDRO_45_SHIKIMATE NADPH → SHIKIMATE + NADP	+
284	R343_45_RXN	Cob(II)yrinic acid a,c-diamide reductase	2 CPD_45_689+FMN → 2 CPD_45_694+FMNH2	
285	N_45_- _ACETYLTRANSFER- _45_RXN	Amino-acid N-acetyltransferase	ACETYL_45_COA + GLT → CO_45_A + ACETYL_45_GLU	+
286	_2_45_- _ISOPROPYLMALATESYN- _45_RXN	2-isopropylmalate synthase	WATER + ACETYL_45_COA + _2_45_KETO_45_ISOVALERATE → CO_45_A+ _3_45_CARBOXY_45_3_45_HYDROXY_45_ISOCAPROATE	+
287	NICONUCADENYLYLTRAN- _45_RXN	Nicotinate-nucleotide adenylyltransferase	NICOTINATE.NUCLEOTIDE + ATP → PPI + DEAMIDO_45_NAD	+
288	RXN_45_8991	3-isopropylmalate dehydratase	CPD_45_9451+WATER → _2_45_D_45_THREO_45_HYDROXY_45_3_45_CAR	
289	SUPEROX_45_- _DISMUT_45_RXN	Superoxide dismutase	2 PROTON+2 SUPER_45_OXIDE → HYDROGEN_45_PEROXIDE+ OXYGEN_45_MOLECULE	
290	DIAMINOPIMEPIM- _45_RXN	Diaminopimelate epimerase	LL_45_DIAMINOPIMELATE → MESO_45_DIAMINOPIMELATE	
291	PTAALT_45_RXN	NA	PROPIONYL_45_COA _124_Pi_124_ → CO_45_A PROPIONYL_45_P	+
292	_1_46_8_46_1- _46_4_45_RXN	NA	NAD+_124_Dihydro_45_Lipoyl_45_Proteins_124_ ⇌ _124_Lipoyl_4	
293	RXN_45_7919	NA	NADH + PROTON WATER+_124_2_45_hydroxyacyl_45_glutathiones_124_ ⇌ _124_2_4	
294	SULFATE_45_- _ADENYLYLTRANS- _45_RXN	Sulfate adenylyltransferase	GLUTATHIONE ATP + SULFATE ⇌ APS + PPI	

Nº	Id	Name	Reaction Equation	SBO
295	_3_45_- _ISOPROPYLMALISOM- _45_RXN	3-isopropylmalate dehydratase	WATER+_3_45_CARBOXY_45_3_45_HYDROXY_45_ISOCAPROATE \longrightarrow WATER+ CPD_45_9451	
296	DNA_45_- _LIGASE_45_- _NAD_43_45_- _RXN	DNA ligase (NAD+)	DEOXYNUCLEOTIDESM + NAD + _124_Deoxynucleotides_124_ \rightleftharpoons NICOTINAMIDE_NUCLEOTIDE+ _124_Deoxynucleotides_124_ + AMP	
297	DIHYDROXYISOVALDEHYDRO- _45_RXN	Hydroxy-acid dehydratase	DIOH_45_ISOVALERATE \longrightarrow WATER + _2_45_KETO_45_ISOVALERATE	
298	UDPNACETYLMURAMATEDEHYDRO- _45_RXN	UDP-N-acetylmuramate dehydrogenase	NADPH+UDP_45_ACETYL_45_CARBOXYVINYL_45_GLUCOSAMINE \longrightarrow UDP_45_1 NADP	
299	OHMETHYLBILANESYN- _45_RXN	Hydroxymethylbilane synthase	4 PORPHOBILINOGEN + WATER \longrightarrow 4 AMMONIA + HYDROXYMETHYLBILANE	
300	ADPREDUCT_45_- _RXN	NA	_124_Red_45_Thioredoxin_124_ + ADP \longrightarrow WATER + _124_Ox_45_Thioredoxin_124_ + DADP	
301	PRIBFAICARPISOM- _45_RXN	N-(5'-phospho-D-ribosylformimino)-5-amino-1-(5"-phosphoribosyl)-4-imidazole carboxamide isomerase	PHOSPHORIBOSYL_45_FORMIMINO_45_AICAR_45_P \longrightarrow PHOSPHORIBULOSYL_45_P	
302	ANTHRANSYN_45- _RXN	Anthranilate synthase	CHORISMATE + GLN \longrightarrow ANTHRANILATE + GLT + PYRUVATE	
303	_6PFRUCTPHOS_- _45_RXN	6-phosphofructokinase	ATP+FRUCTOSE_45_6P \longrightarrow FRUCTOSE_45_16_45_DIPHOSPHATE+ ADP	
304	RXN0_45_2382	NA	INDOLE + SER \longrightarrow TRP + WATER	
305	_2_46_3_46_1- _46_157_45_- _RXN	Glucosamine-1-phosphate acetyltransferase	N- ACETYL_45_COA + GLUCOSAMINE_45_1P \longrightarrow CO_45_A + N_45_ACETYL_45_D_45_GLUCOSAMINE_45_1_45_P	

Nº	Id	Name	Reaction Equation	SBO
306	2_46_4_46_1- _46_129_45_- _RXN	Peptidoglycan glycosyltransferase	124_Peptidoglycans_124_ + CPD_45_7695 → 124_Peptidoglycans_124_ + UNDECAPRENYL_45_DIPHOSPHATE	
307	ISPH2_45_- _RXN	NA	HYDROXY_45_METHYL_45_BUTENYL_45_DIP + PROTON+NADH_45_P_45_OR_45_NOP → DELTA3_45_ISOPENTENYL_45_PP- NAD_45_P_45_OR_45_NOP + WATER	
308	PEPTIDYLPROLYL- _45_ISOMERASE- _45_- _RXN	Peptidylprolyl isomerase	CPD_45_8624 ⇌ CPD_45_8625	
309	OROPRIBTRANS_- _45_- _RXN	Orotate phosphoribosyltransferase	PRPP + OROTATE → PPI + OROTIDINE_45_5_45_PHOSPHATE	
310	SULFITE_45_- _REDUCT_45_- _RXN	Sulfite reductase (NADPH)	3 NADPH + SO3 → 3 NADP + 3 WATER + HS	
311	2_46_5_46_1- _46_19_45_- _RXN	3-phosphoshikimate carboxyvinyltransferase	1- SHIKIMATE_45_5P + PHOSPHO_45_ENOL_45_PYRUVATE → 3_45_ENOLPYRUVYL_45_SHIKIMATE_124_Pi_124_	
312	PYRUVDEH_45_- _RXN	NA	CO_45_A + PYRUVATE + NAD → ACETYL_45_COA + CARBON_45_DIOXIDE + NADH	
313	FOLYLPOLYGLUTAMATE_45_- _RXN	Polypolylglutamate synthetase	ATP + THF_45_GLU_45_N + GLT → THF_45_GLU_45_N + ADP + 124_Pi_124_	
314	LEUCINE_45_- _45_TRNA_45_- _LIGASE_45_- _RXN	Leucine-tRNA ligase	LEU+ATP+124_LEU_45_tRNAs_124_ → AMP+ 124_Charged_45_LEU_45_tRNAs_124_ + PPI	
315	DIHYDLIPOXN_- _45_- _RXN	Dihydrolipoamide dehydrogenase	NAD+DIHYDROLIPOAMIDE ⇌ LIPOAMIDE+NADH	

Nº	Id	Name	Reaction Equation	SBO
316	RXN0_45_5268	NA	4 PROTON + OXYGEN_45_MOLECULE + 2_124_Ubiquinol _s _124_ → 2_124_Ubiquinone _s _124_ + 4 PROTON + 2 WATER	
317	_2OXOGLUTARATEDEHNA _45_RXN	NA	CO_45_A + _2_45_KETOGLUTARATE + NAD → SUC_45_COA + CARBON_45_DIOXIDE + NADH	
318	AICARTRANSFORM- _45_RXN	Phosphoribosylaminoimidazolecarboxamide formyltransferase	AICAR + _10_45_FORMYL_45_THF → THF + PHOSPHORIBOSYL_45_FORMAMIDO_45_CARBOXAMIDE	
319	GDPREDUCT_45- RXN	NA	GDP + _124_Red_45_Thioredoxin_124_ → DGDP + _124_Ox_45_Thioredoxin_124_ + WATER	
320	_2OXOGLUTDECARB- _45_RXN	Oxoglutarate dehydrogenase (lipoamide)	_124_Oxo_45_glutarate_45_dehydrogenase_45_lipoyl_124_ + _2_45_KETOGLUTARATE → _124_Oxo_45_glutarate_45_dehydro_45_suc CARBON_45_DIOXIDE	
321	RXN0_45_884	NA	PROTON + HYDROXY_45_METHYL_45_BUTENYL_45_DIP + NADH_45_P_45_OR_45_NOP → CPD_45_4211 + NAD_45_P_45_OR_45_NOP + WATER	
322	DXPREDISOM_45- RXN	NA	DEOXYXYLULOSE_45_5P + NADPH → _2_45_C_45_METHYL_45_D_45_ERYTHRITOL_45_4_45_PHOSPHA NADP	
323	RXN0_45_882	NA	_2C_45_METH_45_D_45_ERYTHRITOL_45_CYCLODIPHOSPHATE + _124_Protein_45_Dithiol _s _124_ → _124_Protein_45_Disulfide _s _124_ HYDROXY_45_METHYL_45_BUTENYL_45_DIP + WATER	
324	_2TRANSKETO_- _45_RXN	Transketolase	ERYTHROSE_45_4P + XYLULOSE_45_5_45_PHOSPHATE ⇌ GAP + FRUCTOSE_45_6P	
325	_3_46_1_46_- _13_46_1_45_- RXN	Exoribonuclease II	_124_General_45_RNA_45_Substrates_124_ + RNA ⇌ RNA + NUC_45_5_45_PHOSPHATE + _124_General_45_RNA_45_Substrates_124_	

Nº	Id	Name	Reaction Equation	SBO
326	FRUCTOSEPHOSPHO- _45_RXN	transport of fructose by PTS	FRU+_124_Protein_45_3_45_phospho_45_L_45_histidines_124_ \rightleftharpoons _124_Protein_45_Histidines_124_ + WATER	
327	_2_46_7_46_1- _46_148_45_- _RXN	4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol kinase	ATP+_4_45_CYTIDINE_45_5_45_DIPHOSPHO_45_2_45_C \longrightarrow _2_45_PHOSF ADP	
328	SAMDECARB_45_- _RXN	Adenosylmethionine decarboxylase	S_45_ADENOSYLMETHIONINE \longrightarrow S_45_ADENOSYLMETHIONINAMINE+ CARBON_45_DIOXIDE	
329	LYSINE_45_- _45_TRNA_45_- _LIGASE_45_RXN	Lysine-tRNA ligase	LYS + _124_LYS_45_tRNAs_124_ + ATP \longrightarrow _124_Charged_45_LYS_45_tRNAs_124_+ AMP + PPI	
330	_3_45_CH3- _45_2_45_- _OXOBUTANOATE- _45_OH_45_- _CH3_45_XFER_- _45_RXN	3-methyl-2-oxobutanoate hydroxymethyl-transferase	_2_45_KETO_45_ISOVALERATE + WATER + METHYLENE_45_THF \longrightarrow _2_45_DEHYDROPANTOATE+ THF	
331	RXN0_45_2582	NA	CPD_45_8533 \rightleftharpoons CPD_45_8532	
332	GAPOXNPHOSPHN_- _45_RXN	Glyceraldehyde 3-phosphate dehydroge-nase (phosphorylating)	GAP + NAD + _124_Pi_124_ \rightleftharpoons DPG + NADH	
333	RXN0_45_2581	NA	DNA_32_apurinic_32_or_32_apyrimidinic_32_40_AP_41_32_site_	
334	HISTCYCLOHYD_- _45_RXN	Phosphoribosyl-AMP cyclohydrolase	PHOSPHORIBOSYL_45_AMP + WATER \longrightarrow PHOSPHORIBOSYL_45_FORMIMINO_45_AICAR_45_P	
335	RXN0_45_2584	NA	DNA_32_with_32_uracil_32_due_32_to_32_misincorporation_32_or_	
336	UDP_45_- _NACMUR_45_- _ALA_45_LIG_- _45_RXN	UDP-N-acetylmuramate-alanine ligase	_124_DNA_45_with_45_Uracils_124_ \rightleftharpoons DNA_32_with_32_uracil_32 UDP_45_N_45_ACETYLMURAMATE + ATP + L_45_ALPHA_45_ALANINE \longrightarrow UDP_45_ACETYLMURAMOYL_45_ALA+ _124_Pi_124_ + ADP	

Nº	Id	Name	Reaction Equation	SBO
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5.1. Reaction RXN0_45_949

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE ASSOCIATION: (BU269_lipA)PROTEIN ASSOCIATION: (Lipoyl synthase (Lipoic acid synthase) (Lipoate synthase) (Sulfur insertion protein lipA) (Lip-syn) (LS)//Lipoyl synthase)SUBSYSTEM: lipoate biosynthesis and incorporation IPROTEIN CLASS: NASIDE: CH33ADOSIDE: METSIDE: S_45_ADENOSYLMETHIONINESIDE: CPD_45_7046GENERIC: trueTYPE: macroHOLE: false

Reaction equation

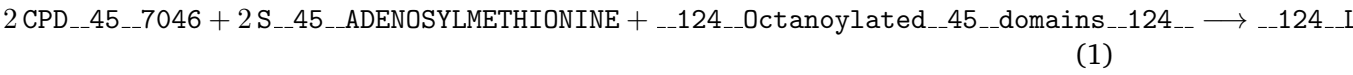


Table 5: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CPD_-45_-7046	S2-	_124_-Lipoylated_45_domains_124_	lipoylated domains
S_45_-ADENOSYLMETHIONINE	S-adenosyl-L-methionine	MET	L-methionine
124-Octanoylated_45_domains_124_	an octanoylated domain	CH33ADO	5'-deoxyadenosine

Kinetic Law

v1 = not specified (2)

5.2. Reaction INORGPYROPHOSPHAT_45_RXN

This is a reversible reaction of two reactants forming one product.

Name Inorganic pyrophosphatase

Notes GENE_ASSOCIATION: (BU088_ppa)PROTEIN_ASSOCIATION: (Inorganic pyrophosphatase (Pyrophosphate phospho- hydrolase) (PPase)//INORGPYROPHOSPHAT-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 3.6.1.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation

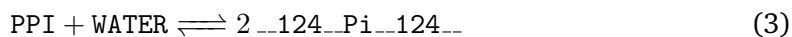


Table 6: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PPI	diphosphate	__124- __Pi_ __124__	phosphate
WATER	H2O		

Kinetic Law

$$v_2 = \text{not specified} \quad (4)$$

5.3. Reaction DEOXYADENPHOSPHOR__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of adenine, hypoxanthine, and their nucleosidesSUBSYSTEM: purine deoxyribonucleosides degradationPROTEIN_CLASS: NASIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 7: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_ __Pi_ __124__	phosphate	DEOXY- __45_ RIBOSE- __45__1P	deoxyribose-1- phosphate
DEOXYADENOSINE	deoxyadenosine	ADENINE	adenine

Kinetic Law

$$v_3 = \text{not specified} \quad (6)$$

5.4. Reaction RXN__45__22

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE ASSOCIATION: (BU051_argH)PROTEIN ASSOCIATION: (Argininosuccinate lyase (Arginosuccinase) (ASAL)//ARGSUCCINLYA-RXN//Argininosuccinate lyase)SUBSYSTEM: canavanine biosynthesisPROTEIN_CLASS: 4.3.2.1SIDE: FUM-GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 8: Overview of participating species.

Id	Reactants Name	Id	Products Name
CANAVANINOSUCCINATE	canavanine succinate	CANAVANINE	canavanine
		FUM	fumarate

Kinetic Law

$$v_4 = \text{not specified} \quad (8)$$

5.5. Reaction RXN0_45_1342

This is a reversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU132_queA)PROTEIN_ASSOCIATION: (S-adenosylmethionine:tRNA
ribosyltransferase-isomerase (Queuosine biosynthesis protein queA))SUBSYSTEM:
NAPROTEIN_CLASS: NAGENERIC: trueTYPE: macroHOLE: false

Reaction equation

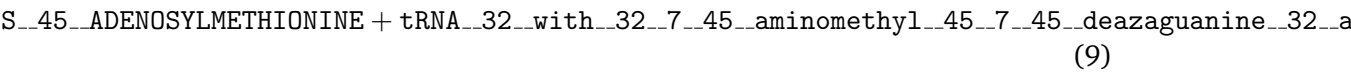


Table 9: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S_45_	S-adenosyl-L-	ADENINE	adenine
_ADENOSYLMETHIONINE			
tRNA-	NA	MET	L-methionine
32			
with			
_32_7-			
45			
_aminomethyl-			
_45_7-			
45			
_deazaguanine-			
32			
_at-			
32			
_position-			
_32_34			
		tRNA-	NA
		32	
		_with-	
		32	
		_epoxyqueuosine-	
		32	
		_at-	
		32	
		_position-	
		_32_34	

Reactants		Products	
Id	Name	Id	Name

Kinetic Law

$$v_5 = \text{not specified} \quad (10)$$

5.6. Reaction ACETOLACTREDUCTOISOM__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name Ketol-acid reductoisomerase

Notes GENE_ASSOCIATION: (BU599_ilvC)PROTEIN_ASSOCIATION: (Ketol-acid reductoisomerase (Acetohydroxy-acid isomeroeductase) (Alpha-keto-beta-hydroxylacil reductoisomerase)//ACETOLACTREDUCTOISOM-RXN//ACETOHBUTREDUCTOISOM-RXN//Ketol-acid reductoisomerase)SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: valine biosynthesisPROTEIN_CLASS: 1.1.1.86COFACTOR: NADPHCOFACTOR: NADPSIDE: PROTONSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

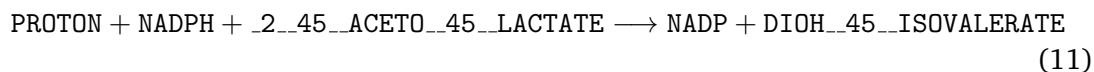


Table 10: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROTON	H+	NADP	NADP+
NADPH	NADPH	DIOH-	2,3-dihydroxy-
		45-	isovalerate
_2_45_-	2-acetolactate	_ISOVALERATE	
_ACETO-			
45-			
_LACTATE			

Kinetic Law

$$v_6 = \text{not specified} \quad (12)$$

5.7. Reaction `_6PGLUCONOLACT__45__RXN`

This is an irreversible reaction of two reactants forming one product.

Name 6-phosphogluconolactonase

Notes GENE_ASSOCIATION: (BU293_pgl)PROTEIN_ASSOCIATION: (6-phosphogluconolactonase (6-P-gluconolactonase)//6PGLUCONOLACT-RXN//6-phosphogluconolactonase)SUB-SYSTEM: formaldehyde oxidation ISUBSYSTEM: pentose phosphate pathwaySUB-SYSTEM: pentose phosphate pathway (oxidative branch)PROTEIN_CLASS: 3.1.1.31SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

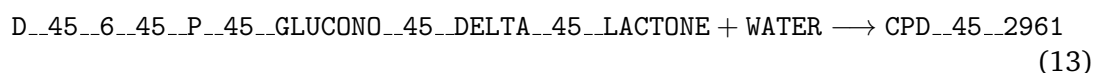


Table 11: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
D__45_- _6__45_- _P__45_- _GLUCONO- __45_- _DELTA- __45_- _LACTONE WATER	D-glucono-- δ-lactone- 6-phosphate H2O	CPD_- _45_- _2961	6-phospho-D- gluconate

Kinetic Law

$$v_7 = \text{not specified} \quad (14)$$

5.8. Reaction `CHORISMATEMUT__45__RXN`

This is an irreversible reaction of one reactant forming one product.

Name Chorismate mutase

Notes GENE_ASSOCIATION: (BU392_pheA)PROTEIN_ASSOCIATION: (P-protein [Includes: Chorismate mutase (CM); Prephenate dehydratase (PDT)]//CHORISMATEMUT-RXN//PREPHENATEDEHYDRAT-RXN//Chorismate mutase//Prephenate dehydratase

)SUBSYSTEM: phenylalanine biosynthesis IPROTEIN_CLASS: 5.4.99.5GENERIC: falseTYPE: smallHOLE: false

Reaction equation

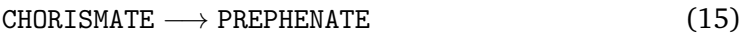


Table 12: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CHORISMATE	chorismate	PREPHENATE	prephenate

Kinetic Law

$v_8 = \text{not specified}$ (16)

5.9. Reaction TRNA_45_PSEUDOURIDINE_45_SYNTHASE_45_I_45_RXN

This is a reversible reaction of one reactant forming one product.

Name tRNA-pseudouridine synthase I

Notes GENE_ASSOCIATION: (BU375_truB) or (BU199_truA)PROTEIN_ASSOCIATION: (tRNA pseudouridine synthase B (tRNA pseudouridine 55 synthase) (Psi55 synthase) (tRNA-uridine isomerase) (tRNA pseudouridylate synthase)) or (tRNA pseudouridine synthase A (tRNA-uridine isomerase I) (tRNA pseudouridylate synthase I)//TRNA-PSEUDOURIDINE-SYNTHASE-I-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 5.4.99.12GENERIC: falseTYPE: macroHOLE: false

Reaction equation

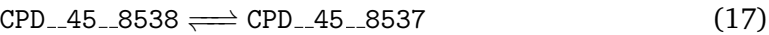


Table 13: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CPD_45_8538	tRNA uridine	CPD_45_8537	tRNA pseudouridine

Kinetic Law

$$v_9 = \text{not specified} \quad (18)$$

5.10. Reaction `DEPHOSPHOCOAKIN__45__RXN`

This is an irreversible reaction of two reactants forming two products.

Name Dephospho-CoA kinase

Notes GENE_ASSOCIATION: (BU203_coaE)PROTEIN_ASSOCIATION: (Dephospho-CoA kinase (Dephosphocoenzyme A kinase)//DEPHOSPHOCOAKIN-RXN//Dephospho-CoA kinase)SUBSYSTEM: coenzyme A biosynthesisPROTEIN_CLASS: 2.7.1.24CO-FACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: small-HOLE: false

Reaction equation

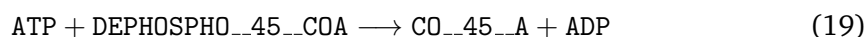


Table 14: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	CO__45_- _A	coenzyme A
DEPHOSPHO-dephospho-CoA __45_- _COA		ADP	ADP

Kinetic Law

$$v_{10} = \text{not specified} \quad (20)$$

5.11. Reaction `_1__46__11__46__1__46__15__45__RXN`

This is a reversible reaction of two reactants forming three products.

Name Peroxiredoxin

Notes GENE_ASSOCIATION: (BU182)PROTEIN_ASSOCIATION: (Probable peroxiredoxin (Thioredoxin reductase))SUBSYSTEM: NAPROTEIN_CLASS: 1.11.1.15GENERIC: trueTYPE: smallHOLE: false

Reaction equation

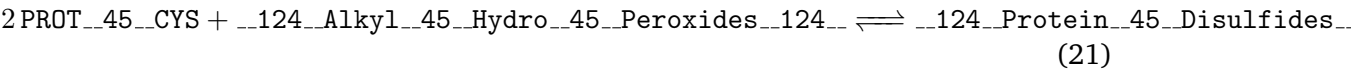


Table 15: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROT_45_CYS	a protein L-cysteine	_124_Protein_45_Disulfides_124_	a protein disulfide
_124_Alkyl_45_Hydro_45_Peroxides_124_	an alkylhydroperoxide	_124_Alcohols_124_	an alcohol
		WATER	H2O

Kinetic Law

v_{11} = not specified

(22)

5.12. Reaction PGLUCISOM_45_RXN

This is a reversible reaction of one reactant forming one product.

Name Glucose-6-phosphate isomerase

Notes GENE_ASSOCIATION: (BU573_pgi)PROTEIN_ASSOCIATION: (Glucose-6-phosphate isomerase (GPI) (Phosphoglucose isomerase) (PGI) (Phosphohexose isomerase) (PHI)//PGLUCISOM-RXN//Glucose-6-phosphate isomerase)SUBSYSTEM: glycolysis ISUBSYSTEM: formaldehyde oxidation ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 5.3.1.9GENERIC: falseTYPE: smallHOLE: false

Reaction equation

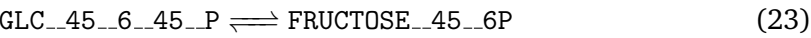


Table 16: Overview of participating species.

Id	Reactants Name	Id	Products Name
GLC_45_6_45_P	β-D-glucose-6-phosphate	FRUCTOSE_45_6P	fructose-6-phosphate

Kinetic Law

$$v_{12} = \text{not specified} \quad (24)$$

5.13. Reaction RXN0_45_947

This is an irreversible reaction of three reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU268_lipB) PROTEIN ASSOCIATION: (Octanoyltransferase (Octanoyl-[acyl-carrier-protein]- protein N-octanoyltransferase) (Lipoyl/octanoyl transferase) (Lipoate- protein ligase B)) SUBSYSTEM: lipoate biosynthesis and incorporation IPROTEIN_CLASS: NASIDE: _124_Non_45_lipoylated_45_domains_124_SIDE: ACPGENERIC: true TYPE: macro HOLE: false

Reaction equation

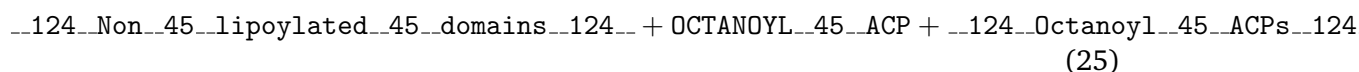


Table 17: Overview of participating species.

Id	Reactants Name	Id	Products Name
_124_Non_45_lipoylated_45_domains_124_	a non-lipoylated apo domain	ACP	a holo-[acp]

Reactants		Products	
Id	Name	Id	Name
OCTANOYL- __45_- _ACP	octanoyl-ACP	__124_- _Octanoyl- __45_- _domains- __124__	an octanoylated domain
__124_- _Octanoyl- __45_- _ACPs- _124__	an octanoyl-[acp]		

Kinetic Law

$$v_{13} = \text{not specified} \quad (26)$$

5.14. Reaction DIHYDROFOLATESYNTH__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name dihydrofolate synthetase

Notes GENE_ASSOCIATION: (BU167_folC)PROTEIN_ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolylpolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: tetrahydrofolate biosynthesis IISUBSYSTEM: formylTHF biosynthesis IIPROTEIN_CLASS: 6.3.2.12COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: GLTSIDE: ATPGENERIC: falseTYPE: small-HOLE: false

Reaction equation

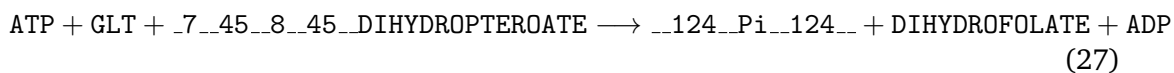


Table 18: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	__124- __Pi__ _124__	phosphate
GLT _7_45_ _8_45_ _DIHYDROPTEROATE	L-glutamate 7,8- dihydropteroate	DIHYDROFOLATE ADP	7,8-dihydrofolate ADP

Kinetic Law

$$v_{14} = \text{not specified} \quad (28)$$

5.15. Reaction HOMOCYSMET__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name 5-methyltetrahydropteroyltriglutamate–homocysteine S-methyltransferase

Notes GENE_ASSOCIATION: (BU030_metE)PROTEIN_ASSOCIATION: (5-methyltetrahydropteroyltriglutamate–homocysteine methyltransferase (Methionine synthase, vitamin-B12 independent isozyme) (Cobalamin-independent methionine synthase)//HOMOCYSMET-RXN)SUB-SYSTEM: Methionine cycle IISUBSYSTEM: S-adenosyl-L-methionine cyclePROTEIN_CLASS: 2.1.1.14SIDE: CPD__45__1301SIDE: CPD__45__1302GENERIC: falseTYPE: smallHOLE: false

Reaction equation

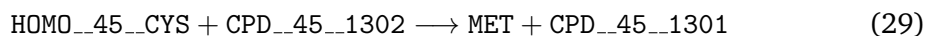


Table 19: Overview of participating species.

Id	Reactants Name	Id	Products Name
HOMO_ _45_CYS	L-homocysteine	MET	L-methionine
CPD_ _45_ _1302	5- methyltetrahydropteroyltri- L-glutamate	CPD_ _45_ _1301	tetrahydropteroyltri- L-glutamate

Kinetic Law

$$v_{15} = \text{not specified} \quad (30)$$

5.16. Reaction F16ALDOLASE__45__RXN

This is a reversible reaction of one reactant forming two products.

Name Fructose-bisphosphate aldolase

Notes GENE_ASSOCIATION: (BU451_fbaA)PROTEIN_ASSOCIATION: (Fructose-bisphosphate aldolase class 2 (Fructose- bisphosphate aldolase class II) (FBP aldolase)//F16ALDOLASE-RXN//Fructose-bisphosphate aldolase)SUBSYSTEM: glycolysis ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypass-SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 4.1.2.13GENERIC: falseTYPE: smallHOLE: false

Reaction equation

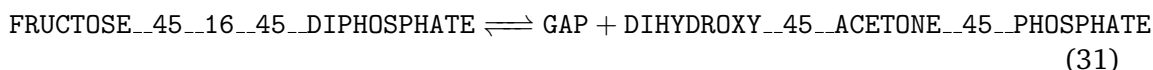


Table 20: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FRUCTOSE__45__16__45__DIPHOSPHATE	fructose-1,6-bisphosphate	GAP	D-glyceraldehyde-3-phosphate
		DIHYDROXY__45__ACETONE__45__PHOSPHATE	dihydroxy-acetone phosphate

Kinetic Law

$$v_{16} = \text{not specified} \quad (32)$$

5.17. Reaction 2 46 3 46 1 46 181 45 RXN

This is a reversible reaction of three reactants forming two products.

Name Lipoyl(octanoyl) transferase

Notes GENE_ASSOCIATION: (BU268_lipB)PROTEIN_ASSOCIATION: (Octanoyltransferase (Octanoyl-[acyl-carrier-protein]- protein N-octanoyltransferase) (Lipoyl/octanoyl transferase) (Lipoate- protein ligase B))SUBSYSTEM: NAPROTEIN_CLASS: 2.3.1.181GENERIC: trueTYPE: macroHOLE: false

Reaction equation

$$\text{--124--General--45--Protein--45--Substrates--124--} + \text{OCTANOYL--45--ACP} + \text{--124--Octanoyl--45--ACPs} \quad (33)$$

Table 21: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- _General- __45_- _Protein- __45_- _Substrates- __124__	a protein	__124_- _Protein- __45_- __45_- __45_- _octanoyl- __45_- _lysines- __124__	a protein-N-6-octanoyl-lysine
OCTANOYL- __45_- _ACP __124_- _Octanoyl- __45_- _ACPs_- __124__	octanoyl-ACP an octanoyl-[acp]	ACP	a holo-[acp]

Kinetic Law

$$v_{17} = \text{not specified} \quad (34)$$

5.18. Reaction UDPREDUCT__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA)PROTEIN_ASSOCIATION:
 (Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)
 or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesPROTEIN_CLASS: 1.17.4.1COFACTOR: __124__Red__45__Thioredoxin__124__Ox__45__Thioredoxin__124__SIDE: WATERSIDE: __124__Red__45__Thioredoxin__124__SIDE: __124__Ox__45__Thioredoxin__124__GENERIC: trueTYPE: macroHOLE: false

Reaction equation

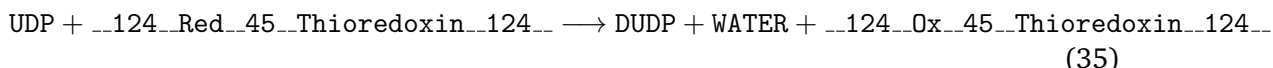


Table 22: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UDP	UDP	DUDP	dUDP
__124__Red__45__Thioredoxin__124__	a reduced thioredoxin	WATER	H2O
		__124__Ox__45__Thioredoxin__124__	an oxidized thioredoxin

Kinetic Law

$$v_{18} = \text{not specified} \quad (36)$$

5.19. Reaction METHYLENETHFDEHYDROG__45__NADP__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Methylenetetrahydrofolate dehydrogenase (NADP+)

Notes GENE_ASSOCIATION: (BU486_fold)PROTEIN_ASSOCIATION: (Bifunctional protein fold [Includes: Methylenetetrahydrofolate dehydrogenase ; Methenyltetrahydrofolate cyclohydrolase]//METHENYLTHFCYCLOHYDRO-RXN//METHYLENETHFDEHYDROG-NADP-RXN//Methenyltetrahydrofolate cyclohydrolase)SUBSYSTEM: reductive acetyl coenzyme A pathwaySUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: formaldehyde oxidation V (tetrahydrofolate pathway)SUBSYSTEM: folate transformation-sPROTEIN_CLASS: 1.5.1.5COFACTOR: NADPHCOFACTOR: NADPSIDE: NADPH-SIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

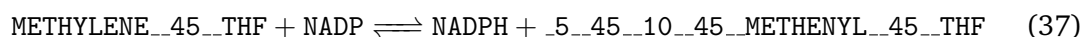


Table 23: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
METHYLENE-5,10-methylene- __45__- _THF		NADPH	NADPH
NADP	NADP+	5__45__10__45__ _METHENYL- __45__- _THF	5,10-methenyltetrahydrofolate

Kinetic Law

$$v_{19} = \text{not specified} \quad (38)$$

5.20. Reaction PRAISOM__45__RXN

This is an irreversible reaction of one reactant forming one product.

Name Phosphoribosylanthranilate isomerase

Notes GENE ASSOCIATION: (BU279_trpC)PROTEIN ASSOCIATION: (Tryptophan biosynthesis protein trpCF [Includes: Indole-3-glycerol phosphate synthase (IGPS); N-(5'-phospho- ribosyl)anthranilate isomerase (PRAI)]//IGPSYN-RXN//PRAISOM-RXN)SUBSYSTEM: tryptophan biosynthesisPROTEIN_CLASS: 5.3.1.24GENERIC: false-
TYPE: smallHOLE: false

Reaction equation

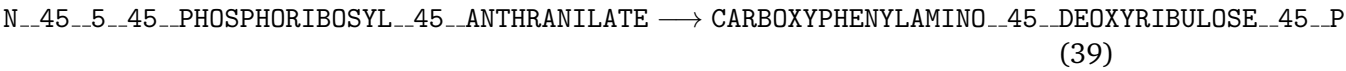


Table 24: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
N_45_5_45_	N-(5'-phosphoribosyl)-anthranilate	CARBOXYPHENYLAMINO_45_	carboxyphenylamino-1-deoxyribulose-5'-phosphate

Kinetic Law

$$v_{20} = \text{not specified} \quad (40)$$

5.21. Reaction 1_46_8_46_4_46_8_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name Phosphoadenylyl-sulfate reductase (thioredoxin)

Notes GENE ASSOCIATION: (BU426_cysH)PROTEIN ASSOCIATION: (Phosphoadenosine phosphosulfate reductase (PAPS reductase, thioredoxin dependent) (PAdoPS reductase) (3'- phosphoadenylylsulfate reductase) (PAPS sulfotransferase)//1.8.4.8-RXN)SUBSYSTEM: sulfate reduction I (assimilatory)SUBSYSTEM: superpathway of cysteine biosynthesisPROTEIN_CLASS: 1.8.4.8COFACTOR: PAPCOFACTOR: _124_Red_45_Thioredoxin_124_Ox_45_Thioredoxin_124_COFACTOR: PAPSSIDE: PAPSIDE: _124_Red_45_Thioredoxin_124_Ox_45_Thioredoxin_124_GENERIC: trueTYPE: macroHOLE: false

Reaction equation

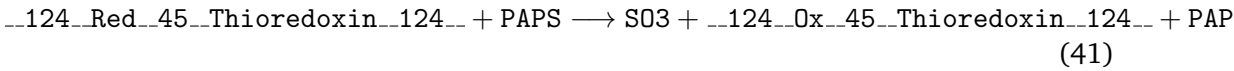


Table 25: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- __Red- __45- __Thioredoxin- __124__	a reduced thiore- doxin	S03	sulfite
PAPS	phosphoadenosine- 5'-phosphosulfate	__124- __0x- __45- __Thioredoxin- __124__	an oxidized thioredoxin
		PAP	adenosine-3',5'- bisphosphate

Kinetic Law

$$v_{21} = \text{not specified}$$

(42)

5.22. Reaction DISULFOXRED__45__RXN

This is a reversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU430_dsbA)PROTEIN_ASSOCIATION: (Thiol:disulfide interchange protein dsbA precursor)SUBSYSTEM: NAPROTEIN_CLASS: NAGENERIC: trueTYPE: macroHOLE: false

Reaction equation

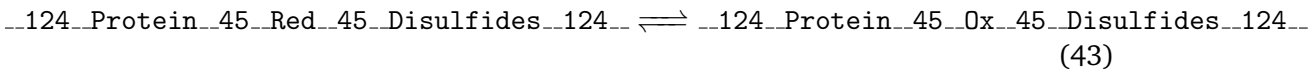


Table 26: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _Protein- __45_- _Red- __45_- _Disulfides- __124__	a protein with reduced sulfide groups	__124_- _Protein- __45_- _Ox- __45_- _Disulfides- __124__	a protein with oxidized disulfide bonds

Kinetic Law

$$v_{22} = \text{not specified} \quad (44)$$

5.23. Reaction RIBULP3EPIM__45__RXN

This is a reversible reaction of one reactant forming one product.

Name ribulose phosphate 3-epimerase

Notes GENE_ASSOCIATION: (BU537_rpe)PROTEIN_ASSOCIATION: (Ribulose-phosphate 3-epimerase (Pentose-5-phosphate 3- epimerase) (PPE) (R5P3E)//RIBULP3EPIM-RXN//Ribulose-phosphate 3-epimerase)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (partial)SUBSYSTEM: pentose phosphate pathway (non-oxidative branch)SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 5.1.3.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation

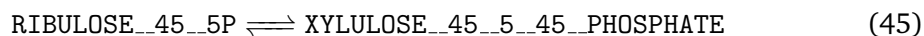


Table 27: Overview of participating species.

Id	Reactants Name	Id	Products Name
RIBULOSE- __45__5P	D-ribulose-5- phosphate	XYLULOSE- __45__5- __45_- _PHOSPHATE	D-xylulose-5- phosphate

Kinetic Law

$$v_{23} = \text{not specified} \quad (46)$$

5.24. Reaction

RRNA_45_ADENINE_45_N6_45_45_METHYLTRANSFERASE_45_RXN

This is a reversible reaction of three reactants forming two products.

Name rRNA (adenine-N6-)-methyltransferase

Notes GENE_ASSOCIATION: (BU141_ksgA)PROTEIN_ASSOCIATION: (Dimethyladenosine transferase (S-adenosylmethionine-6-N', N'-adenosyl(rRNA) dimethyltransferase) (16S rRNA dimethylase) (High level kasugamycin resistance protein ksgA) (Kasugamycin dimethyltransferase))SUBSYSTEM: NAPROTEIN_CLASS: 2.1.1.48COFACTOR: ADENOSYL_45_HOMO_45_CYS COFACTOR: S_45_ADENOSYLMETHIONINEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

$$_124_rRNAs_124_ + _124_General_45_rRNA_45_Substrates_124_ + S_45_ADENOSYLMETHIONINE \rightleftharpoons _124_ADENOSYLMETHIONINE_45_rRNAs_124_ + _124_METHYLADENINE_45_rRNAs_124_ \quad (47)$$

Table 28: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
_124_rRNAs_124_	rRNA	ADENOSYL_45_HOMO_45_CYS	S-adenosyl-L-homocysteine
_124_General_45_rRNA_45_Substrates_124_	an rRNA	_124_N6_45_Methyladenine_45_containing_45_rRNAs_124_	rRNA containing N6-methyladenine
S_45_ADENOSYLMETHIONINE	S-adenosyl-L-methionine		

Kinetic Law

$$v_{24} = \text{not specified} \quad (48)$$

5.25. Reaction GUANPHOSPHOR__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Guanosine phosphorylase

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.4.2.15SIDE: RIBOSE__45__1PSIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 29: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__Pi__124__	phosphate	GUANINE	guanine
GUANOSINE	guanosine	RIBOSE__45__1P	ribose-1-phosphate

Kinetic Law

$$v_{25} = \text{not specified} \quad (50)$$

5.26. Reaction GLYCINE__45____45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Glycine-tRNA ligase

Notes GENE_ASSOCIATION: (BU135_glyS) or (BU136_glyQ)PROTEIN_ASSOCIATION: (Glycyl-tRNA synthetase beta chain (Glycine-tRNA ligase beta chain) (GlyRS)//GLYCINE-TRNA-LIGASE-RXN//Glycine-tRNA ligase) or (Glycyl-tRNA synthetase alpha chain

(Glycine-tRNA ligase alpha chain) (GlyRS)//GLYCINE-TRNA-LIGASE-RXN//Glycine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.14CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

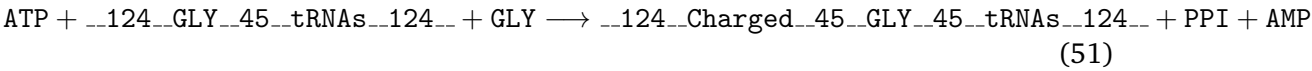


Table 30: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124__- _Charged- __45__- _GLY- __45__- _tRNAs_- _124__	glycyl-tRNAgly
__124__- _GLY- __45__- _tRNAs_- _124__	tRNAgly	PPI	diphosphate
GLY	glycine	AMP	AMP

Kinetic Law

v26 = not specified (52)

5.27. Reaction GLUTRACE__45__RXN

This is an irreversible reaction of one reactant forming one product.

Name Glutamate racemase

Notes GENE_ASSOCIATION: (BU554_murI)PROTEIN_ASSOCIATION: (Glutamate racemase//GLUTRACE RXN//Glutamate racemase)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 5.1.1.3GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 31: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GLT	L-glutamate	D_45_- _GLT	D-glutamate

Kinetic Law

$$v_{27} = \text{not specified} \quad (54)$$

5.28. Reaction RIBOFLAVINKIN_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Riboflavin kinase

Notes GENE_ASSOCIATION: (BU150_ribF)PROTEIN_ASSOCIATION: (Riboflavin biosynthesis protein ribF [Includes: Riboflavin kinase (Flavokinase); FMN adenylyltransferase (FAD pyrophosphorylase) (FAD synthetase)]//FADSYN-RXN//RIBOFLAVINKIN-RXN//Riboflavin kinase//FAD synthetase)SUBSYSTEM: 5,6-dimethylbenzimidazole biosynthesisSUBSYSTEM: flavin biosynthesisPROTEIN_CLASS: 2.7.1.26COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

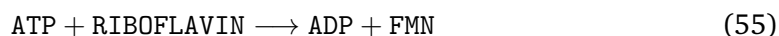


Table 32: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
RIBOFLAVIN	riboflavin	FMN	FMN

Kinetic Law

$$v_{28} = \text{not specified} \quad (56)$$

5.29. Reaction `_1_46_6_46_99_46_5_45_RXN`

This is a reversible reaction of three reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU158_nuoF) or (BU155_nuoB) or (BU164_nuoL) or (BU159_nuoG) or (BU160_nuoH) or (BU154_nuoA) or (BU156_nuoCD) or (BU166_nuoN) or (BU157_nuoE) or (BU163_nuoK) or (BU161_nuoI) or (BU165_nuoM) or (BU162_nuoJ) PROTEIN_ASSOCIATION: (NADH-quinone oxidoreductase subunit F (NADH dehydrogenase I subunit F) (NDH-1 subunit F)) or (NADH-quinone oxidoreductase subunit B (NADH dehydrogenase I subunit B) (NDH-1 subunit B)) or (NADH-quinone oxidoreductase subunit L (NADH dehydrogenase I subunit L) (NDH-1 subunit L)) or (NADH-quinone oxidoreductase subunit G (NADH dehydrogenase I subunit G) (NDH-1 subunit G)) or (NADH-quinone oxidoreductase subunit H (NADH dehydrogenase I subunit H) (NDH-1 subunit H)) or (NADH-quinone oxidoreductase subunit A (NADH dehydrogenase I subunit A) (NDH-1 subunit A)) or (NADH-quinone oxidoreductase subunit C/D (NADH dehydrogenase I subunit C/D) (NDH-1 subunit C/D)) or (NADH-quinone oxidoreductase subunit N (NADH dehydrogenase I subunit N) (NDH-1 subunit N)) or (NADH-quinone oxidoreductase subunit E (NADH dehydrogenase I subunit E) (NDH-1 subunit E)) or (NADH-quinone oxidoreductase subunit K (NADH dehydrogenase I subunit K) (NDH-1 subunit K)) or (NADH-quinone oxidoreductase subunit I (NADH dehydrogenase I subunit I) (NDH-1 subunit I)) or (NADH-quinone oxidoreductase subunit M (NADH dehydrogenase I subunit M) (NDH-1 subunit M)) or (NADH-quinone oxidoreductase subunit J (NADH dehydrogenase I subunit J) (NDH-1 subunit J)) SUBSYSTEM: NAPROTEIN_CLASS: 1.6.99.5 COFACTOR: `_124_Donor_45_H2_124_` COFACTOR: NAD COFACTOR: NADH COFACTOR: `_124_Acceptor_124_` GENERIC: true TYPE: small HOLE: false

Reaction equation

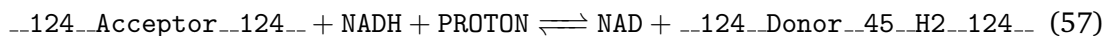


Table 33: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- _Acceptor- __124_-	an oxidized elec- tron acceptor	NAD	NAD+
NADH	NADH	__124_- _Donor_- _45_H2- __124_-	a reduced elec- tron acceptor
PROTON	H+		

Kinetic Law

$$v_{29} = \text{not specified} \tag{58}$$

5.30. Reaction [_3_45_DEHYDROQUINATE_45_DEHYDRATASE_45_RXN](#)

This is an irreversible reaction of one reactant forming two products.

Name 3-dehydroquinate dehydratase

Notes GENE_ASSOCIATION: (BU399_aroQ)PROTEIN_ASSOCIATION: (3-dehydroquinate dehydratase (3-dehydroquinase) (Type II DHQase)//3-dehydroquinate dehydratase)SUBSYSTEM: chorismate biosynthesisPROTEIN_CLASS: 4.2.1.10SIDE: WATER-GENERIC: falseTYPE: smallHOLE: false

Reaction equation

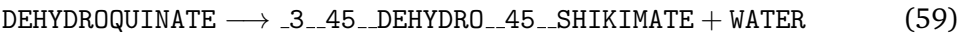


Table 34: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DEHYDROQUINATE	3-dehydroquinate	__3_45_- _DEHYDRO- __45_- _SHIKIMATE	3-dehydro- shikimate
		WATER	H2O

Kinetic Law

$$v_{30} = \text{not specified} \quad (60)$$

5.31. Reaction RXN__45__10

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU050_argG)PROTEIN_ASSOCIATION: (Argininosuccinate synthase (Citrulline–aspartate ligase)//ARGSUCCINSYN-RXN//Argininosuccinate synthase)SUBSYSTEM: canavanine biosynthesisPROTEIN_CLASS: 6.3.4.5COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPSIDE: L__45__ASPARTATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

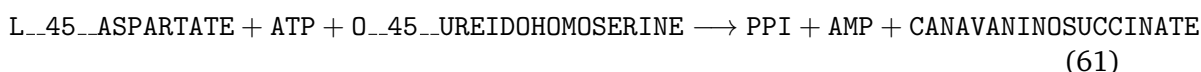


Table 35: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L__45__- _ASPARTATE	L-aspartate	PPI	diphosphate
ATP	ATP	AMP	AMP
O__45__- _UREIDOHOMOSERINE	O- ureidohomoserine	CANAVANINOSUCCINATE	canavanine succinate

Kinetic Law

$$v_{31} = \text{not specified} \quad (62)$$

5.32. Reaction SIROHEME__45__FERROCHELAT__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Sirohydrochlorin ferrochelatase

Notes GENE_ASSOCIATION: (BU425_cysG)PROTEIN_ASSOCIATION: (Siroheme synthase [Includes: Uroporphyrinogen-III C-methyltransferase (Urogen III methylase) (SUMT) (Uroporphyrinogen III methylase) (UROM)]; Precorrin-2 dehydrogenase ;

Sirohydrochlorin ferrochelatase]//DIMETHUROPORDEHYDROG-RXN//RXN-8675//SIROHEME-FERROCHELAT-RXN//UROPORIIIMETHYLTRANSA-RXN//Uroporphyrinogen-III C-methyltransferase//Precorrin-2 dehydrogenase//Sirohydrochlorin ferrochelatase)SUB-SYSTEM: siroheme biosynthesisPROTEIN_CLASS: 4.99.1.4SIDE: PROTONSIDE: FE__43__2GENERIC: falseTYPE: smallHOLE: false

Reaction equation

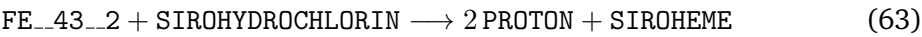


Table 36: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FE__43__2	Fe2+	PROTON	H+
SIROHYDROCHLORIN	Sirohydrochlorin	SIROHEME	siroheme

Kinetic Law

v32 = not specified (64)

5.33. Reaction _1__46__5__46__1__46__20__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name Methylenetetrahydrofolate reductase (NADPH)

Notes GENE_ASSOCIATION: (BU046_metF)PROTEIN_ASSOCIATION: (5,10-methylenetetrahydrofolate reductase//1.5.1.20-RXN)SUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: folate transformationsPROTEIN_CLASS: 1.5.1.20COFACTOR: NAD__45__P__45__OR__45__NOPCOFACTOR: NADH__45__P__45__OR__45__NOPSIDE: PROTONSIDE: NAD__45__P__45__OR__45__NOPSIDE: NADH__45__P__45__OR__45__NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

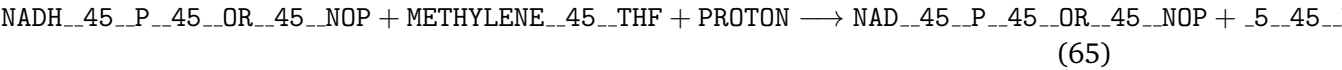


Table 37: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADH_45_P_45_OR_45_NOP	NAD(P)H	NAD_45_P_45_OR_45_NOP	NAD(P)+
METHYLENE_45_THF	5,10-methylene-THF	5_45_METHYL_45_THF	5-methyl-THF
PROTON	H+		

Kinetic Law

$$v_{33} = \text{not specified}$$

(66)

5.34. Reaction DIHYDROOROTOX_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Dihydroorotate oxidase

Notes GENE_ASSOCIATION: (BU362_pyrD)PROTEIN_ASSOCIATION: (Dihydroorotate dehydrogenase (Dihydroorotate oxidase) (DHodehase) (DHODase) (DHOD)//DIHYDROOROTOXN//Dihydroorotate oxidase)SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphateSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 1.3.3.1SIDE: HYDROGEN_45_PEROXIDESIDE: OXYGEN_45_MOLECULEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

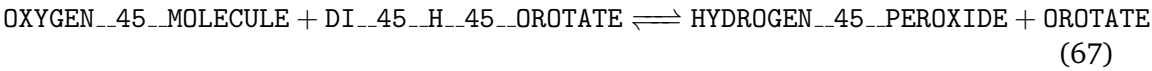


Table 38: Overview of participating species.

Id	Reactants Name	Id	Products Name
OXYGEN- __45_- _MOLECULE	oxygen	HYDROGEN- __45_- _PEROXIDE	H2O2
DI__45_- _H__45_- _OROTATE	dihydroorotate	OROTATE	orotate

Kinetic Law

$$v_{34} = \text{not specified} \quad (68)$$

5.35. Reaction CHORISMATE__45__SYNTHASE__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Chorismate synthase

Notes GENE_ASSOCIATION: (BU097_aroC) PROTEIN_ASSOCIATION: (Chorismate synthase (5-enolpyruvylshikimate-3-phosphate phospholyase) // CHORISMATE-SYNTHASE-RXN // Chorismate synthase) SUBSYSTEM: chorismate biosynthesis PROTEIN_CLASS: 4.2.3.5 SIDE: __124__Pi__124__ GENERIC: false TYPE: small HOLE: false

Reaction equation

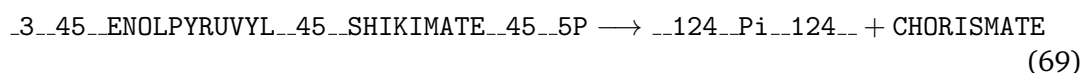


Table 39: Overview of participating species.

Id	Reactants Name	Id	Products Name
__3__45_- _ENOLPYRUVYL- _SHIKIMATE-3- _phosphate __45_- _SHIKIMATE- __45__5P	5-enolpyruvyl- shikimate-3- phosphate	__124_- _Pi_- _124__	phosphate
		CHORISMATE	chorismate

Kinetic Law

$$v_{35} = \text{not specified} \quad (70)$$

5.36. Reaction PHOSACETYLTRANS__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Phosphate acetyltransferase

Notes GENE_ASSOCIATION: (BU176_pta)PROTEIN_ASSOCIATION: (Phosphate acetyltransferase (Phosphotransacetylase)//PHOSACETYLTRANS-RXN//Phosphate acetyltransferase)SUBSYSTEM: mixed acid fermentationSUBSYSTEM: sulfoacetaldehyde degradationSUBSYSTEM: acetate formation from acetyl-CoA ISUBSYSTEM: pyruvate fermentation to acetate IISUBSYSTEM: pyruvate fermentation to acetate IVPROTEIN_CLASS: 2.3.1.8COFACTOR: CO__45__ACOFACITOR: ACETYL__45__COASIDE: CO__45__ASIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation

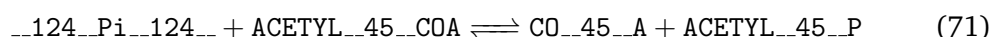


Table 40: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__ __Pi__ __124__	phosphate	CO__45__ _A	coenzyme A
ACETYL__ __45__ _COA	acetyl-CoA	ACETYL__ __45__ _P	acetylphosphate

Kinetic Law

$$v_{36} = \text{not specified} \quad (72)$$

5.37. Reaction PROPKIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU175_ackA)PROTEIN_ASSOCIATION: (Acetate kinase (Acetokinase)//ACETATEKIN-RXN//Acetate kinase)SUBSYSTEM: threonine degradation IPROTEIN_CLASS: 2.7.2.15COFACTOR: ADPCOFACTOR: ATPSIDE: ADP-SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

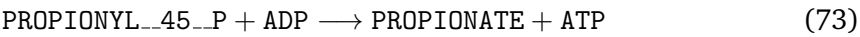


Table 41: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROPIONYL__45__P	propionyl-P	PROPIONATE	propionate
ADP	ADP	ATP	ATP

Kinetic Law

v₃₇ = not specified (74)

5.38. Reaction CDPREDUCT__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA)PROTEIN_ASSOCIATION: (Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase) or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesPROTEIN_CLASS: 1.17.4.1COFACTOR: __124__Red__45__Thioredox__124__Ox__45__Thioredoxin__124__SIDE: WATERSIDE: __124__Red__45__Thioredox__124__SIDE: __124__Ox__45__Thioredoxin__124__GENERIC: trueTYPE: macroHOLE: false

Reaction equation

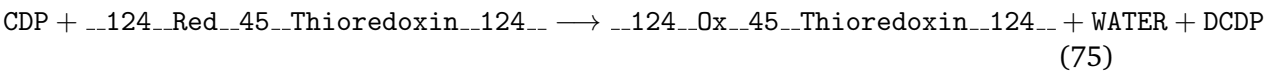


Table 42: Overview of participating species.

Id	Reactants Name	Id	Products Name
CDP	CDP	__124- __0x- __45_- _Thioredoxin- __124__	an oxidized thioredoxin
__124- __Red- __45_- _Thioredoxin- __124__	a reduced thiore- doxin	WATER	H2O
		DCDP	dCDP

Kinetic Law

$$v_{38} = \text{not specified} \quad (76)$$

5.39. Reaction PANTEPADENYLYLTRAN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Pantetheine-phosphate adenylyltransferase

Notes GENE_ASSOCIATION: (BU583_coaD)PROTEIN_ASSOCIATION: (Phosphopantetheine adenylyltransferase (Pantetheine- phosphate adenylyltransferase) (PPAT) (Dephospho-CoA pyrophosphorylase)//PANTEPADENYLYLTRAN-RXN)SUBSYSTEM: coenzyme A biosynthesisPROTEIN_CLASS: 2.7.7.3SIDE: PPISIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

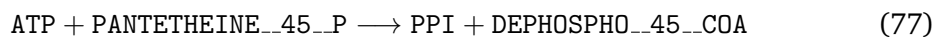


Table 43: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	PPI	diphosphate

Reactants		Products	
Id	Name	Id	Name
PANTETHEINE-45-P	Pantetheine 4'-phosphate	DEPHOSPHO-45-COA	dephospho-CoA

Kinetic Law

$$v_{39} = \text{not specified} \quad (78)$$

5.40. Reaction THREONINE_45_45_TRNA_45_LIGASE_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Threonine-tRNA ligase

Notes GENE_ASSOCIATION: (BU125_thrS)PROTEIN_ASSOCIATION: (Threonyl-tRNA synthetase (Threonine-tRNA ligase) (ThrRS)//THREONINE-TRNA-LIGASE-RXN//Threonine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.3CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

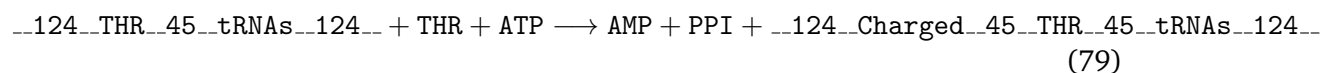


Table 44: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
THR-45-tRNAs-124	tRNAthr	AMP	AMP
THR	L-threonine	PPI	diphosphate
ATP	ATP	Charged-THR-45-tRNAs-124	L-threonyl-tRNAthr

Reactants		Products	
Id	Name	Id	Name

Kinetic Law

$v_{40} = \text{not specified}$

(80)

5.41. Reaction `_3_46_4_46_21_46_89_45_RXN`

This is a reversible reaction of one reactant forming one product.

Name Signal peptidase I

Notes GENE_ASSOCIATION: (BU259_lepB)PROTEIN_ASSOCIATION: (Signal peptidase I (SPase I) (Leader peptidase I)//3.4.21.89-RXN//Signal peptidase I)SUB-SYSTEM: NAPROTEIN_CLASS: 3.4.21.89GENERIC: trueTYPE: smallHOLE: false

Reaction equation

`_124_Peptides_45_with_45_Leader_45_Sequence_124_ <=> _124_Leader_45-Sequences_124_`

(81)

Table 45: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
<code>_124_-</code>	a peptide with a	<code>_124_-</code>	a leader sequence
<code>_Peptides-leader</code>	sequence	<code>_Leader-</code>	
<code>_45_-</code>		<code>_45_-</code>	
<code>_with-</code>		<code>_Sequences-</code>	
<code>_45_-</code>		<code>_124_</code>	
<code>_Leader-</code>			
<code>_45_-</code>			
<code>_Sequence-</code>			
<code>_124_</code>			

Kinetic Law

$v_{41} = \text{not specified}$

(82)

5.42. Reaction 2_46_8_46_1_46_8_45_RXN

This is a reversible reaction of three reactants forming three products.

Name Lipoyl synthase

Notes GENE ASSOCIATION: (BU269_lipA)PROTEIN ASSOCIATION: (Lipoyl synthase (Lipoic acid synthase) (Lipoate synthase) (Sulfur insertion protein lipA) (Lip-syn) (LS)//Lipoyl synthase)SUBSYSTEM: NAPROTEIN_CLASS: 2.8.1.8GENERIC: true-
TYPE: smallHOLE: false

Reaction equation

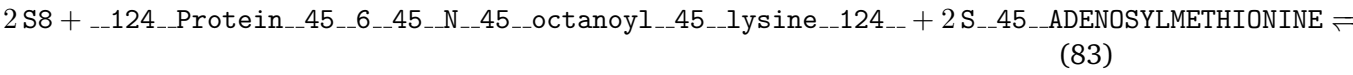


Table 46: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S8	S0	_124_- _Protein- _45_6- _45_N- _45_- _lipoyl- _45_- _lysine- _124_-	a protein 6-N- (lipoyl)lysine
124- _Protein- _45_6- _45_N- _45_- _octanoyl- _45_- _lysine- _124_-	a protein 6-N- (octanoyl)lysine	MET	L-methionine
S_45_- _ADENOSYLMETHIONINE	S-adenosyl-L- methionine	CH33ADO	5'- deoxyadenosine

Kinetic Law

$$v_{42} = \text{not specified} \quad (84)$$

5.43. Reaction DECAPCISTRANSFER__45__RXN

This is a reversible reaction of two reactants forming two products.

Name di-trans-poly-cis-decaprenylcistransferase

Notes GENE_ASSOCIATION: (BU236_uppS)PROTEIN_ASSOCIATION: (Undecaprenyl pyrophosphate synthetase (UPP synthetase) (Di-trans,poly-cis-decaprenylcistransferase) (Undecaprenyl diphosphate synthase) (UDS)//Di-trans,poly-cis-decaprenylcistransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.5.1.31GENERIC: falseTYPE: smallHOLE: false

Reaction equation

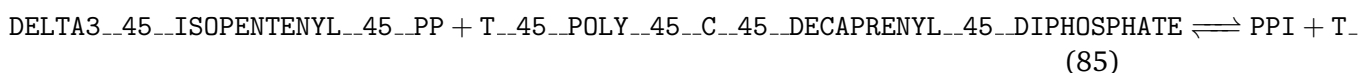


Table 47: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DELTA3- __45_- ISOPENTENYL- __45__PP	isopentenyl diphosphate	PPI	diphosphate
T__45_- POLY_- 45_C- __45_- DECAPRENYL- __45_- DIPHOSPHATE	di-trans,poly- cis-decaprenyl diphosphate	T__45_- POLY_- 45_C- __45_- UNDECAPRENYL- __45_- DIPHOSPHATE	di-trans,poly-cis- undecaprenyl diphosphate

Kinetic Law

$$v_{43} = \text{not specified} \quad (86)$$

5.44. Reaction GPPSYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Dimethylallyltransferase

Notes GENE_ASSOCIATION: (BU465_ispA)PROTEIN_ASSOCIATION: (Geranyltranstransferase (Farnesyl-diphosphate synthase) (FPP synthase)//FPPSYN-RXN//Geranyltranstransferase)SUBSYSTEM: geranyldiphosphate biosynthesisSUBSYSTEM: geranylgeranyldiphosphate biosynthesis II (plastidic)SUBSYSTEM: trans,trans-farnesyl diphosphate biosynthesisPROTEIN_CLASS: 2.5.1.1SIDE: PPIGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 48: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CPD_- _45_- _4211	dimethylallyl- diphosphate	PPI	diphosphate
DELTA3- _45_- _ISOPENTENYL- _45_PP	isopentenyl diphosphate	GERANYL- _45_PP	geranyl- diphosphate

Kinetic Law

$$v_{44} = \text{not specified} \quad (88)$$

5.45. Reaction ORNCARBAMTRANSFER_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Ornithine carbamoyltransferase

Notes GENE_ASSOCIATION: (BU368_argI)PROTEIN_ASSOCIATION: (Ornithine carbamoyltransferase (OTCase)//Ornithine carbamoyltransferase)SUBSYSTEM: citrulline degradationSUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 2.1.3.3SIDE: _124_Pi_124_GENERIC: falseTYPE: smallHOLE: false

Reaction equation

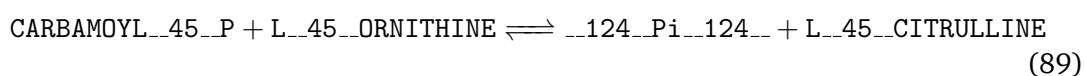


Table 49: Overview of participating species.

Id	Reactants Name	Id	Products Name
CARBAMOYL- __45__P	carbamoyl- phosphate	__124- __Pi_ _124__	phosphate
L__45_- _ORNITHINE	L-ornithine	L__45_- _CITRULLINE	citrulline

Kinetic Law

$$v_{45} = \text{not specified} \quad (90)$$

5.46. Reaction PREPHENATEDEHYDRAT__45__RXN

This is an irreversible reaction of one reactant forming three products.

Name Prephenate dehydratase

Notes GENE_ASSOCIATION: (BU392.pheA)PROTEIN_ASSOCIATION: (P-protein [Includes: Chorismate mutase (CM); Prephenate dehydratase (PDT)]//CHORISMATEMUT-RXN//PREPHENATEDEHYDRAT-RXN//Chorismate mutase//Prephenate dehydratase)SUBSYSTEM: phenylalanine biosynthesis IPROTEIN_CLASS: 4.2.1.51SIDE: WATERSIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

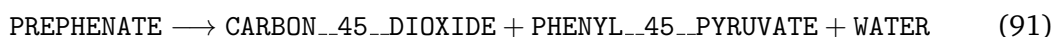


Table 50: Overview of participating species.

Id	Reactants Name	Id	Products Name
PREPHENATE	prephenate	CARBON- __45_- _DIOXIDE	CO2
		PHENYL- __45_- _PYRUVATE	phenylpyruvate
		WATER	H2O

Kinetic Law

$$v_{46} = \text{not specified} \quad (92)$$

5.47. Reaction ARGSUCCINSYN__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name argininosuccinate synthetase

Notes GENE_ASSOCIATION: (BU050_argG)PROTEIN_ASSOCIATION: (Argininosuccinate synthase (Citrulline–aspartate ligase)//ARGSUCCINSYN-RXN//Argininosuccinate synthase)SUBSYSTEM: arginine biosynthesis IIISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 6.3.4.5COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPSIDE: L__45__ASPARTATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

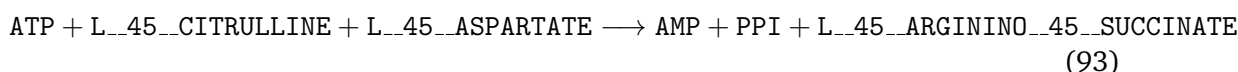


Table 51: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	AMP	AMP
L__45_- _CITRULLINE	citrulline	PPI	diphosphate
L__45_- _ASPARTATE	L-aspartate	L__45_- _ARGININO- _45_- _SUCCINATE	L-arginino- succinate

Kinetic Law

$$v_{47} = \text{not specified} \quad (94)$$

5.48. Reaction RXNO__45__1321

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU133.tgt)PROTEIN_ASSOCIATION: (Queuine tRNA-ribosyltransferase (tRNA-guanine transglycosylase) (Guanine insertion enzyme)//tRNA-guanine transglycosylase)SUBSYSTEM: NAPROTEIN_CLASS: NAGENERIC: true-TYPE: macroHOLE: false

Reaction equation

7_45_AMINOMETHYL_45_7_45_DEAZAGUANINE + guanine_45_34_32_of_32_trNA_32_with_32_a_3
(95)

Table 52: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
7_45_	7-aminomethyl-	GUANINE	guanine
AMINOMETHYL-	deazaguanine		
45_7-			
45_-			
DEAZAGUANINE			
guanine-	NA	tRNA-	NA
45_-		32_-	
34_-		with_-	
32_of-		32_7-	
32_-		45_-	
tRNA-		aminomethyl-	
32_-		45_7-	
with_-		45_-	
32_a_-		deazaguanine-	
32_GU-		32_-	
40_-		at-	
N_41-		32_-	
32_-		position-	
anticodon		32_34	

Kinetic Law

$$v_{48} = \text{not specified} \quad (96)$$

5.49. Reaction TRANSALDOL_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Transaldolase

Notes GENE_ASSOCIATION: (BU093_tal)PROTEIN_ASSOCIATION: (Transaldolase//Transaldolase)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (non-oxidative branch)SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 2.2.1.2GENERIC: falseTYPE: smallHOLE: false

Reaction equation

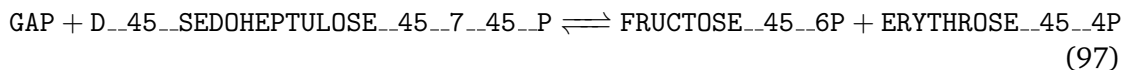


Table 53: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GAP	D-glyceraldehyde-3-phosphate	FRUCTOSE_45_6P	fructose-6-phosphate
D_45_SEDOHEPTULOSE_45_7_45_P	D-sedoheptulose-7-phosphate	ERYTHROSE_45_4P	D-erythrose-4-phosphate

Kinetic Law

$$v_{49} = \text{not specified} \tag{98}$$

5.50. Reaction INOPHOSPHOR_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of adenine, hypoxanthine, and their nucleosidesSUBSYSTEM: degradation of purine ribonucleosidesPROTEIN_CLASS: 2.4.2.-SIDE: _124_Pi_124_GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 54: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124- _Pi_- _124__	phosphate	RIBOSE- __45__1P	ribose-1- phosphate
INOSINE	inosine	HYPOXANTHINE	hypoxanthine

Kinetic Law

$$v_{50} = \text{not specified} \quad (100)$$

5.51. Reaction RXN__45__6102

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE ASSOCIATION: (BU167_folC)PROTEIN ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolylpolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: tetrahydrofolate biosynthesis IIPROTEIN_CLASS: 6.3.2.17CO-FACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: GLTSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

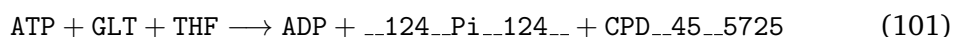


Table 55: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
GLT	L-glutamate	__124- _Pi_- _124__	phosphate

Id	Reactants Name	Id	Products Name
THF	tetrahydrofolate	CPD_-.45_-.5725	tetrahydrofolate-L-glutamate

Kinetic Law

$$v_{51} = \text{not specified} \quad (102)$$

5.52. Reaction RXN0_45_308

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU602_iscS)PROTEIN_ASSOCIATION: (Cysteine desulfurase//RXN0-308//Cysteine desulfurase)SUBSYSTEM: alanine biosynthesis IIIPROTEIN_CLASS: 2.8.1.7GENERIC: trueTYPE: smallHOLE: false

Reaction equation

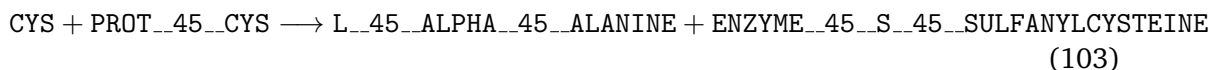


Table 56: Overview of participating species.

Id	Reactants Name	Id	Products Name
CYS	L-cysteine	L_45_-.ALPHA_45_-.ALANINE	L-alanine
PROT_45_CYS	a protein cysteine	ENZYME_45_S_45_SULFANYLCYSTEINE	a protein-S-sulfanylcysteine

Kinetic Law

$$v_{52} = \text{not specified} \quad (104)$$

5.53. Reaction TRIOSEPISOMERIZATION__45__RXN

This is a reversible reaction of one reactant forming one product.

Name Triosephosphate isomerase

Notes GENE_ASSOCIATION: (BU307_tpiA)PROTEIN_ASSOCIATION: (Triosephosphate isomerase (TIM) (Triose-phosphate isomerase)//TRIOSEPISOMERIZATION-RXN//Triose-phosphate isomerase)SUBSYSTEM: glycolysis ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 5.3.1.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation

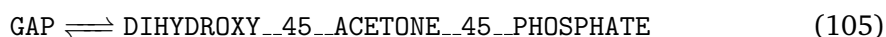


Table 57: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GAP	D-glyceraldehyde-3-phosphate	DIHYDROXY-dihydroxy- __45_- acetone phos- _ACETONE- phate __45_- _PHOSPHATE	

Kinetic Law

$$v_{53} = \text{not specified} \quad (106)$$

5.54. Reaction QUEUOSINE__45__TRNA__45__RIBOSYLTRANSFERASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Queuine tRNA-ribosyltransferase

Notes GENE_ASSOCIATION: (BU133_tgt)PROTEIN_ASSOCIATION: (Queuine tRNA-ribosyltransferase (tRNA-guanine transglycosylase) (Guanine insertion enzyme)//tRNA-guanine transglycosylase)SUBSYSTEM: NAPROTEIN_CLASS: 2.4.2.29GENERIC: trueTYPE: macroHOLE: false

Reaction equation

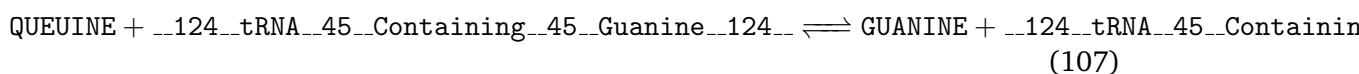


Table 58: Overview of participating species.

Id	Reactants Name	Id	Products Name
QUEUEINE __124_- _tRNA- _45_- _Containing- _45_- _Guanine- _124_	queueine tRNA containing guanine	GUANINE __124_- _tRNA- _45_- _Containing- _45_- _Queueine- _124_	guanine tRNA containing queueine

Kinetic Law

$$v_{54} = \text{not specified} \quad (108)$$

5.55. Reaction RXN0__45__5225

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU576_amiB)PROTEIN_ASSOCIATION: (Putative N-acetylmuramoyl-L-alanine amidase//N-acetylmuramoyl-L-alanine amidase)SUB-SYSTEM: NAPROTEIN_CLASS: 3.5.1.28GENERIC: falseTYPE: smallHOLE: false

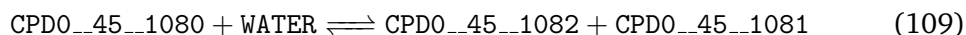
Reaction equation

Table 59: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD0- __45_- _1080	GlcNAc-1,6- anhMurNAc-L- Ala-γ-D- Glu-DAP-D-Ala	CPD0- __45_- _1082	L-Ala-γ- D-Glu-DAP-D-Ala
WATER	H2O	CPD0- __45_- _1081	GlcNAc-1,6- anhMurNAc

Kinetic Law

$$v_{55} = \text{not specified} \quad (110)$$

5.56. Reaction RXNO__45__302

This is an irreversible reaction of one reactant forming two products.

Name 2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase

Notes GENE_ASSOCIATION: (BU419_ispF)PROTEIN_ASSOCIATION: (2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase (MECPS) (MECDP-synthase)//RXN0-302//2-C-methyl-D-erythritol 2,4-cyclodiphosphate synthase)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 4.6.1.12SIDE: CMPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

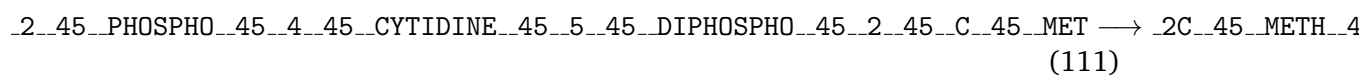


Table 60: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
_2_45_	2-phospho-4-	_2C_45-	2-C-methyl-D-
_PHOSPHO-	(cytidine 5'-	_METH_	erythritol-2,4-
_45_4-	diphospho)-2-	_45_D-	cyclodiphosphate
45	C-methyl-D-	_45_	
_CYTIDINE-	erythritol	_ERYTHRITOL-	
_45_5-		_45_	
45		_CYCLODIPHOSPHATE	
_DIPHOSPHO-			
_45_2-			
_45_C-			
45			
_MET			
		CMP	CMP

Kinetic Law

$$v_{56} = \text{not specified} \quad (112)$$

5.57. Reaction SUCCDIAMINOPIMDESUCC_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Succinyl-diaminopimelate desuccinylase

Notes GENE_ASSOCIATION: (BU095_dapE)PROTEIN_ASSOCIATION: (Succinyl-diaminopimelate desuccinylase (SDAP)//SUCCDIAMINOPIMDESUCC-RXN//Succinyl-diaminopimelate desuccinylase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 3.5.1.18SIDE: SUCSIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

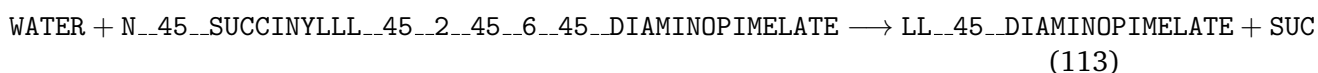


Table 61: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	LL_45_	L,L-
N_45_	N-succinyl-	DIAMINOPI MELATE	diaminopimelate
SUCCINYLL	L,L-2,6-	SUC	succinate
_45_2_	diaminopimelate		
_45_6_			
45			
_DIAMINOPI MELATE			

Kinetic Law

$$v_{57} = \text{not specified} \quad (114)$$

5.58. Reaction RXN_45_4543

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU569_miaA)PROTEIN_ASSOCIATION: (tRNA delta(2)-isopentenylpyrophosphate transferase (IPP transferase) (Isopentenyl-diphosphate:tRNA isopentenyltransferase) (IPTase) (IPPT)//TRNA-ISOPENTENYLTRANSFERASE-RXN//tRNA isopentenyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.5.1.8GENERIC: true-TYPE: macroHOLE: false

Reaction equation

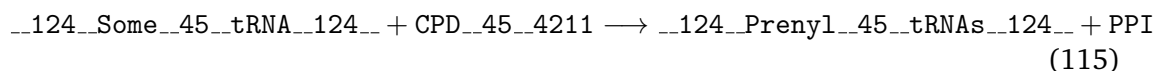


Table 62: Overview of participating species.

Id	Reactants Name	Id	Products Name
Some_45_tRNA_124_	a tRNA	Prenyl_45_tRNAs_124_	prenyl-tRNA
CPD_45_4211	dimethylallyl-diphosphate	PPI	diphosphate

Kinetic Law

$$v_{58} = \text{not specified} \quad (116)$$

5.59. Reaction ATPPHOSPHORIBOSYLTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name ATP phosphoribosyltransferase

Notes GENE_ASSOCIATION: (BU099_hisG)PROTEIN_ASSOCIATION: (ATP phosphoribosyltransferase (ATP-PRTase) (ATP-PRT)//ATPPHOSPHORIBOSYLTRANS-RXN//ATP phosphoribosyltransferase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 2.4.2.17SIDE: PPIGENERIC: falseTYPE: smallHOLE: false

Reaction equation

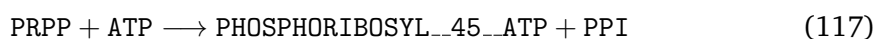


Table 63: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PHOSPHORIBOSYL-__45_-ATP	5-phosphoribosyl-ATP
ATP	ATP	PPI	diphosphate

Kinetic Law

$$v_{59} = \text{not specified}$$

(118)

5.60. Reaction PSERTRANSAMPYR__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU312.serC)PROTEIN ASSOCIATION: (Phosphoserine aminotransferase (Phosphohydroxythreonine aminotransferase) (PSAT)//PSERTRANSAM-RXN//PSERTRANSAMPYR-RXN)SUBSYSTEM: pyridoxal 5'-phosphate biosynthesisPROTEIN CLASS: 2.6.1.52COFACTOR: _2__45__KETOGLUTARATECOFACTOR: GLT-SIDE: _2__45__KETOGLUTARATESIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

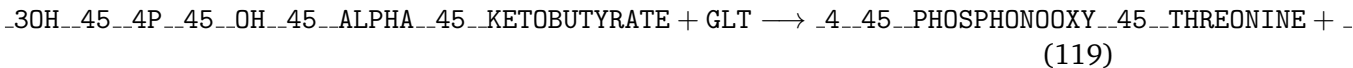


Table 64: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
30H- _45__4P- __45_- _OH__45- __ALPHA- __45_- _KETOBUTYRATE	2-oxo-3-hydroxy-4-phosphobutanoate	_4__45_- _PHOSPHONOOXY- __45_- _THREONINE	4-(phosphonooxy)-threonine
GLT	L-glutamate	_2__45_- _KETOGLUTARATE	2-ketoglutarate

Kinetic Law

$$v_{60} = \text{not specified} \quad (120)$$

5.61. Reaction FADSYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name FMN adenylyltransferase

Notes GENE_ASSOCIATION: (BU150_ribF)PROTEIN_ASSOCIATION: (Riboflavin biosynthesis protein ribF [Includes: Riboflavin kinase (Flavokinase); FMN adenylyltransferase (FAD pyrophosphorylase) (FAD synthetase)]//FADSYN-RXN//RIBOFLAVINKIN-RXN//Riboflavin kinase//FAD synthetase)SUBSYSTEM: flavin biosynthesisPROTEIN_CLASS: 2.7.7.2SIDE: PPISIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 65: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FMN	FMN	PPI	diphosphate
ATP	ATP	FAD	FAD

Kinetic Law

$$v_{61} = \text{not specified} \quad (122)$$

5.62. Reaction _3__46__5__46__1__46__28__45__RXN

This is a reversible reaction of two reactants forming two products.

Name N-acetylmuramoyl-L-alanine amidase

Notes GENE_ASSOCIATION: (BU576_amiB)PROTEIN_ASSOCIATION: (Putative N-acetylmuramoyl-L-alanine amidase//N-acetylmuramoyl-L-alanine amidase)SUBSYSTEM: NAPROTEIN_CLASS: 3.5.1.28GENERIC: trueTYPE: macroHOLE: false

Reaction equation

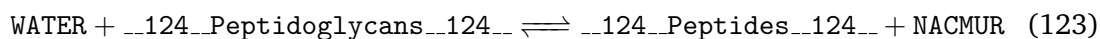


Table 66: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	__124_- _Peptides- __124__	a peptide
__124_- _Peptidoglycans- __124__	a peptidoglycan	NACMUR	N- acetylmuramate

Kinetic Law

$$v_{62} = \text{not specified}$$

(124)

5.63. Reaction PHENYLALANINE__45__45_TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Phenylalanine–tRNA ligase

Notes GENE_ASSOCIATION: (BU130_pheT) or (BU129_pheS)PROTEIN_ASSOCIATION:
(Phenylalanyl-tRNA synthetase beta chain (Phenylalanine– tRNA ligase beta chain)
(PheRS)//PHENYLALANINE–TRNA-LIGASE-RXN) or (Phenylalanyl-tRNA synthetase
alpha chain (Phenylalanine–tRNA ligase alpha chain) (PheRS)//PHENYLALANINE–
TRNA-LIGASE-RXN//Phenylalanine–tRNA ligase)SUBSYSTEM: tRNA charging path-
wayPROTEIN_CLASS: 6.1.1.20COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMP-
SIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

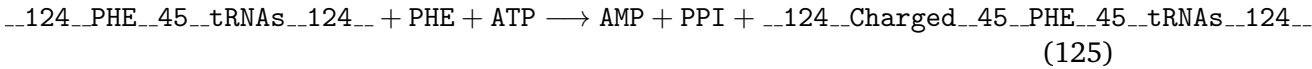


Table 67: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124- _PHE- __45_- _tRNAs_- _124__	tRNAphe	AMP	AMP
PHE ATP	L-phenylalanine ATP	PPI __124_- _Charged- __45_- _PHE- __45_- _tRNAs_- _124__	diphosphate L-phenylalanyl- tRNAphe

Kinetic Law

$$v_{63} = \text{not specified}$$

(126)

5.64. Reaction ADENPHOSPHOR__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of adenine, hypoxanthine, and their nucleosidesSUBSYSTEM: degradation of purine ribonucleosidesSUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.4.2.-SIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 68: Overview of participating species.

Id	Reactants Name	Id	Products Name
ADENOSINE	adenosine	RIBOSE- __45__1P	ribose-1- phosphate
__124- _Pi_- _124__	phosphate	ADENINE	adenine

Kinetic Law

$$v_{64} = \text{not specified} \quad (128)$$

5.65. Reaction VALINE__45__45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Valine-tRNA ligase

Notes GENE_ASSOCIATION: (BU366_valS)PROTEIN_ASSOCIATION: (Valyl-tRNA synthetase (Valine-tRNA ligase) (ValRS)//VALINE-TRNA-LIGASE-RXN//Valine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.9COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: true-TYPE: macroHOLE: false

Reaction equation

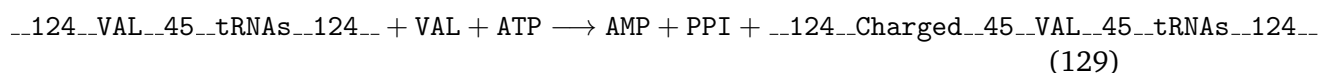


Table 69: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- __VAL- __45_- _tRNAs_- _124__	tRNAval	AMP	AMP
VAL	L-valine	PPI	diphosphate

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124_- _Charged- _45_- _VAL- _45_- _tRNAs_- _124__	L-valyl-tRNAval

Kinetic Law

$$v_{65} = \text{not specified} \quad (130)$$

5.66. Reaction LACTOSEPHOSPHO__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Protein-N(PI)-phosphohistidine-sugar phosphotransferase

Notes GENE_ASSOCIATION: (BU572_mtlA) or (BU356_ptsG)PROTEIN_ASSOCIATION: (PTS system mannitol-specific EIICBA component (EIICBA-Mtl) (EII-Mtl) [Includes: Mannitol permease IIC component (PTS system mannitol- specific EIIC component); Mannitol-specific phosphotransferase enzyme IIB component (PTS system mannitol-specific EIIB component); Mannitol-specific phosphotransferase enzyme IIA component (PTS system mannitol-specific EIIA component)]) or (PTS system glucose-specific EIICB component (EIICB-Glc) (EII-Glc) [Includes: Glucose permease IIC component (PTS system glucose-specific EIIC component); Glucose-specific phosphotransferase enzyme IIB component (PTS system glucose-specific EIIB component)])SUBSYSTEM: NAPROTEIN_CLASS: 2.7.1.69GENERIC: trueTYPE: macroHOLE: false

Reaction equation

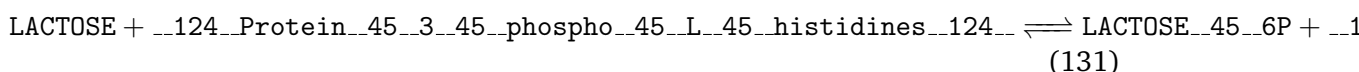


Table 70: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
LACTOSE	lactose	LACTOSE- __45__6P	lactose 6'- phosphate

Id	Reactants Name	Id	Products Name
--124-- Protein- --45--3- --45-- phospho- --45--L- --45-- histidines- --124--	a protein-N- π-phospho-L- histidine	--124-- Protein- --45-- Histidines- --124--	a protein histi- dine

Kinetic Law

$$v_{66} = \text{not specified} \quad (132)$$

5.67. Reaction DIHYDRODIPICSYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name dihydrodipicolinate synthase

Notes GENE_ASSOCIATION: (BU096_dapA)PROTEIN_ASSOCIATION: (Dihydrodipicolinate synthase (DHDPS)//DIHYDRODIPICSYN-RXN//Dihydrodipicolinate synthase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 4.2.1.52SIDE: WATER-SIDE: PYRUVATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

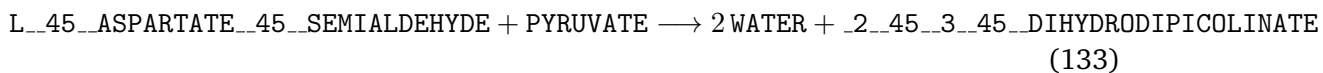


Table 71: Overview of participating species.

Id	Reactants Name	Id	Products Name
L__45__ _ASPARTATE __45__ _SEMIALDEHYDE	L-aspartate- semialdehyde	WATER	H2O

Reactants		Products	
Id	Name	Id	Name
PYRUVATE	pyruvate	_2_45_	L-2,3-
		_3_45_	dihydrodipicolinate
			DIHYDRODIPICOLINATE

Kinetic Law

$$v_{67} = \text{not specified} \quad (134)$$

5.68. Reaction PEPDEPHOS_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Pyruvate kinase

Notes GENE_ASSOCIATION: (BU319_pykA)PROTEIN_ASSOCIATION: (Pyruvate kinase (PK)//PEPDEPHOS-RXN//Pyruvate kinase)SUBSYSTEM: glycolysis ISUBSYSTEM: mixed acid fermentationSUBSYSTEM: respiration (anaerobic)SUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 2.7.1.40COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 72: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ADP	ADP	ATP	ATP
PHOSPHO_45_	phosphoenolpyruvate	PYRUVATE	pyruvate
ENOL_45_			
PYRUVATE			

Kinetic Law

$$v_{68} = \text{not specified} \quad (136)$$

5.69. Reaction DIMETHUROPORDEHYDROG__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU425_cysG)PROTEIN_ASSOCIATION: (Siroheme synthase [Includes: Uroporphyrinogen-III C-methyltransferase (Urogen III methylase) (SUMT) (Uroporphyrinogen III methylase) (UROM); Precorrin-2 dehydrogenase ; Sirohydrochlorin ferrochelatase]//DIMETHUROPORDEHYDROG-RXN//RXN-8675//SIROHEME-FERROCHELAT-RXN//UROPORIIIMETHYLTRANSA-RXN//Uroporphyrinogen-III C-methyltransferase//Precorrin-2 dehydrogenase//Sirohydrochlorin ferrochelatase)SUBSYSTEM: siroheme biosynthesisPROTEIN_CLASS: 1.3.1.76COFACTOR: NADCOFACTOR: NADHSIDE: NADSIDE: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 73: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	NADH	NADH
DIHYDROSIROHYDROCHLORIN	DIHYDROSIROHYDROCHLORIN	SIROHYDROCHLORIN	SIROHYDROCHLORIN

Kinetic Law

$$v_{69} = \text{not specified} \quad (138)$$

5.70. Reaction RXN0__45__5217

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU209_speE)PROTEIN_ASSOCIATION: (Spermidine synthase (Putrescine aminopropyltransferase) (PAPT) (SPDSY)//SPERMIDINESYN-RXN//Spermidine synthase)SUBSYSTEM: aminopropylcadaverine biosynthesisPROTEIN_CLASS: NASIDE: _5__45__METHYLTHIOADENOSINESIDE: S__45__ADENOSYLMETHIONINAfalseTYPE: smallHOLE: false

Reaction equation

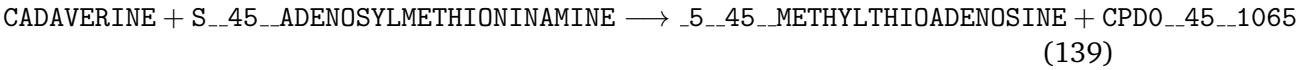


Table 74: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CADAVERINE	Cadaverine	5_45_	S-methyl-5'-
S_45_	S-adenosyl-L-	METHYLTHIOADENOSINE	adenosine
ADENOSYLMETHIONINAMINE	Adenosyl-L-methionine	CPD0_45_1065	aminopropylcadaverine

Kinetic Law

v_{70} = not specified (140)

5.71. Reaction GLUTAMINE_45_45_TRNA_45_LIGASE_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Glutamine–tRNA ligase

Notes GENE ASSOCIATION: (BU415_glnS)PROTEIN ASSOCIATION: (Glutaminyl-tRNA synthetase (Glutamine–tRNA ligase) (GlnRS)//GLUTAMINE–TRNA-LIGASE-RXN//Glutamine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.18CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

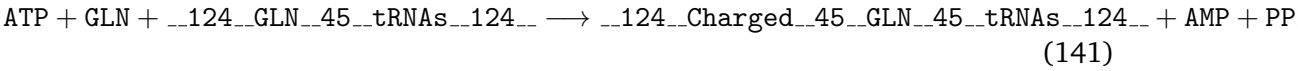


Table 75: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124_- _Charged- __45_- _GLN- __45_- _tRNAs_- _124__	L-glutaminyl- tRNAgln
GLN __124_- _GLN- __45_- _tRNAs_- _124__	L-glutamine tRNAgln	AMP PPI	AMP diphosphate

Kinetic Law

$$v_{71} = \text{not specified}$$

(142)

5.72. Reaction OROTPDECARB__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Orotidine-5'-phosphate decarboxylase

Notes GENE_ASSOCIATION: (BU270_pyrF)PROTEIN_ASSOCIATION: (Orotidine 5'-phosphate decarboxylase (OMP decarboxylase) (OMPDCase) (OMPdecase)//OROTPDECARB-RXN)SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphateSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 4.1.1.23SIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 76: Overview of participating species.

Id	Reactants Name	Id	Products Name
OROTIDINE- __45__5- __45__- _PHOSPHATE	orotidine-5'- phosphate	UMP	UMP
		CARBON- __45__- _DIOXIDE	CO2

Kinetic Law

$$v_{72} = \text{not specified} \quad (144)$$

5.73. Reaction NADH__45__DEHYDROGENASE__45__QUINONE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NADH dehydrogenase (quinone)

Notes GENE_ASSOCIATION: (BU158_nuoF) or (BU155_nuoB) or (BU164_nuoL) or (BU159_nuoG) or (BU160_nuoH) or (BU154_nuoA) or (BU156_nuoCD) or (BU166_nuoN) or (BU157_nuoE) or (BU163_nuoK) or (BU161_nuoI) or (BU165_nuoM) or (BU162_nuoJ) PROTEIN_ASSOCIATION: (NADH-quinone oxidoreductase subunit F (NADH dehydrogenase I subunit F) (NDH-1 subunit F)) or (NADH-quinone oxidoreductase subunit B (NADH dehydrogenase I subunit B) (NDH-1 subunit B)) or (NADH-quinone oxidoreductase subunit L (NADH dehydrogenase I subunit L) (NDH-1 subunit L)) or (NADH-quinone oxidoreductase subunit G (NADH dehydrogenase I subunit G) (NDH-1 subunit G)) or (NADH-quinone oxidoreductase subunit H (NADH dehydrogenase I subunit H) (NDH-1 subunit H)) or (NADH-quinone oxidoreductase subunit A (NADH dehydrogenase I subunit A) (NDH-1 subunit A)) or (NADH-quinone oxidoreductase subunit C/D (NADH dehydrogenase I subunit C/D) (NDH-1 subunit C/D)) or (NADH-quinone oxidoreductase subunit N (NADH dehydrogenase I subunit N) (NDH-1 subunit N)) or (NADH-quinone oxidoreductase subunit E (NADH dehydrogenase I subunit E) (NDH-1 subunit E)) or (NADH-quinone oxidoreductase subunit K (NADH dehydrogenase I subunit K) (NDH-1 subunit K)) or (NADH-quinone oxidoreductase subunit I (NADH dehydrogenase I subunit I) (NDH-1 subunit I)) or (NADH-quinone oxidoreductase subunit M (NADH dehydrogenase I subunit M) (NDH-1 subunit M)) or (NADH-quinone oxidoreductase subunit J (NADH dehydrogenase

I subunit J) (NDH-1 subunit J))SUBSYSTEM: NAPROTEIN_CLASS: 1.6.99.5CO-FACTOR: NADCOFACTOR: NADHGENERIC: trueTYPE: smallHOLE: false

Reaction equation

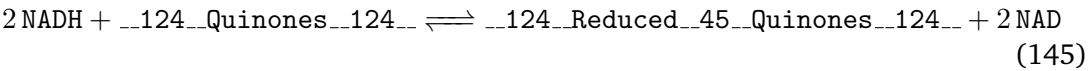


Table 77: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADH	NADH	__124__- _Reduced- __45__- _Quinones- __124__	a hydroquinone
__124__- _Quinones- __124__	a quinone	NAD	NAD+

Kinetic Law

$v_{73} = \text{not specified}$ (146)

5.74. Reaction RXN0__45__2023

This is a reversible reaction of three reactants forming four products.

Name NA

Notes GENE ASSOCIATION: (BU261_trmU)PROTEIN ASSOCIATION: (Probable tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase//tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: NACOFAC-TOR: PPICOFACITOR: ATPCOFACTOR: AMPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

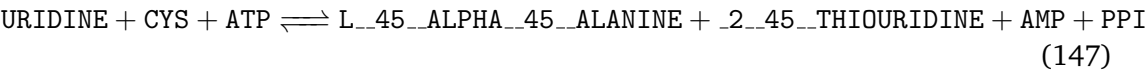


Table 78: Overview of participating species.

Id	Reactants Name	Id	Products Name
URIDINE	uridine	L__45_- _ALPHA- __45_- _ALANINE	L-alanine
CYS	L-cysteine	_2__45_- _THIOURIDINE	2-thiouridine
ATP	ATP	AMP	AMP
		PPI	diphosphate

Kinetic Law

$$v_{74} = \text{not specified} \quad (148)$$

5.75. Reaction AICARSYN__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Adenylosuccinate lyase

Notes GENE_ASSOCIATION: (BU263_purB)PROTEIN_ASSOCIATION: (Adenylosuccinate lyase (Adenylosuccinase) (ASL)//AICARSYN-RXN//AMPSYN-RXN//Adenylosuccinate lyase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis IPROTEIN_CLASS: 4.3.2.2SIDE: FUMGENERIC: falseTYPE: smallHOLE: false

Reaction equation

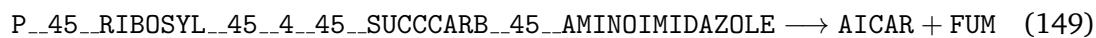


Table 79: Overview of participating species.

Id	Reactants Name	Id	Products Name
P__45_- _RIBOSYL- __45__4- __45_- _SUCCCARB-5- __45_- _AMINOIMIDAZOLE	5'- phosphoribosyl- 4-(N- succinocarboxamide)- 5- aminoimidazole	AICAR	aminoimidazole carboxamide ribonucleotide
		FUM	fumarate

Kinetic Law

$$v_{75} = \text{not specified} \quad (150)$$

5.76. Reaction DIHYDROOROT__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Dihydroorotase

Notes GENE_ASSOCIATION: (BU334_pyrC)PROTEIN_ASSOCIATION: (Dihydroorotase (DHOase)//DIHYDROOROT-RXN//Dihydroorotase)SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphateSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 3.5.2.3SIDE: WATERGENERIC: falseTYPE: small-HOLE: false

Reaction equation



Table 80: Overview of participating species.

Id	Reactants Name	Id	Products Name
CARBAMYUL-N-carbamoyl-L- __45__L- __45__- _ASPARTATE	aspartate	WATER	H2O

Id	Reactants Name	Id	Products Name
		DI__45_- H__45_- _OROTATE	dihydroorotate

Kinetic Law

$$v_{76} = \text{not specified} \quad (152)$$

5.77. Reaction PHOSNACMURPENTATRANS__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Phospho-N-acetylmuramoyl-pentapeptide-transferase

Notes GENE_ASSOCIATION: (BU219_mraY)PROTEIN_ASSOCIATION: (Phospho-N-acetylmuramoyl-pentapeptide-transferase (UDP- MurNAc-pentapeptide phosphotransferase)//PHOSNACMURPENTATRANS__45__RXN//Phospho-N-acetylmuramoyl-pentapeptide-transferase)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 2.7.8.13SIDE: UMPSIDE: UNDECAPRENYL__45__PGENERIC: falseTYPE: smallHOLE: false

Reaction equation

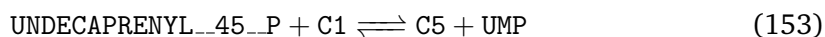


Table 81: Overview of participating species.

Id	Reactants Name	Id	Products Name
UNDECAPRENYL__45__P	undecaprenyl phosphate	C5	N- acetylmuramoyl- L-alanyl-D- glutamyl- meso-2,6- diaminoheptane- D-alanyl- D-alanine- diphosphoundecaprenol

Id	Reactants Name	Id	Products Name
C1	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptanedioate-D-alanyl-D-alanine	UMP	UMP

Kinetic Law

$$v_{77} = \text{not specified} \quad (154)$$

5.78. Reaction [GLU6PDEHYDROG__45__RXN](#)

This is an irreversible reaction of two reactants forming three products.

Name Glucose-6-phosphate 1-dehydrogenase

Notes GENE_ASSOCIATION: (BU320_zwf)PROTEIN_ASSOCIATION: (Glucose-6-phosphate 1-dehydrogenase (G6PD)//GLU6PDEHYDROG-RXN//Glucose-6-phosphate 1-dehydrogenase)SUBSYSTEM: formaldehyde oxidation ISUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (oxidative branch)PROTEIN_CLASS: 1.1.1.49COFACTOR: NADPHCOFACTOR: NADPSIDE: PROTONSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

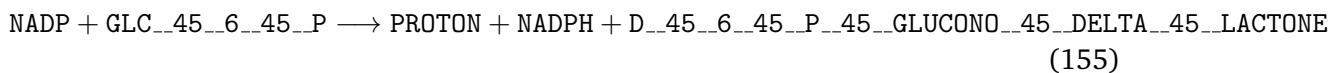


Table 82: Overview of participating species.

Id	Reactants Name	Id	Products Name
NADP	NADP+	PROTON	H+
GLC_- _45_6_- _45_P	β-D-glucose-6-phosphate	NADPH	NADPH

Id	Reactants Name	Id	Products Name
		D__45_- _6__45_- _P__45_- _GLUCONO- __45_- _DELTA- __45_- _LACTONE	D-glucono-- δlactone- 6-phosphate

Kinetic Law

$$v_{78} = \text{not specified} \quad (156)$$

5.79. Reaction HISTIDINE__45___45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Histidine–tRNA ligase

Notes GENE_ASSOCIATION: (BU288_hisS)PROTEIN_ASSOCIATION: (Histidyl-tRNA synthetase (Histidine–tRNA ligase) (HisRS)//HISTIDINE-TRNA-LIGASE-RXN//Histidine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.21CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

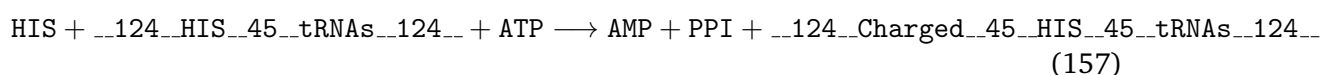


Table 83: Overview of participating species.

Id	Reactants Name	Id	Products Name
HIS __124- _HIS- __45_- _tRNAs_- _124__	L-histidine tRNAhis	AMP PPI	AMP diphosphate

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124_- _Charged- _45_- _HIS- _45_- _tRNAs_- _124__	L-histidyl- tRNAHis

Kinetic Law

$$v_{79} = \text{not specified} \quad (158)$$

5.80. Reaction IMPCYCLOHYDROLASE__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name IMP cyclohydrolase

Notes GENE_ASSOCIATION: (BU031_purH)PROTEIN_ASSOCIATION: (Bifunctional purine biosynthesis protein purH [Includes: Phosphoribosylaminoimidazolecarboxamide formyltransferase (AICAR transformylase); IMP cyclohydrolase (Inosinase) (IMP synthetase) (ATIC)]//AICARTRANSFORM-RXN//IMPCYCLOHYDROLASE-RXN//Phosphoribosylaminoimidazolecarboxamide formyltransferase//IMP cyclohydrolase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis IPROTEIN_CLASS: 3.5.4.10SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 84: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PHOSPHORIBOSYL__45_- _FORMAMIDO _FORMAMIDO _45_- _CARBOXAMIDE	phosphoribosyl- formamido- carboxamide	WATER	H2O

Id	Reactants Name	Id	Products Name
		IMP	inosine-5'-phosphate

Kinetic Law

$$v_{80} = \text{not specified} \tag{160}$$

5.81. Reaction RXN0_45_2601

This is a reversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU119_nth)PROTEIN_ASSOCIATION: (Endonuclease III (DNA-(apurinic or apyrimidinic site) lyase)//RXN0-2601//DNA-(apurinic or apyrimidinic site) lyase)SUBSYSTEM: NAPROTEIN_CLASS: 4.2.99.18GENERIC: trueTYPE: macroHOLE: false

Reaction equation

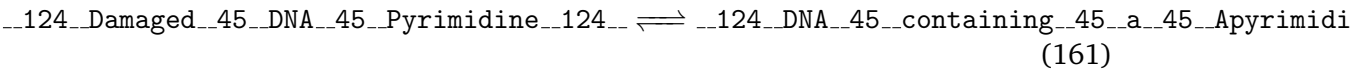


Table 85: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _Damaged- __45_- _DNA- __45_- _Pyrimidine- __124__	a damaged DNA pyrimidine	__124_- _DNA- __45_- _containing- __45_a- __45_- _Apyrimidinic- __45_- _Sites_- _124__	a DNA contain- ing a apyrimidinic site

Id	Reactants Name	Id	Products Name
		DNA_	NA
		32	
		with	
		_32__AP_	
		_32__	
		_40__	
		32	
		aprimidinic	
		32	
		site	
		_41__	
		_32__as_	
		32	
		part	
		_32__of_	
		32	
		base	
		32	
		excision	
		32	
		repair	
		32	
		_process	

Kinetic Law

$$v_{81} = \text{not specified}$$

(162)

5.82. Reaction HYPXPRIBOSYLTRAN__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU251_gpt) or (BU195_hpt)PROTEIN_ASSOCIATION: (Xanthine phosphoribosyltransferase (Xanthine-guanine phosphoribosyltransferase) (XGPRT)//XANPRIBOSYLTRAN-RXN//Xanthine phosphoribosyltransferase) or (Hypoxanthine phosphoribosyltransferase (HPRT)//GUANPRIBOSYLTRAN-RXN//HYPOXANPRIBOSY RXN//Hypoxanthine phosphoribosyltransferase)SUBSYSTEM: salvage pathways of adenine, hypoxanthine, and their nucleosidesPROTEIN_CLASS: NASIDE: PPI-SIDE: PRPPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

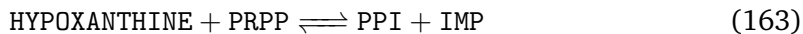


Table 86: Overview of participating species.

Id	Reactants Name	Id	Products Name
HYPOXANTHINE	hypoxanthine	PPI	diphosphate
PRPP	5-phosphoribosyl 1-pyrophosphate	IMP	inosine-5'- phosphate

Kinetic Law

$$v_{82} = \text{not specified} \quad (164)$$

5.83. Reaction RXN__45__9

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU368_argI)PROTEIN_ASSOCIATION: (Ornithine carbamoyltransferase (OTCase)//Ornithine carbamoyltransferase)SUBSYSTEM: canavanine biosynthesisPROTEIN_CLASS: 2.1.3.3SIDE: CARBAMOYL__45__PSIDE: __124__Pi__124__GENERfalseTYPE: smallHOLE: false

Reaction equation

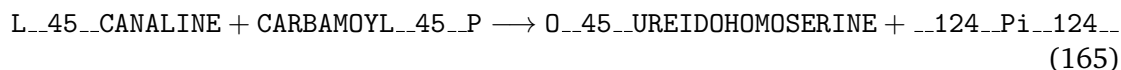


Table 87: Overview of participating species.

Id	Reactants Name	Id	Products Name
L__45__CANALINE	L-canaline	O__45__UREIDOHOMOSERINE	O-ureidohomoserine
CARBAMOYL__45__P	carbamoyl-phosphate	__124__Pi__124__	phosphate

Kinetic Law

$$v_{83} = \text{not specified} \quad (166)$$

5.84. Reaction UMPKI__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU233_pyrH)PROTEIN_ASSOCIATION: (Uridylate kinase (UK) (Uridine monophosphate kinase) (UMP kinase))SUBSYSTEM: pyrimidine ribonucleotides interconversionSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 2.7.4.14COFACTOR: ADPCOFACTOR: ATPSIDE: ATPGENERIC: false-TYPE: smallHOLE: false

Reaction equation



Table 88: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UMP	UMP	UDP	UDP
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{84} = \text{not specified} \quad (168)$$

5.85. Reaction ASPARTATEKIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Aspartate kinase

Notes GENE_ASSOCIATION: (BU194_thrA)PROTEIN_ASSOCIATION: (Bifunctional aspartokinase/homoserine dehydrogenase (AK-HD) [Includes: Aspartokinase ; Homoserine dehydrogenase]//ASPARTATEKIN-RXN//HOMOSERDEHYDROG-RXN//Homoserine dehydrogenase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of

lysine, threonine and methionine biosynthesis ISUBSYSTEM: homoserine biosynthesis
PROTEIN.CLASS: 2.7.2.4 COFACTOR: ADP COFACTOR: ATP SIDE: ADP SIDE:
ATP GENERIC: false TYPE: small HOLE: false

Reaction equation

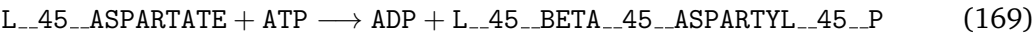


Table 89: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L_45_- _ASPARTATE	L-aspartate	ADP	ADP
ATP	ATP	L_45_- _BETA- _45_- _ASPARTYL- _45_P	L-aspartyl-4-phosphate

Kinetic Law

$v_{85} = \text{not specified}$ (170)

5.86. Reaction PNP_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Purine-nucleoside phosphorylase

Notes GENE ASSOCIATION: (BU541_deoD)
PROTEIN ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)
SUBSYSTEM: NAPROTEIN.CLASS: 2.4.2.1
GENERIC: true
TYPE: small
HOLE: false

Reaction equation

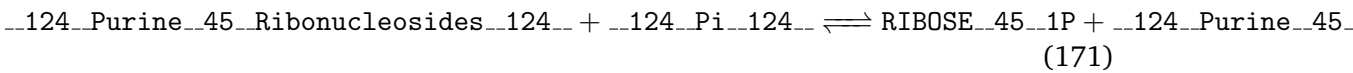


Table 90: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _Purine- __45_- _Ribonucleosides- __124__	a purine ribonu- cleoside	RIBOSE- __45__1P	ribose-1- phosphate
__124_- _Pi_- __124__	phosphate	__124_- _Purine- __45_- _Bases_- __124__	a purine base

Kinetic Law

$$v_{86} = \text{not specified} \quad (172)$$

5.87. Reaction S__45__ADENMETSYN__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Methionine adenosyltransferase

Notes GENE_ASSOCIATION: (BU408_metK)PROTEIN_ASSOCIATION: (S-adenosylmethionine synthetase (Methionine adenosyltransferase) (AdoMet synthetase) (MAT)//S-ADENMETSYN-RXN//Methionine adenosyltransferase)SUBSYSTEM: Methionine cycle IISUBSYSTEM: S-adenosyl-L-methionine cycleSUBSYSTEM: S-adenosylmethionine biosynthesisPROTEIN_CLASS: 2.5.1.6SIDE: WATERSIDE: PPISIDE: __124__Pi__124__SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 91: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	PPI	diphosphate

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	S__45_- _ADENOSYL-METHIONINE	S-adenosyl-L-methionine
MET	L-methionine	__124_- _Pi_- _124_	phosphate

Kinetic Law

$$v_{87} = \text{not specified} \quad (174)$$

5.88. Reaction HISTALDEHYD__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name Histidinol dehydrogenase

Notes GENE_ASSOCIATION: (BU100_hisD) PROTEIN_ASSOCIATION: (Histidinol dehydrogenase (HDH)//HISTALDEHYD-RXN//HISTOLDEHYD-RXN//Histidinol dehydrogenase) SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesis SUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 1.1.1.23 COFACTOR: NAD COFACTOR: NADH SIDE: WATER SIDE: NAD SIDE: NADH GENERIC: false TYPE: small HOLE: false

Reaction equation



Table 92: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	HIS	L-histidine
WATER	H2O	NADH	NADH
HISTIDINAL	histidinal		

Kinetic Law

$$v_{88} = \text{not specified} \quad (176)$$

5.89. Reaction NAD__45__SYNTH__45__NH3__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name NAD(+) synthetase

Notes GENE_ASSOCIATION: (BU174_nadE)PROTEIN_ASSOCIATION: (NH(3)-dependent NAD(+) synthetase//NAD-SYNTH-NH3-RXN)SUBSYSTEM: NAD biosynthesis I (from aspartate)PROTEIN_CLASS: 6.3.1.5COFACTOR: PPICOFAC-
TOR: AMPSIDE: AMMONIASIDE: PPISIDE: ATPSIDE: AMPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

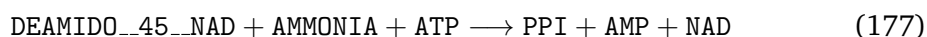


Table 93: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DEAMIDO- __45__- _NAD	deamido-NAD	PPI	diphosphate
AMMONIA	ammonia	AMP	AMP
ATP	ATP	NAD	NAD+

Kinetic Law

$$v_{89} = \text{not specified} \quad (178)$$

5.90. Reaction GLUTATHIONE__45__SYN__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name glutathione synthetase

Notes GENE_ASSOCIATION: (BU547_gshB)PROTEIN_ASSOCIATION: (Glutathione syn-
thetase (Glutathione synthase) (GSH synthetase) (GSH-S) (GSHase)//GLUTATHIONE-
SYN-RXN//Glutathione synthase)SUBSYSTEM: glutathione biosynthesisPROTEIN_CLASS:
6.3.2.3COFACTOR: ADPCOFAC-
TOR: ADP-
SIDE: __124__Pi__124__SIDE: ATPSIDE: GLYGENERIC: falseTYPE: smallHOLE: false

Reaction equation

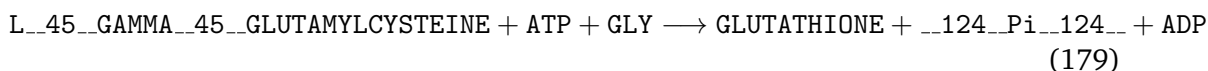


Table 94: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L_45_- _GAMMA_- _45_- _GLUTAMYL CYSTEINE	L-γ- glutamylcysteine	GLUTATHIONE	Glutathione
ATP	ATP	_124_- _Pi_- _124_-	phosphate
GLY	glycine	ADP	ADP

Kinetic Law

$$v_{90} = \text{not specified} \quad (180)$$

5.91. Reaction GTP_45_CYCLOHYDRO_45_II_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name GTP cyclohydrolase II

Notes GENE_ASSOCIATION: (BU271_ribA) PROTEIN_ASSOCIATION: (GTP cyclohydrolase-2 (GTP cyclohydrolase II)//GTP-CYCLOHYDRO-II-RXN//GTP cyclohydrolase II) SUB-SYSTEM: flavin biosynthesis PROTEIN_CLASS: 3.5.4.25 SIDE: FORMATE SIDE: WATER SIDE: PPI GENERIC: false TYPE: small HOLE: false

Reaction equation

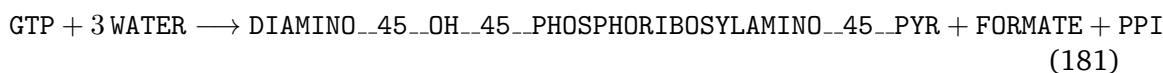


Table 95: Overview of participating species.

Id	Reactants Name	Id	Products Name
GTP	GTP	DIAMINO- __45_- _OH- __45_- _PHOSPHORIBOSYLAMINE- __45_- _PYR	2,5-diamino-6- (ribosylamino)- 4-(3H)- pyrimidinone supraphosphate
WATER	H2O	FORMATE PPI	formate diphosphate

Kinetic Law

$$v_{91} = \text{not specified} \quad (182)$$

5.92. Reaction ADENYLYLSULFKIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Adenylylsulfate kinase

Notes GENE_ASSOCIATION: (BU422_cysC)PROTEIN_ASSOCIATION: (Adenylyl-sulfate kinase (APS kinase) (Adenosine-5'-phosphosulfate kinase) (ATP adenosine-5'-phosphosulfate 3'-phosphotransferase)//ADENYLYLSULFKIN-RXN//Adenylyl-sulfate kinase)SUBSYSTEM: sulfate reduction I (assimilatory)SUBSYSTEM: superpathway of cysteine biosynthesisSUBSYSTEM: sulfate activation for sulfonationPROTEIN_CLASS: 2.7.1.25COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: small-HOLE: false

Reaction equation



Table 96: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	ADP	ADP

Reactants		Products	
Id	Name	Id	Name
APS	adenosine 5'-phosphosulfate	PAPS	phosphoadenosine-5'-phosphosulfate

Kinetic Law

$$v_{92} = \text{not specified} \quad (184)$$

5.93. Reaction HOMOSERDEHYDROG__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name Homoserine dehydrogenase

Notes GENE_ASSOCIATION: (BU194_thrA)PROTEIN_ASSOCIATION: (Bifunctional aspartokinase/homoserine dehydrogenase (AK-HD) [Includes: Aspartokinase ; Homoserine dehydrogenase]//ASPARTATEKIN-RXN//HOMOSERDEHYDROG-RXN//Homoserine dehydrogenase)SUBSYSTEM: homoserine biosynthesisPROTEIN_CLASS: 1.1.1.3CO-FACTOR: NAD__45__P__45__OR__45__NOPCOFACTOR: NADH__45__P__45__OR__45__NOPSIDE: PROTONSIDE: NAD__45__P__45__OR__45__NOPSIDE: NADH__45__P__45__OR__45__NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

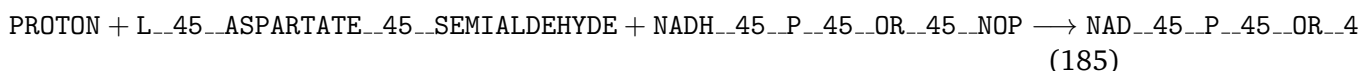


Table 97: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROTON	H+	NAD_- _45__P_- _45__OR_- __45__- _NOP	NAD(P)+
L__45_- _ASPARTATE __45__- _SEMIALDEHYDE	L-aspartate-semialdehyde	HOMO_- _45__SER	homoserine

Id	Reactants Name	Id	Products Name
NADH_45_P_45_OR_45_NOP	NAD(P)H		

Kinetic Law

$$v_{93} = \text{not specified} \quad (186)$$

5.94. Reaction UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanine-D-glutamate ligase

Notes GENE_ASSOCIATION: (BU218_murD)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoylalanine-D-glutamate ligase (UDP-N- acetylmuramoyl-L-alanyl-D-glutamate synthetase) (D-glutamic acid- adding enzyme)//UDP-NACMURALA-GLU-LIG-RXN)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 6.3.2.9COFACTOR: ADPCOFACTOR: _124_Pi_124_COFACTOR: ATPSIDE: ADPSIDE: _124_Pi_124_SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

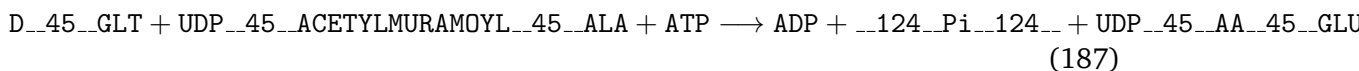


Table 98: Overview of participating species.

Id	Reactants Name	Id	Products Name
D_45_GLT	D-glutamate	ADP	ADP
UDP_45_ACETYLMURAMOYL_45_ALA	UDP-N-acetylmuramoylalanine	_124_Pi_124_	phosphate

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	UDP_-.45_AA- _45_- _GLUTAMATE	UDP-N- acetylmuramoyl- L-alanyl-D- glutamate

Kinetic Law

$$v_{94} = \text{not specified} \quad (188)$$

5.95. Reaction NADH_45_DEHYDROG_45_A_45_RXN

This is a reversible reaction of three reactants forming two products.

Name NADH dehydrogenase (ubiquinone)

Notes GENE_ASSOCIATION: (BU158_nuoF) or (BU154_nuoA) or (BU166_nuoN) or (BU164_nuoL) or (BU157_nuoE) or (BU155_nuoB) or (BU163_nuoK) or (BU159_nuoG) or (BU165_nuoM) or (BU161_nuoI) or (BU162_nuoJ) or (BU160_nuoH) PROTEIN_ASSOCIATION: (NADH-quinone oxidoreductase subunit F (NADH dehydrogenase I subunit F) (NDH-1 subunit F)) or (NADH-quinone oxidoreductase subunit A (NADH dehydrogenase I subunit A) (NDH-1 subunit A)) or (NADH-quinone oxidoreductase subunit N (NADH dehydrogenase I subunit N) (NDH-1 subunit N)) or (NADH-quinone oxidoreductase subunit L (NADH dehydrogenase I subunit L) (NDH-1 subunit L)) or (NADH-quinone oxidoreductase subunit E (NADH dehydrogenase I subunit E) (NDH-1 subunit E)) or (NADH-quinone oxidoreductase subunit B (NADH dehydrogenase I subunit B) (NDH-1 subunit B)) or (NADH-quinone oxidoreductase subunit K (NADH dehydrogenase I subunit K) (NDH-1 subunit K)) or (NADH-quinone oxidoreductase subunit G (NADH dehydrogenase I subunit G) (NDH-1 subunit G)) or (NADH-quinone oxidoreductase subunit M (NADH dehydrogenase I subunit M) (NDH-1 subunit M)) or (NADH-quinone oxidoreductase subunit I (NADH dehydrogenase I subunit I) (NDH-1 subunit I)) or (NADH-quinone oxidoreductase subunit J (NADH dehydrogenase I subunit J) (NDH-1 subunit J)) or (NADH-quinone oxidoreductase subunit H (NADH dehydrogenase I subunit H) (NDH-1 subunit H)) SUBSYSTEM: aerobic respiration – electron donors reaction list SUBSYSTEM: respiration (anaerobic)– electron donors reaction list SUBSYSTEM: aerobic respiration – electron donor II SUBSYSTEM: aerobic respiration – electron donor III PROTEIN_CLASS: 1.6.5.3 COFACTOR: _124_Ubiquinols_124_COFACTOR: NAD COFACTOR: _124_Ubiquinones_124_COFACTOR: NADH SIDE: PROTON GENERIC: true TYPE: small HOLE: false

Reaction equation

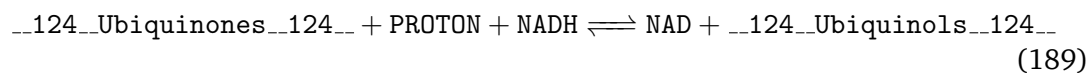


Table 99: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__- __124__ Ubiquinones- __124__	a ubiquinone	NAD	NAD+
PROTON	H+	__124__- __124__ Ubiquinols- __124__	a ubiquinol
NADH	NADH		

Kinetic Law

$$v_{95} = \text{not specified} \quad (190)$$

5.96. Reaction RXN__45__8631

This is a reversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU451_fbaA)PROTEIN_ASSOCIATION: (Fructose-bisphosphate aldolase class 2 (Fructose- bisphosphate aldolase class II) (FBP aldolase)//F16ALDOLASE-RXN//Fructose-bisphosphate aldolase)SUBSYSTEM: NAPROTEIN_CLASS: 4.1.2.13GENERIC: falseTYPE: smallHOLE: false

Reaction equation

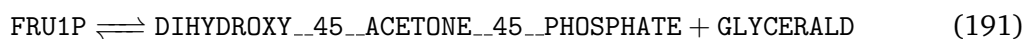


Table 100: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FRU1P	fructose-1-phosphate	DIHYDROXY-dihydroxy- __45_- acetone phos- _ACETONE- phate __45_- _PHOSPHATE GLYCERALD glyceraldehyde	

Kinetic Law

$$v_{96} = \text{not specified} \quad (192)$$

5.97. Reaction

RRNA__45__GUANINE__45__N2__45____45__METHYLTRANSFERASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name rRNA (guanine-N2-)-methyltransferase

Notes GENE_ASSOCIATION: (BU328_rsmC)PROTEIN_ASSOCIATION: (Ribosomal RNA small subunit methyltransferase C (rRNA (guanine-N(2)-)-methyltransferase) (16S rRNA m2G1207 methyltransferase)//RRNA-(GUANINE-N2-)-METHYLTRANSFERASE-RXN//rRNA (guanine-N(2)-)-methyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.1.1.52COFACTOR: ADENOSYL__45__HOMO__45__CYSCOFACITOR: S__45__ADENOSYLMETHIONINE trueTYPE: macroHOLE: false

Reaction equation

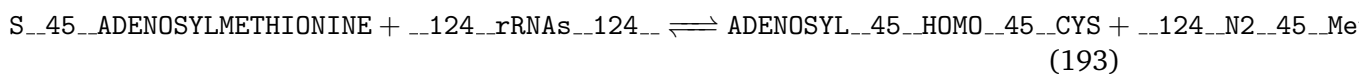


Table 101: Overview of participating species.

Id	Reactants Name	Id	Products Name
S__45_- _ADENOSYLMETHIONINE	S-adenosyl-L- methionine	ADENOSYL- __45_- _HOMO_- _45__CYS	S-adenosyl-L- homocysteine

Reactants		Products		
Id	Name	Id	Name	
__124_- rRNAs_- _124__	rRNA	__124_- __N2_- __45_- _Methylguanine- __45_- _containing- __45_- _rRNAs_- _124__	rRNA con- taining N2- methylguanine Methylguanine- containing- rRNAs-	

Kinetic Law

$$v_{97} = \text{not specified}$$

(194)

5.98. Reaction DNA__45__DIRECTED__45__RNA__45__POLYMERASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name DNA-directed RNA polymerase

Notes GENE_ASSOCIATION: (BU499_rpoA) or (BU034_rpoB) or (BU033_rpoC)PROTEIN_ASSOCIATION: (DNA-directed RNA polymerase subunit alpha (RNAP subunit alpha) (Transcriptase subunit alpha) (RNA polymerase subunit alpha)//DNA-DIRECTED-RNA-POLYMERASE-RXN//DNA-directed RNA polymerase) or (DNA-directed RNA polymerase subunit beta (RNAP subunit beta) (Transcriptase subunit beta) (RNA polymerase subunit beta)//DNA-DIRECTED-RNA-POLYMERASE-RXN//DNA-directed RNA polymerase) or (DNA-directed RNA polymerase subunit beta' (RNAP subunit beta') (Transcriptase subunit beta') (RNA polymerase subunit beta')//DNA-DIRECTED-RNA-POLYMERASE-RXN//DNA-directed RNA polymerase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.7.6GENERIC: trueTYPE: macroHOLE: false

Reaction equation

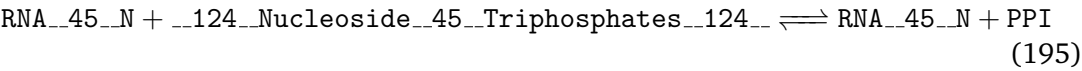


Table 102: Overview of participating species.

Id	Reactants Name	Id	Products Name
RNA_45_N	RNA	RNA_45_N	RNA
__124_	a nucleoside triphosphate	PPI	diphosphate
__45_			
__Triphosphates_			
__124__			

Kinetic Law

$$v_{98} = \text{not specified} \quad (196)$$

5.99. Reaction THYMIDYLATESYN__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Thymidylate synthase

Notes GENE_ASSOCIATION: (BU440_thyA)PROTEIN_ASSOCIATION: (Thymidylate synthase (TS) (TSase)//THYMIDYLATESYN-RXN//Thymidylate synthase)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesSUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.1.1.45COFACTOR: METHYLENE__45__THFCOFACTOR: DIHYDROFOLATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 103: Overview of participating species.

Id	Reactants Name	Id	Products Name
DUMP	dUMP	TMP	dTMP
METHYLENE_5,10-methylene-__45_	THF	DIHYDROFOLATE	dihydrofolate
__THF			

Kinetic Law

$$v_{99} = \text{not specified} \quad (198)$$

5.100. Reaction TRYPTOPHAN__45____45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Tryptophan–tRNA ligase

Notes GENE_ASSOCIATION: (BU536_trpS)PROTEIN_ASSOCIATION: (Tryptophanyl-tRNA synthetase (Tryptophan–tRNA ligase) (TrpRS)//TRYPTOPHAN-TRNA-LIGASE-RXN//Tryptophan–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.2COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

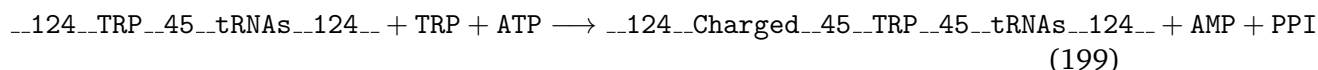


Table 104: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__ __TRP__ __45__ __tRNAs__ __124__	tRNA ^{trp}	__124__ __Charged__ __45__ __TRP__ __45__ __tRNAs__ __124__	L-tryptophanyl-tRNA ^{trp}
TRP	L-tryptophan	AMP	AMP
ATP	ATP	PPI	diphosphate

Kinetic Law

$$v_{100} = \text{not specified} \quad (200)$$

5.101. Reaction ARGININE__45____45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Arginine–tRNA ligase

Notes GENE_ASSOCIATION: (BU242_argS)PROTEIN_ASSOCIATION: (Arginyl-tRNA synthetase (Arginine-tRNA ligase) (ArgRS)//ARGININE-TRNA-LIGASE-RXN//Arginine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.19CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

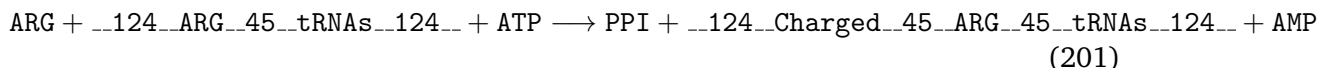


Table 105: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ARG	L-arginine	PPI	diphosphate
124	tRNAarg	_124_	L-arginyl-
ARG		_Charged_	tRNAarg
45		_45_	
tRNAs		_ARG_	
124		_45_	
		tRNAs	
		124	
ATP	ATP	AMP	AMP

Kinetic Law

$$v_{101} = \text{not specified} \tag{202}$$

5.102. Reaction TRNA_45_ADENYLYLTRANSFERASE_45_RXN

This is a reversible reaction of two reactants forming two products.

Name tRNA adenylyltransferase

Notes GENE_ASSOCIATION: (BU061_cca)PROTEIN_ASSOCIATION: (CCA-adding enzyme (tRNA nucleotidyltransferase) (tRNA adenylyl-/cytidylyl- transferase) (tRNA CCA-pyrophosphorylase) (tRNA-NT)//TRNA-ADENYLYLTRANSFERASE-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.7.25GENERIC: trueTYPE: macroHOLE: false

Reaction equation

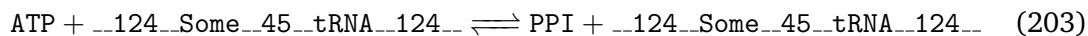


Table 106: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	PPI	diphosphate
__124_-	a tRNA	__124_-	a tRNA
_Some-		_Some-	
__45_-		__45_-	
tRNA-		_tRNA_-	
_124__		_124__	

Kinetic Law

$$v_{102} = \text{not specified} \quad (204)$$

5.103. Reaction ENOYL__45__ACP__45__REDUCT__45__NADH__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Enoyl-[acyl-carrier protein] reductase (NADH)

Notes GENE_ASSOCIATION: (BU265_fabI) PROTEIN_ASSOCIATION: (Enoyl-[acyl-carrier-protein] reductase [NADH] (NADH- dependent enoyl-ACP reductase)//ENOYL-ACP-REDUCT-NADH-RXN) SUBSYSTEM: superpathway of fatty acid biosynthesis- SUBSYSTEM: fatty acid elongation – saturated PROTEIN_CLASS: 1.3.1.9 COFACTOR: NAD COFACTOR: NADH SIDE: __124__Saturated__45__Fatty__45__Acyl__45__ACPs__124__SIDE: NAD SIDE: NADH GENERIC: true TYPE: macro HOLE: false

Reaction equation

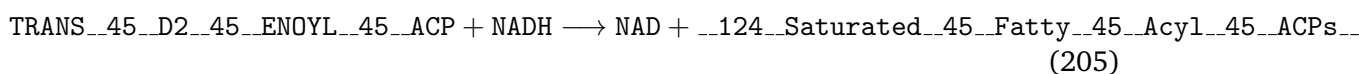


Table 107: Overview of participating species.

Id	Reactants Name	Id	Products Name
TRANS_-	a trans-Δ2-	NAD	NAD+
_45_D2-	enoyl-acyl-[acp]		
__45_-			
ENOYL-			
_45__ACP			

Reactants		Products	
Id	Name	Id	Name
NADH	NADH	__124_	a 2,3,4-saturated Saturated fatty acyl-[acp]
		__45_	Fatty-
		__45_	Acyl-
		__45_	ACPs-
		__124_	ACYL-
		__45_	an acyl-[acp] ACP

Kinetic Law

$$v_{103} = \text{not specified} \quad (206)$$

5.104. Reaction CARDIOLIPSYN__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU273.cls)PROTEIN_ASSOCIATION: (Cardiolipin synthetase (Cardiolipin synthase) (CL synthase))SUBSYSTEM: cardiolipin biosynthesis IPROTEIN_CLASS: 2.7.8.-SIDE: GLYCEROLGENERIC: trueTYPE: smallHOLE: false

Reaction equation



Table 108: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L__45_	an	L-1-	CARDIOLIPIN
__1__45_	phosphatidyl-		cardiolipin
__PHOSPHATIDYL	glycerol		
__45_			
__GLYCEROL		GLYCEROL	glycerol

Kinetic Law

$$v_{104} = \text{not specified} \quad (208)$$

5.105. Reaction GLURS__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Glutamate–tRNA ligase

Notes GENE_ASSOCIATION: (BU070_gltX)PROTEIN_ASSOCIATION: (Glutamyl-tRNA synthetase (Glutamate–tRNA ligase) (GluRS)//GLURS-RXN//Glutamate–tRNA ligase)SUBSYSTEM: tetrapyrrole biosynthesis ISUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.17COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMP-SIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

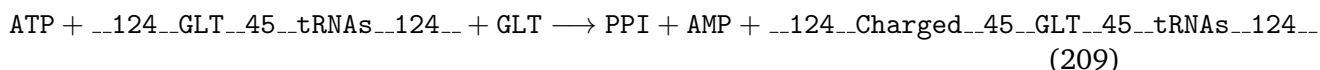


Table 109: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	PPI	diphosphate
__124__GLT__45__tRNAs__124__	tRNAGlu	AMP	AMP
GLT	L-glutamate	__124__Charged__45__GLT__45__tRNAs__124__	L-glutamyl-tRNAGlu

Kinetic Law

$$v_{105} = \text{not specified} \quad (210)$$

5.106. Reaction [2_46_7_46_1_46_69_45_RXN](#)

This is a reversible reaction of two reactants forming two products.

Name Protein-N(PI)-phosphohistidine-sugar phosphotransferase

Notes GENE ASSOCIATION: (BU572_mtIA) or (BU356_ptsG)PROTEIN ASSOCIATION: (PTS system mannitol-specific EIICBA component (EIICBA-Mtl) (EII-Mtl) [Includes: Mannitol permease IIC component (PTS system mannitol- specific EIIC component); Mannitol-specific phosphotransferase enzyme IIB component (PTS system mannitol-specific EIIB component); Mannitol-specific phosphotransferase enzyme IIA component (PTS system mannitol-specific EIIA component)]) or (PTS system glucose-specific EIICB component (EIICB-Glc) (EII-Glc) [Includes: Glucose permease IIC component (PTS system glucose-specific EIIC component); Glucose-specific phosphotransferase enzyme IIB component (PTS system glucose-specific EIIB component)])SUBSYSTEM: NAPROTEIN_CLASS: 2.7.1.69GENERIC: trueTYPE: macroHOLE: false

Reaction equation

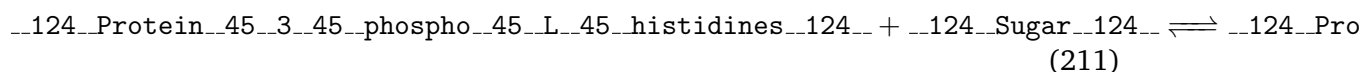


Table 110: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__ Protein- __45__3- __45__ phospho- __45__L- __45__ histidines- __124__	a protein-N- π-phospho-L- histidine	__124__ a protein histi- Protein- dine __45__ Histidines- __124__	
__124__ Sugar_- __124__	a sugar	__124__ a sugar phos- Sugar- phate __45__ Phosphate- __124__	

Kinetic Law

$$v_{106} = \text{not specified} \quad (212)$$

5.107. Reaction GMP__45__REDUCT__45__RXN

This is a reversible reaction of three reactants forming two products.

Name GMP reductase

Notes GENE_ASSOCIATION: (BU204_guaC)PROTEIN_ASSOCIATION: (GMP reductase (Guanosine 5'-monophosphate oxidoreductase) (Guanosine monophosphate reductase)//GMP-REDUCT-RXN//GMP reductase)SUBSYSTEM: NAPROTEIN_CLASS: 1.7.1.7COFACTOR: NADPHCOFACTOR: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 111: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
IMP	inosine-5'-phosphate	NADPH	NADPH
AMMONIA	ammonia	GMP	GMP
NADP	NADP+		

Kinetic Law

$$v_{107} = \text{not specified} \quad (214)$$

5.108. Reaction TRNA__45__CYTIDYLYLTRANSFERASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name tRNA cytidylyltransferase

Notes GENE_ASSOCIATION: (BU061_cca)PROTEIN_ASSOCIATION: (CCA-adding enzyme (tRNA nucleotidyltransferase) (tRNA adenylyl-/cytidylyl- transferase) (tRNA CCA-pyrophosphorylase) (tRNA-NT)//TRNA-ADENYLYLTRANSFERASE-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.7.21GENERIC: trueTYPE: macroHOLE: false

Reaction equation

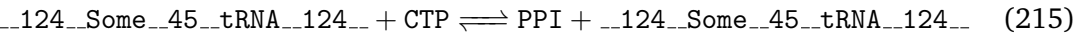


Table 112: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124__ Some__45__ tRNA__124__	a tRNA	PPI	diphosphate
CTP	CTP	__124__ Some__45__ tRNA__124__	a tRNA

Kinetic Law

$v_{108} = \text{not specified}$

(216)

5.109. Reaction RIBONUCLEOSIDE__45__DIP__45__REDUCTI__45__RXN

This is a reversible reaction of three reactants forming two products.

Name Ribonucleoside-diphosphate reductase

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA)PROTEIN_ASSOCIATION:
(Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)
or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)SUBSYSTEM: NAPROTEIN_CLASS:
1.17.4.1COFACTOR: __124__Red__45__Thioredoxin__124__COFACTOR: __124__Ox__45__Thioredoxin__124__trueTYPE: macroHOLE: false

Reaction equation

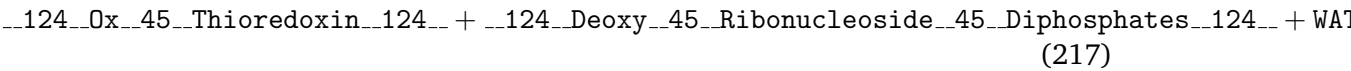


Table 113: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124__ __0x__ __45__ Thioredoxin-	an oxidized thioredoxin	__124__ __124__ __45__ Diphosphates-	a ribonucleoside diphosphate
__124__ __124__ __124__ Deoxy- __45__ Ribonucleoside- __45__ Diphosphates- __124__ WATER	a 2'- deoxyribonucleoside diphosphate H2O	__124__ __124__ __45__ Red- Thioredoxin- __124__	a reduced thiore- doxin

Kinetic Law

$$v_{109} = \text{not specified} \quad (218)$$

5.110. Reaction RXN0__45__2625

This is a reversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU429_mutS)PROTEIN_ASSOCIATION: (DNA mismatch repair protein mutS)SUBSYSTEM: NAPIROTEIN_CLASS: NAGENERIC: falseTYPE: macroHOLE: false

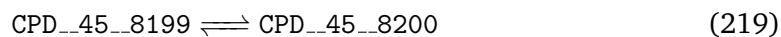
Reaction equation

Table 114: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_- _45_- _8199	a mismatched DNA base pair	CPD_- _45_- _8200	a properly matched DNA base pair

Kinetic Law

$$v_{110} = \text{not specified} \quad (220)$$

5.111. Reaction RXN0_45_1

This is a reversible reaction of three reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA) PROTEIN_ASSOCIATION:
(Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase
small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-
DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)
or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-
RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-
RXN//Ribonucleoside-diphosphate reductase) SUBSYSTEM: NAPROTEIN_CLASS:
1.17.4.-COFACTOR: _124_Donor_45_H2_124_COFACTOR: _124_Acceptor_124_GENERIC:
trueTYPE: smallHOLE: false

Reaction equation

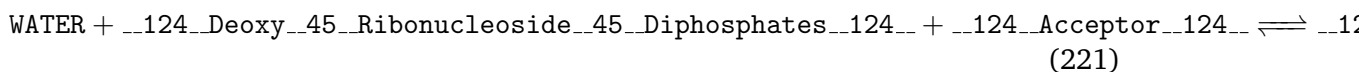


Table 115: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	_124_- _45_- _8199	a ribonucleoside diphosphate base pair

Reactants		Products	
Id	Name	Id	Name
__124_-	a 2'-	__124_-	a reduced elec-
Deoxy-	deoxyribonucleoside	Donor_-	tron acceptor
__45_-	diphosphate	__45_H2-	
Ribonucleoside-		__124__	
__45_-			
Diphosphates-			
__124__			
__124_-	an oxidized elec-		
Acceptor-	tron acceptor		
__124__			

Kinetic Law

$$v_{111} = \text{not specified}$$

(222)

5.112. Reaction GLUTAMIDOTRANS__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU105_hisF) or (BU103_hisH)PROTEIN_ASSOCIATION: (Imidazole glycerol phosphate synthase subunit hisF (IGP synthase cyclase subunit) (IGP synthase subunit hisF) (ImGP synthase subunit hisF) (IGPS subunit hisF)) or (Imidazole glycerol phosphate synthase subunit hisH (IGP synthase glutamine amidotransferase subunit) (IGP synthase subunit hisH) (ImGP synthase subunit hisH) (IGPS subunit hisH))SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 2.4.2.-SIDE: GLNSIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

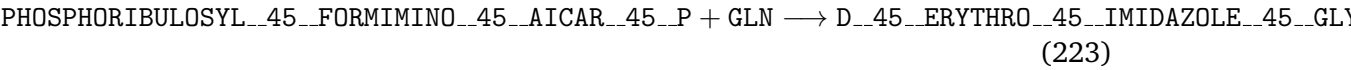


Table 116: Overview of participating species.

Id	Reactants Name	Id	Products Name
PHOSPHORIBULOSE-5-P	phosphoribulose-5-phosphate	D-ERYTHRO-IMIDAZOLE-GLYCEROL-3-P	D-erythro-imidazole-glycerol-phosphate
AICAR-4-P	AICAR-4-P	GLT	L-glutamate
GLN	L-glutamine	AICAR	aminoimidazole carboxamide ribonucleotide

Kinetic Law

$$v_{112} = \text{not specified} \quad (224)$$

5.113. Reaction 3-45-DEHYDROQUINATE-45-SYNTHASE-45-RXN

This is an irreversible reaction of one reactant forming two products.

Name 3-dehydroquinate synthase

Notes GENE_ASSOCIATION: (BU538_aroB)PROTEIN_ASSOCIATION: (3-dehydroquinate synthase//3-DEHYDROQUINATE-SYNTHASE-RXN//3-dehydroquinate synthase)SUB-SYSTEM: chorismate biosynthesisPROTEIN_CLASS: 4.2.3.4SIDE: 124_Pi_124_GENERIC: falseTYPE: smallHOLE: false

Reaction equation

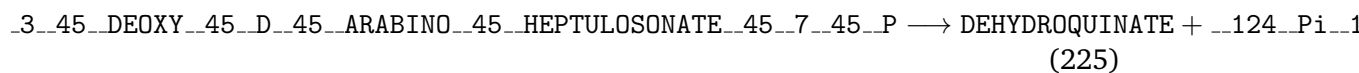


Table 117: Overview of participating species.

Id	Reactants Name	Id	Products Name
_3_45_- _DEOXY- _45_D- _45_- _ARABINO- _45_- _HEPTULOSONATE- _45_7- _45_P	3-deoxy- D-arabino- heptulosonate-7- phosphate	DEHYDROQUINATE _124_- _Pi_- _124_	3-deoxy- D-arabino- heptulosonate-7- phosphate

Kinetic Law

$$v_{113} = \text{not specified} \quad (226)$$

5.114. Reaction TRNA_45_ISOPENTENYLTRANSFERASE_45_RXN

This is a reversible reaction of two reactants forming two products.

Name tRNA isopentenyltransferase

Notes GENE_ASSOCIATION: (BU569_miaA)PROTEIN_ASSOCIATION: (tRNA delta(2)-isopentenylpyrophosphate transferase (IPP transferase) (Isopentenyl-diphosphate:tRNA isopentenyltransferase) (IPTase) (IPPT)//TRNA-ISOPENTENYLTRANSFERASE-RXN//tRNA isopentenyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.5.1.8GENERIC: true-TYPE: macroHOLE: false

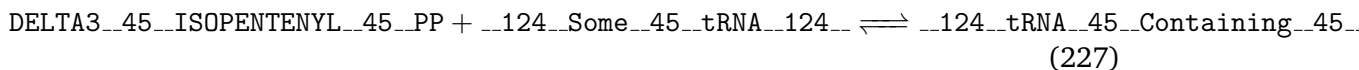
Reaction equation

Table 118: Overview of participating species.

Id	Reactants Name	Id	Products Name
DELTA3- __45_- _ISOPENTENYL- _45_PP	isopentenyl diphosphate	__124_- _tRNA- _45_- _Containing- _45_- _6Isopentenyladenosine- __124__	tRNA con- taining 6- Isopentenyladenosine
__124_- _Some- _45_- _tRNA_- _124__	a tRNA	PPI	diphosphate

Kinetic Law

$$v_{114} = \text{not specified} \quad (228)$$

5.115. Reaction HEMN__45__RXN

This is an irreversible reaction of two reactants forming four products.

Name NA

Notes GENE_ASSOCIATION: (BU550)PROTEIN_ASSOCIATION: (Oxygen-independent
coproporphyrinogen III oxidase-like protein BU550)SUBSYSTEM: NAPROTEIN_CLASS:
1.3.99.22GENERIC: falseTYPE: smallHOLE: false

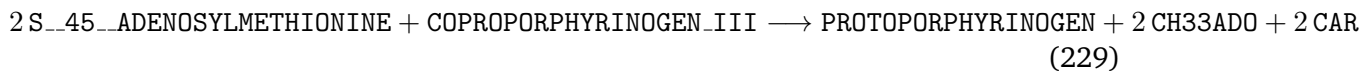
Reaction equation

Table 119: Overview of participating species.

Id	Reactants Name	Id	Products Name
S__45_- _ADENOSYLMETHIONINE	S-adenosyl-L- methionine	PROTOPORPHYRINOGEN IX	protoporphyrinogen IX

Reactants		Products	
Id	Name	Id	Name
COPROPORPHIN-III	COPROPORPHIN-III	CH33AD0	5'-deoxyadenosine CO2
		CARBON-__45_-DIOXIDE	
		MET	L-methionine

Kinetic Law

$$v_{115} = \text{not specified} \quad (230)$$

5.116. Reaction NICOTINATEPRIBOSYLTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Nicotinate phosphoribosyltransferase

Notes GENE ASSOCIATION: (BU361_pncB)PROTEIN ASSOCIATION: (Nicotinate phosphoribosyltransferase (NAPRTase)//NICOTINATEPRIBOSYLTRANS-RXN//Nicotinate phosphoribosyltransferase)SUBSYSTEM: NAD salvage pathway IPROTEIN_CLASS: 2.4.2.11SIDE: PPISIDE: PRPPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

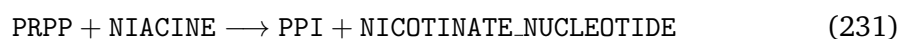


Table 120: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PPI	diphosphate
NIACINE	nicotinate	NICOTINATE_NUCLEOTIDE	nicotinate nucleotide

Kinetic Law

$$v_{116} = \text{not specified} \quad (232)$$

5.117. Reaction `_3_46_4_46_11_46_1_45_RXN`

This is an irreversible reaction of two reactants forming two products.

Name Leucyl aminopeptidase

Notes GENE_ASSOCIATION: (BU367_pepA)PROTEIN_ASSOCIATION: (Cytosol aminopeptidase (Leucine aminopeptidase) (LAP) (Leucyl aminopeptidase)//3.4.11.1-RXN//Leucyl aminopeptidase)SUBSYSTEM: NAPROTEIN_CLASS: 3.4.11.1GENERIC: trueTYPE: macroHOLE: false

Reaction equation

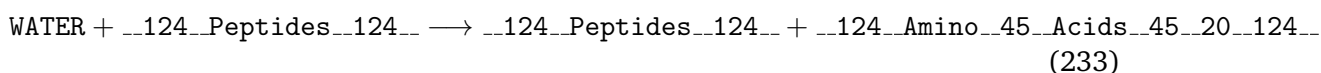


Table 121: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	_124_Peptides_124_	a peptide
_124_Peptides_124_	a peptide	_124_Amino_45_Acids_45_20_124_	a standard α amino acid

Kinetic Law

$$v_{117} = \text{not specified} \quad (234)$$

5.118. Reaction `PRTRANS_45_RXN`

This is an irreversible reaction of two reactants forming two products.

Name Anthranilate phosphoribosyltransferase

Notes GENE_ASSOCIATION: (BU280_trpD)PROTEIN_ASSOCIATION: (Anthranilate phosphoribosyltransferase//PRTRANS-RXN//Anthranilate phosphoribosyltransferase)SUBSYSTEM: tryptophan biosynthesisPROTEIN_CLASS: 2.4.2.18SIDE: PPISIDE: PRPPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

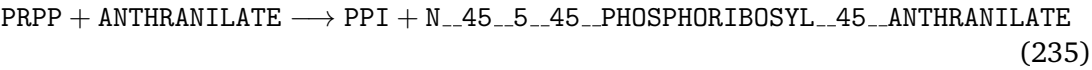


Table 122: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PPI	diphosphate
ANTHRANILATE	anthranilate	N_45_- _5_45_- _PHOSPHORIBOSYL- _45_- _ANTHRANILATE	N-(5'- phosphoribosyl)- anthranilate

Kinetic Law

v_{118} = not specified (236)

5.119. Reaction RXN_45_8629

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-SYSTEM: glycine cleavage complexPROTEIN_CLASS: 1.8.1.4COFACTOR: NADCO-FACTOR: NADHSIDE: PROTONSIDE: NADSIDE: NADHGENERIC: trueTYPE: macro-HOLE: false

Reaction equation

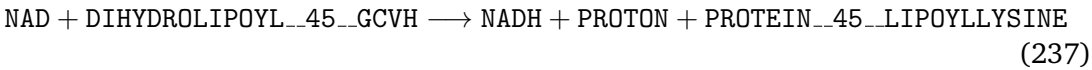


Table 123: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	NADH	NADH
DIHYDROLIPOYL- __45_- _GCVH	H-Gcv-protein- (dihydrolipoyl)lysine	PROTON	H+
		PROTEIN- __45_- _LIPOYLLYSINE	H-Gcv-protein- (lipoyl)lysine

Kinetic Law

$$v_{119} = \text{not specified} \quad (238)$$

5.120. Reaction RIBOFLAVIN__45__SYN__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Riboflavin synthase

Notes GENE_ASSOCIATION: (BU112_ribE) or (BU459_ribH) PROTEIN_ASSOCIATION:
(Riboflavin synthase alpha chain//Riboflavin synthase) or (6,7-dimethyl-8-ribityllumazine
synthase (DMRL synthase) (Lumazine synthase) (Riboflavin synthase beta chain)//Riboflavin
synthase) SUBSYSTEM: flavin biosynthesis PROTEIN_CLASS: 2.5.1.9 GENERIC: false-
TYPE: small HOLE: false

Reaction equation

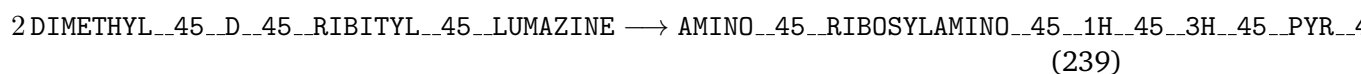


Table 124: Overview of participating species.

Id	Reactants Name	Id	Products Name
DIMETHYL- __45__D- __45__- RIBITYL- __45__- LUMAZINE	6,7-dimethyl- 8-(1-D- ribityl)lumazine	AMINO- __45__- RIBOSYLAM- __45__- 1H- __45__3H- __45__- PYR- __45__- DIONE RIBOFLAVIN	5-amino-6- ribitylamino- 2,4-(1H,3H)- pyrimidinedione riboflavin

Kinetic Law

$$v_{120} = \text{not specified} \quad (240)$$

5.121. Reaction DIHYDRODICRED__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name Dihydrodipicolinate reductase

Notes GENE_ASSOCIATION: (BU146_dapB)PROTEIN_ASSOCIATION: (Dihydrodipicolinate reductase (DHPR)//DIHYDRODICRED-RXN//Dihydrodipicolinate reductase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 1.3.1.26COFACTOR: NAD__45__P__45__OR__45__NADH__45__P__45__OR__45__NOPSIDE: PROTONSIDE: NAD__45__P__45__OR__45__NOPSIDE: NADH__45__P__45__OR__45__NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

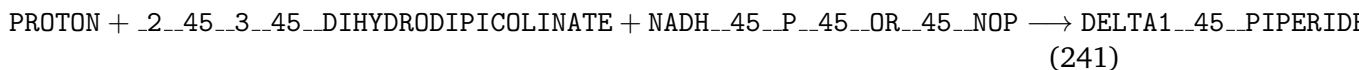


Table 125: Overview of participating species.

Id	Reactants Name	Id	Products Name
PROTON	H+	DELTA1- _45_- _PIPERIDEINE- _45__2- _45__6- _45_- _DICARBOXYLATE	tetrahydrodipicolinate
_2__45_- _3__45_- _DIHYDRODIPICOLINATE	L-2,3- dihydrodipicolinate	NAD_- _45__P_- _45__OR- _45_- _NOP	NAD(P)+
NADH_- _45__P_- _45__OR- _45_- _NOP	NAD(P)H		

Kinetic Law

$$v_{121} = \text{not specified} \quad (242)$$

5.122. Reaction _3__45__OXOACYL__45__ACP__45__SYNTH__45__BASE__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name 3-oxoacyl-[acyl-carrier protein] synthase

Notes GENE ASSOCIATION: (BU092_fabB)PROTEIN ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] synthase 1 (3-oxoacyl- [acyl-carrier-protein] synthase I) (Beta-ketoacyl-ACP synthase I) (KAS I)//3-OXOACYL-ACP-SYNTH-BASE-RXN//3-OXOACYL-ACP-SYNTH-RXN//MALONYL-ACPDECARBOX-RXN)SUBSYSTEM: fatty acid biosynthesis - initial steps ISUBSYSTEM: superpathway of fatty acid biosynthesisPROTEIN_CLASS: 2.3.1.41SIDE: _124__All__45__ACPs__124__SIDE: CARBON__45__DIOXIDEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

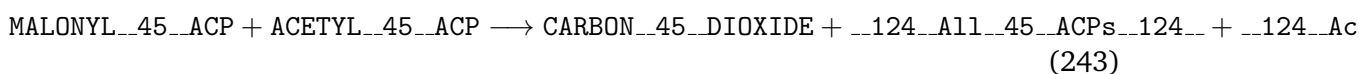


Table 126: Overview of participating species.

Id	Reactants Name	Id	Products Name
MALONYL- __45_- _ACP	a malonyl-[acp]	CARBON- __45_- _DIOXIDE	CO2
ACETYL- __45_- _ACP	an acetyl-[acp]	__124- _A11- __45_- _ACPs_- _124_ __124_- _Acetoacetyl- _Acetoacetyl-[acp] __45_- _ACPs_- _124_	all acyl carrier proteins an acetoacetyl-

Kinetic Law

$$v_{122} = \text{not specified} \quad (244)$$

5.123. Reaction RXN__45__8447

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: NAPROTEIN_ASSOCIATION: NASUBSYSTEM: pyridoxal 5'-phosphate biosynthesisPROTEIN_CLASS: NASIDE: PROTONSIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

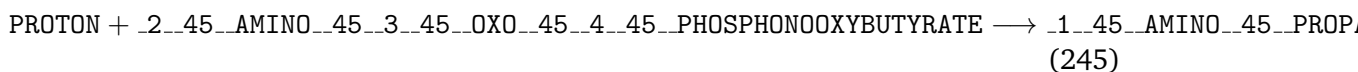
Reaction equation

Table 127: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROTON	H+	_1__45_- _AMINO- _45_- _PROPAN- _45_- _2__45- _ONE_- _45__3- _45_- _PHOSPHATE	1-amino- propan-2-one- 3-phosphate
_2__45_- _AMINO- _45_- _3__45- _OXO_- _45__4- _45_- _PHOSPHONOOXYBUTYRATE	(2S)-2-amino- 3-oxo-4- phosphonooxybutanoate	CARBON- _45_- _OXIDE	CO2

Kinetic Law

$$v_{123} = \text{not specified} \quad (246)$$

5.124. Reaction NAG1P__45__URIDYLTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name UDP-N-acetylglucosamine pyrophosphorylase

Notes GENE ASSOCIATION: (BU027_glmU) PROTEIN ASSOCIATION: (Bifunctional protein glmU [Includes: UDP-N-acetylglucosamine pyrophosphorylase (N-acetylglucosamine-1-phosphate uridyltransferase); Glucosamine-1-phosphate N-acetyltransferase]//2.3.1.157-RXN//NAG1P-URIDYLTRANS-RXN//Glucosamine-1-phosphate N-acetyltransferase) SUBSYSTEM: UDP-N-acetyl-D-glucosamine biosynthesis I PROTEIN CLASS: 2.7.7.23 SIDE: PPISIDE: UTPGENERIC: false TYPE: small HOLE: false

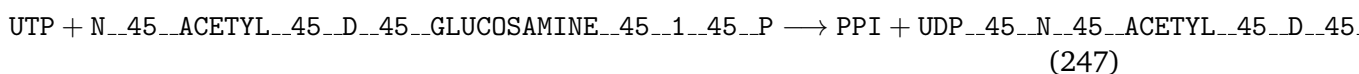
Reaction equation

Table 128: Overview of participating species.

Id	Reactants Name	Id	Products Name
UTP	UTP	PPI	diphosphate
N__45_- _ACETYL- _45_D- _45_- _GLUCOSAMINE- _45_1- _45_P	N-acetyl- glucosamine- 1-phosphate	UDP_- _45_N- _45_- _ACETYL- _45_D- _45_- _GLUCOSAMINE	UDP-N-acetyl-D- glucosamine

Kinetic Law

$$v_{124} = \text{not specified} \quad (248)$$

5.125. Reaction ISOLEUCINE__45___45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Isoleucine-tRNA ligase

Notes GENE_ASSOCIATION: (BU149.ileS)PROTEIN_ASSOCIATION: (Isoleucyl-tRNA synthetase (Isoleucine-tRNA ligase) (IleRS)//ISOLEUCINE-TRNA-LIGASE-RXN//Isoleucine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.5CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

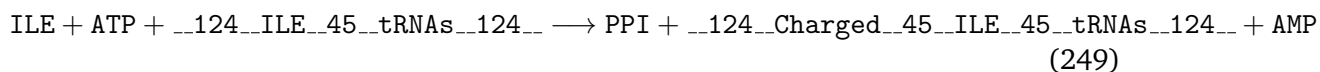
Reaction equation

Table 129: Overview of participating species.

Id	Reactants Name	Id	Products Name
ILE	L-isoleucine	PPI	diphosphate

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124__- _Charged- _45_- _ILE- _45_- _tRNAs_- _124__	L-isoleucyl- tRNAile
__124__- _ILE- _45_- _tRNAs_- _124__	tRNAile	AMP	AMP

Kinetic Law

$$v_{125} = \text{not specified} \quad (250)$$

5.126. Reaction METHIONINE__45__45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Methionine–tRNA ligase

Notes GENE_ASSOCIATION: (BU109_metG)PROTEIN_ASSOCIATION: (Methionyl-tRNA synthetase (Methionine–tRNA ligase) (MetRS)//METHIONINE–TRNA-LIGASE-RXN//Methionine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.10CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

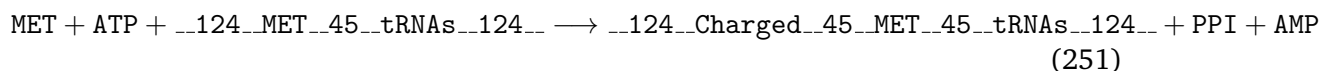


Table 130: Overview of participating species.

Id	Reactants Name	Id	Products Name
MET	L-methionine	__124_- _Charged- __45_- _MET- __45_- _tRNAs_- _124__	L-methionyl- tRNAmet
ATP __124_- _MET- __45_- _tRNAs_- _124__	ATP tRNAmet	PPI AMP	diphosphate AMP

Kinetic Law

$$v_{126} = \text{not specified} \quad (252)$$

5.127. Reaction RXN0__45__2921

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU167_folC)PROTEIN_ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolylpolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: folate polyglutamylation IPROTEIN_CLASS: 6.3.2.17COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: GLTSIDE: ATPGENERIC: trueTYPE: smallHOLE: false

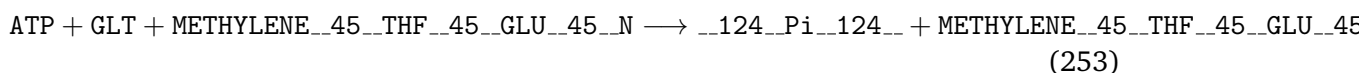
Reaction equation

Table 131: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	__124- __Pi__ __124__	phosphate
GLT	L-glutamate	METHYLENE-a __45_- _THF- __45_- _GLU_- _45__N	5,10- methylene- tetrahydrofolate
METHYLENE-a __45_- _THF- __45_- _GLU_- _45__N	5,10- methylene- tetrahydrofolate	ADP	ADP

Kinetic Law

$$v_{127} = \text{not specified} \quad (254)$$

5.128. Reaction _6__46__3__46__2__46__10__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanine-D-glutamyl-lysine-D-alanyl-D-alanine ligase

Notes GENE_ASSOCIATION: (BU220_murF) PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase (UDP-MurNAc-pentapeptide synthetase) (D-alanyl-D- alanine-adding enzyme)//UDP-NACMURALGLDAPAALIG-RXN//UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase) SUBSYSTEM: NAPROTEIN_CLASS: 6.3.2.10 COFACTOR: ADP COFACTOR: __124__Pi__124__ COFACTOR: ATP GENERIC: false TYPE: small HOLE: false

Reaction equation

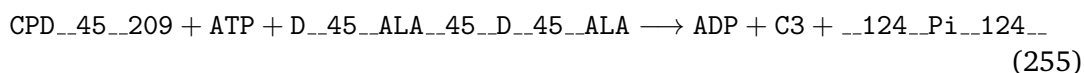


Table 132: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_45_209	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysine	ADP	ADP
ATP	ATP	C3	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine
D_45_ALA_45_D_45_ALA	D-alanyl-D-alanine	_124_Pi_124	phosphate

Kinetic Law

$$v_{128} = \text{not specified} \quad (256)$$

5.129. Reaction IGPSYN_45_RXN

This is an irreversible reaction of one reactant forming three products.

Name indole-3-glycerol-phosphate synthase

Notes GENE_ASSOCIATION: (BU279_trpC)PROTEIN_ASSOCIATION: (Tryptophan biosynthesis protein trpCF [Includes: Indole-3-glycerol phosphate synthase (IGPS); N-(5'-phospho- ribosyl)anthranilate isomerase (PRAI)]//IGPSYN-RXN//PRAISOM-RXN)SUBSYSTEM: tryptophan biosynthesisPROTEIN_CLASS: 4.1.1.48SIDE: WATER-SIDE: CARBON_45_DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

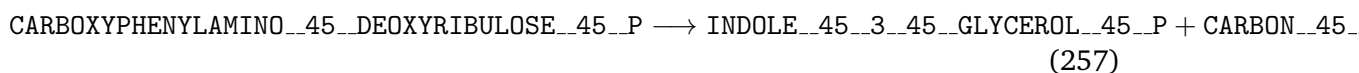


Table 133: Overview of participating species.

Id	Reactants Name	Id	Products Name
__45_	CARBOXYPHENYLAMINO- carboxyphenylamino)	__45_3-	INDOLE- indole-3-glycerol- phosphate
__45__P	DEOXYRIBULOSE- 5'-phosphate	__45_	GLYCEROL-
		__45__P	CARBON- CO2
		__45_	DIOXIDE
		WATER	H2O

Kinetic Law

$$v_{129} = \text{not specified} \quad (258)$$

5.130. Reaction

MYO__45__INOSITOL__45__1OR__45__4__45__MONOPHOSPHATASE__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Myo-inositol-1(or 4)-monophosphatase

Notes GENE_ASSOCIATION: (BU285_suhB)PROTEIN_ASSOCIATION: (Inositol-1-monophosphatase (IMPase) (Inositol-1- phosphatase) (I-1-Pase)//MYO-INOSITOL-1(OR-4)-MONOPHOSPHATASE-RXN)SUBSYSTEM: myo-inositol biosynthesisPROTEIN_CLASS: 3.1.3.25SIDE: WATERSIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

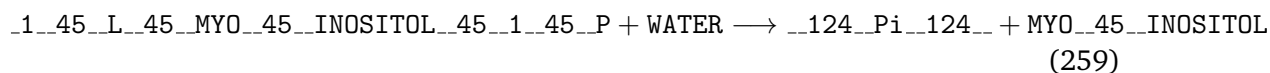
Reaction equation

Table 134: Overview of participating species.

Id	Reactants Name	Id	Products Name
_1_45_- L_45_- _MYO- _45_- _INOSITOL- _45_1- _45_P WATER	D-myo- inositol (3)- monophosphate H2O	_124- _Pi_- _124_	phosphate myo-inositol
		MYO- _45_- _INOSITOL	

Kinetic Law

$$v_{130} = \text{not specified} \quad (260)$$

5.131. Reaction _2_46_1_46_1_46_61_45_RXN

This is a reversible reaction of two reactants forming two products.

Name tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase

Notes GENE_ASSOCIATION: (BU261_trmU)PROTEIN_ASSOCIATION: (Probable tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase//tRNA (5-methylaminomethyl-2-thiouridylate)-methyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.1.1.61CO-FACTOR: ADENOSYL_45_HOMO_45_CYScoFACTOR: S_45_ADENOSYLMETHIONINEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

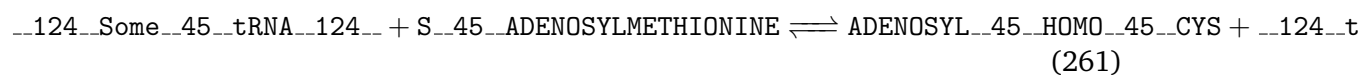


Table 135: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _Some- __45_- _tRNA_- _124__	a tRNA	ADENOSYL- __45_- _HOMO_- _45__CYS	S-adenosyl-L- homocysteine
S__45_- _ADENOSYLMETHYLHOMO-	S-adenosyl-L- adenosine	__124_- _tRNA_- __45_- _Containing- __45_- _5MeAminoMe- __45__2- __45_- _ThioU_- _124__	tRNA con- taining 5- methylaminomethyl- 2-thiouridylate

Kinetic Law

$$v_{131} = \text{not specified} \quad (262)$$

5.132. Reaction ADENOSYLMETHYLHOMOCYSTEINE__45__NUCLEOSIDASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Adenosylhomocysteine nucleosidase

Notes GENE_ASSOCIATION: (BU210_mtnN)PROTEIN_ASSOCIATION: (MTA/SAH nucleosidase (5'-methylthioadenosine nucleosidase) (S-adenosylhomocysteine nucleosidase))SUBSYSTEM: NAPROTEIN_CLASS: 3.2.2.9GENERIC: falseTYPE: small-HOLE: false

Reaction equation

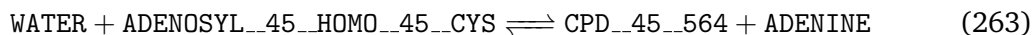


Table 136: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	CPD_- _45_564	S-ribosyl-L- homocysteine
ADENOSYL- _45_- _HOMO_- _45_CYS	S-adenosyl-L- homocysteine	ADENINE	adenine

Kinetic Law

$$v_{132} = \text{not specified} \quad (264)$$

5.133. Reaction ACETATEKIN_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Acetate kinase

Notes GENE_ASSOCIATION: (BU175_ackA)PROTEIN_ASSOCIATION: (Acetate kinase (Acetokinase)//ACETATEKIN-RXN//Acetate kinase)SUBSYSTEM: mixed acid fermentationSUBSYSTEM: acetate formation from acetyl-CoA ISUBSYSTEM: pyruvate fermentation to acetate IISUBSYSTEM: pyruvate fermentation to acetate IVPROTEIN_CLASS: 2.7.2.1COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

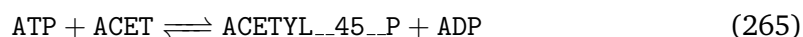


Table 137: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	ACETYL- _45_P	acetylphosphate
ACET	acetate	ADP	ADP

Kinetic Law

$$v_{133} = \text{not specified} \quad (266)$$

5.134. Reaction FMNREDUCT__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name NAD(P)H dehydrogenase (FMN)

Notes GENE_ASSOCIATION: (BU427_cysI) or (BU428_cysJ) PROTEIN_ASSOCIATION: (Sulfite reductase [NADPH] hemoprotein beta-component (SIR-HP) (SIRHP)//SULFITE-REDUCT-RXN) or (Sulfite reductase [NADPH] flavoprotein alpha-component (SIR-FP)//SULFITE-REDUCT-RXN) SUBSYSTEM: two-component alkanesulfonate monooxygenase SUBSYSTEM: 5,6-dimethylbenzimidazole biosynthesis PROTEIN_CLASS: 1.5.1.29 COFACTOR: NAD__45__P__45__OR__45__NOP COFACTOR: FMN COFACTOR: FMNH2 COFACTOR: NADH__45__P__45__OR__45__NOP SIDE: PROTON SIDE: NAD__45__P__45__OR__45__NOP NADH__45__P__45__OR__45__NOP GENERIC: true TYPE: small HOLE: false

Reaction equation



Table 138: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADH__45__P__45__OR__45__NOP	NAD(P)H	FMNH2	FMNH2
FMN	FMN	NAD__45__P__45__OR__45__NOP	NAD(P)+
PROTON	H+		

Kinetic Law

$$v_{134} = \text{not specified} \quad (268)$$

5.135. Reaction 3_45_OXOACYL_45_ACP_45_SYNTH_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name 3-oxoacyl-[acyl-carrier protein] synthase

Notes GENE ASSOCIATION: (BU092_fabB)PROTEIN ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] synthase 1 (3-oxoacyl- [acyl-carrier-protein] synthase I) (Beta-ketoacyl-ACP synthase I) (KAS I)//3-OXOACYL-ACP-SYNTH-BASE-RXN//3-OXOACYL-ACP-SYNTH-RXN//MALONYL-ACPDICARBOXY-RXN)SUBSYSTEM: superpathway of fatty acid biosynthesisSUBSYSTEM: fatty acid elongation – saturatedPROTEIN_CLASS: 2.3.1.41SIDE: _124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_SIDE: MAL-ONYL_45_ACPSIDE: ACPSIDE: CARBON_45_DIOXIDEGENERIC: trueTYPE: macro-HOLE: false

Reaction equation

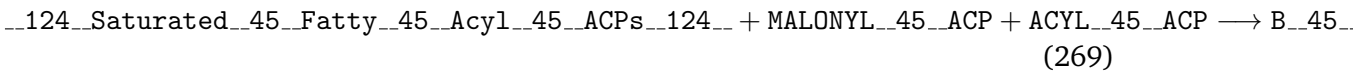


Table 139: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
124	a 2,3,4-saturated	B_45_	a β-
_Saturated_45_	fatty acyl-[acp]	_KETOACYL_45_	-ketoacyl-[acp]
_Fatty_45_		_ACP	
_Acyl_45_			
_ACPs_124_			
MALONYL_45_	a malonyl-[acp]	ACP	a holo-[acp]
_ACP			
ACYL_45_ACP	an acyl-[acp]	CARBON_45_	CO2
		_DIOXIDE	

Kinetic Law

$$v_{135} = \text{not specified}$$

(270)

5.136. Reaction [_3_46_6_46_1_46_41_45_RXN](#)

This is a reversible reaction of two reactants forming one product.

Name Bis(5'-nucleosyl)-tetraphosphatase (symmetrical)

Notes GENE_ASSOCIATION: (BU142_apah)PROTEIN_ASSOCIATION: (Bis(5'-nucleosyl)-tetraphosphatase, symmetrical (Diadenosine tetraphosphatase) (Ap4A hydrolase) (Diadenosine 5',5'''- P1,P4-tetraphosphate pyrophosphohydrolase)//3.6.1.41-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 3.6.1.41GENERIC: falseTYPE: smallHOLE: false

Reaction equation

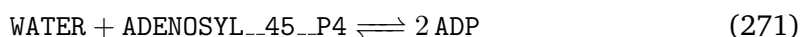


Table 140: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	ADP	ADP
ADENOSYL- _45_P4	5',5'''-diadenosine tetraphosphate		

Kinetic Law

$$v_{136} = \text{not specified} \quad (272)$$

5.137. Reaction [DTMPKI_45_RXN](#)

This is an irreversible reaction of two reactants forming two products.

Name Thymidylate kinase

Notes GENE_ASSOCIATION: (BU353_tmk)PROTEIN_ASSOCIATION: (Thymidylate kinase (dTMP kinase)//DTMPKI-RXN//dTMP kinase)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesSUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.7.4.9COFACTOR: ADPCOFACTOR: ATPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 141: Overview of participating species.

Id	Reactants Name	Id	Products Name
TMP	dTMP	ADP	ADP
ATP	ATP	TDP	dTDP

Kinetic Law

$$v_{137} = \text{not specified} \quad (274)$$

5.138. Reaction THI__45__P__45__KIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Thiamine-phosphate kinase

Notes GENE_ASSOCIATION: (BU460_thiL)PROTEIN_ASSOCIATION: (Thiamine-monophosphate kinase (Thiamine-phosphate kinase)//THI-P-KIN-RXN//Thiamine-phosphate kinase)SUBSYSTEM: thiamine biosynthesisPROTEIN_CLASS: 2.7.4.16COFACTOR: ADP-COFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 142: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	ADP	ADP
THIAMINE-__45__P	thiamine-phosphate	THIAMINE-__45__PYROPHOSPHATE	thiamine diphosphate

Kinetic Law

$$v_{138} = \text{not specified} \quad (276)$$

5.139. Reaction 5_46_4_46_2_46_10_45_RXN

This is an irreversible reaction of one reactant forming one product.

Name Phosphoglucosamine mutase

Notes GENE_ASSOCIATION: (BU381_glmM)PROTEIN_ASSOCIATION: (Phosphoglucosamine mutase//5.4.2.10-RXN//Phosphoglucosamine mutase)SUBSYSTEM: UDP-N-acetyl-D-glucosamine biosynthesis IPROTEIN_CLASS: 5.4.2.10GENERIC: false-TYPE: smallHOLE: false

Reaction equation

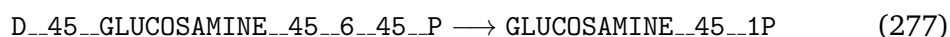


Table 143: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
D_45_- _GLUCOSAMINE _45_6- _45_P	D-glucosamine-6-phosphate	GLUCOSAMINE_45_1P	D-glucosamine 1-phosphate

Kinetic Law

$$v_{139} = \text{not specified} \quad (278)$$

5.140. Reaction RXN0_45_5180

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU236_uppS)PROTEIN_ASSOCIATION: (Undecaprenyl pyrophosphate synthetase (UPP synthetase) (Di-trans,poly-cis-decaprenylcistransferase) (Undecaprenyl diphosphate synthase) (UDS)//Di-trans,poly-cis-decaprenylcistransferase)SUBSYSTEM: undecaprenyl diphosphate biosynthesisPROTEIN_CLASS: 2.5.1.31SIDE: PPISIDE: DELTA3_45_ISOPENTENYL_45_PPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

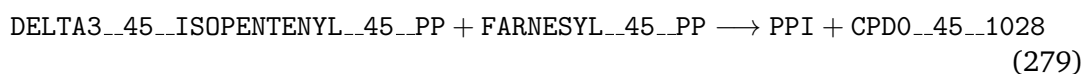


Table 144: Overview of participating species.

Id	Reactants Name	Id	Products Name
DELTA3- __45_- __ISOPENTENYL- __45__PP	isopentenyl diphosphate	PPI	diphosphate
FARNESYL- __45__PP	(E,E)-farnesyl diphosphate	CPD0- __45_- _1028	2-cis,6- trans,10-trans- geranylgeranyl diphosphate

Kinetic Law

$$v_{140} = \text{not specified} \quad (280)$$

5.141. Reaction DEOXYGUANPHOSPHOR__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of guanine, xanthine, and their nucleosidesSUBSYSTEM: purine deoxyribonucleosides degradationPROTEIN_CLASS: NASIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation

Table 145: Overview of participating species.

Id	Reactants Name	Id	Products Name
DEOXYGUANOSINE	deoxyguanosine	DEOXY- __45_- RIBOSE- __45__1P	deoxyribose-1- phosphate

Reactants		Products	
Id	Name	Id	Name
__124- _Pi_ _124__	phosphate	GUANINE	guanine

Kinetic Law

$$v_{141} = \text{not specified} \quad (282)$$

5.142. Reaction ASPCARBTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Aspartate carbamoyltransferase

Notes GENE_ASSOCIATION: (BU369_pyrB) or (BU370_pyrI) PROTEIN_ASSOCIATION: (Aspartate carbamoyltransferase catalytic chain (Aspartate transcarbamylase) (ATCase)//ASPCARBTRANS__45__RXN//Aspartate carbamoyltransferase) or (Aspartate carbamoyltransferase regulatory chain) SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphate SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesis SUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotides PROTEIN_CLASS: 2.1.3.2 SIDE: __124__Pi__124__SIDE: L__45__ASPARTATE GENERIC: false TYPE: small HOLE: false

Reaction equation

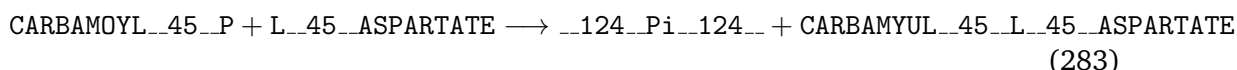


Table 146: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CARBAMOYL- __45__P	carbamoyl- phosphate	__124- _Pi_ _124__	phosphate
L__45_- _ASPARTATE	L-aspartate	CARBAMYUL-N-carbamoyl-L- __45__L- _45_- _ASPARTATE	aspartate

Kinetic Law

$$v_{142} = \text{not specified} \quad (284)$$

5.143. Reaction GUANPRIBOSYLTRAN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU251_gpt) or (BU195_hpt) PROTEIN_ASSOCIATION: (Xanthine phosphoribosyltransferase (Xanthine-guanine phosphoribosyltransferase) (XGPRT)//XANPRIBOSYLTRAN-RXN//Xanthine phosphoribosyltransferase) or (Hypoxanthine phosphoribosyltransferase (HPRT)//GUANPRIBOSYLTRAN-RXN//HYPOXANPRIBOSYLTRAN-RXN//Hypoxanthine phosphoribosyltransferase) SUBSYSTEM: salvage pathways of guanine, xanthine, and their nucleosides SUBSYSTEM: salvage pathways of purine and pyrimidine nucleotides PROTEIN_CLASS: 2.4.2.8 SIDE: PPI GENERIC: false TYPE: small HOLE: false

Reaction equation



Table 147: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PPI	diphosphate
GUANINE	guanine	GMP	GMP

Kinetic Law

$$v_{143} = \text{not specified} \quad (286)$$

5.144. Reaction DIHYDROXYMETVALDEHYDRAT__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Dihydroxy-acid dehydratase

Notes GENE_ASSOCIATION: (BU600_ilvD) PROTEIN_ASSOCIATION: (Dihydroxy-acid dehydratase (DAD)//DIHYDROXYISOVALDEHYDRAT-RXN//DIHYDROXYMETVALDEHYDRAT-RXN)

RXN//Dihydroxy-acid dehydratase)SUBSYSTEM: isoleucine biosynthesis IISUB-
SYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYS-
TEM: isoleucine biosynthesis from threoninePROTEIN_CLASS: 4.2.1.9SIDE: WA-
TERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

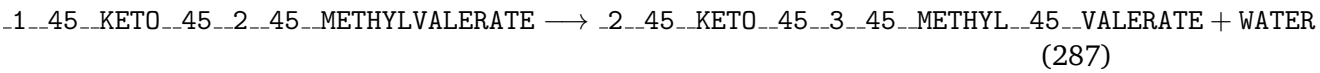


Table 148: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
<code>_1_45_KETO_45_2_45_METHYLVALERATE</code>	2,3-dihydroxy-3-methylvalerate	<code>_2_45_KETO_45_3_45_METHYL_45_VALERATE</code>	2-keto-3-methylvalerate
		<code>WATER</code>	H2O

Kinetic Law

$v_{144} = \text{not specified}$ (288)

5.145. Reaction

`TRNA_45_GUANINE_45_N1_45_45_METHYLTRANSFERASE_45_RXN`

This is a reversible reaction of two reactants forming two products.

Name tRNA (guanine-N1-)-methyltransferase

Notes GENE_ASSOCIATION: (BU396_trmD)PROTEIN_ASSOCIATION: (tRNA (guanine-N(1)-)-methyltransferase (M1G- methyltransferase) (tRNA [GM37] methyltransferase)//TRNA-(GUANINE-N1-)-METHYLTRANSFERASE-RXN//tRNA (guanine-N(1)-)-methyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.1.1.31COFACTOR: ADENOSYL_45_HOMO_45_CYS COFACTOR: S_45_ADENOSYLMETHIONINEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

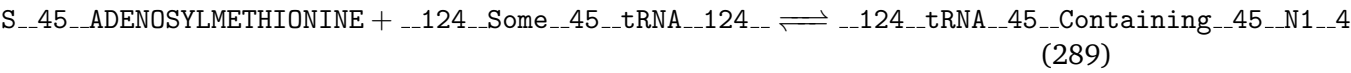


Table 149: Overview of participating species.

Id	Reactants Name	Id	Products Name
S__45_- _ADENOSYL- _METHYL- _HOMO- _CYS	S-adenosyl-L- homocysteine	__124_- _tRNA- _45_- _Containing- _45_- _N1- _45_- _Methylguanine- _124_- ADENOSYL- _45_- _HOMO- _45_- _CYS	tRNA con- taining N1- methylguanine
__124_- _Some- _45_- _tRNA- _124_-	a tRNA		S-adenosyl-L- homocysteine

Kinetic Law

$$v_{145} = \text{not specified} \quad (290)$$

5.146. Reaction DNA__45__DIRECTED__45__DNA__45__POLYMERASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name DNA-directed DNA polymerase

Notes GENE_ASSOCIATION: (BU248_dnaQ) or (BU354_holB) or (BU481_dnaX) or (BU011_dnaN) or (BU445_holA) or (BU238_dnaE) PROTEIN_ASSOCIATION: (DNA polymerase III subunit epsilon) or (DNA polymerase III subunit delta') or (DNA polymerase III subunit gamma) or (DNA polymerase III subunit beta) or (DNA polymerase III subunit delta) or (DNA polymerase III subunit alpha//DNA-DIRECTED-DNA-POLYMERASE-RXN) SUBSYSTEM: NAPROTEIN_CLASS: 2.7.7.7 GENERIC: true TYPE: macro HOLE: false

Reaction equation

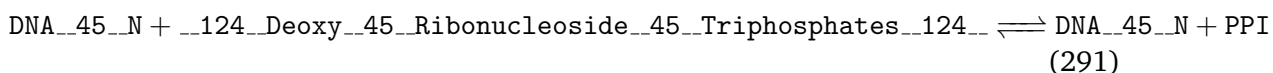


Table 150: Overview of participating species.

Id	Reactants Name	Id	Products Name
DNA_45_N	DNAn	DNA_45_N	DNAn
__124_	a	PPI	diphosphate
Deoxy_45_	deoxyribonucleoside triphosphate		
Ribonucleoside_45_			
Triphosphates_124_			

Kinetic Law

$$v_{146} = \text{not specified} \quad (292)$$

5.147. Reaction RXN_45_8442

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: NAPROTEIN_CLASS: 2.4.2.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation

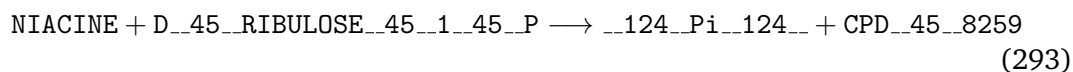


Table 151: Overview of participating species.

Id	Reactants Name	Id	Products Name
NIACINE	nicotinate	__124_	phosphate
		__Pi_	
		124_	

Reactants		Products		
Id	Name	Id	Name	
D__45_- _RIBULOSE-phosphate _45__1- _45__P	D-ribulose-1-phosphate	CPD_- _45_- _8259	nicotinate side	ribo-

Kinetic Law

$$v_{147} = \text{not specified} \quad (294)$$

5.148. Reaction ARGSUCCINLYA__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Argininosuccinate lyase

Notes GENE_ASSOCIATION: (BU051_argH)PROTEIN_ASSOCIATION: (Argininosuccinate lyase (Arginosuccinase) (ASAL)//ARGSUCCINLYA-RXN//Argininosuccinate lyase)SUBSYSTEM: arginine biosynthesis IIISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 4.3.2.1SIDE: FUMGENERIC: falseTYPE: smallHOLE: false

Reaction equation

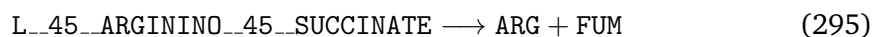


Table 152: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L__45_- _ARGININO-succinate _45_- _SUCCINATE	L-arginino-succinate	ARG	L-arginine
		FUM	fumarate

Kinetic Law

$$v_{148} = \text{not specified} \quad (296)$$

5.149. Reaction HISTAMINOTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Histidinol-phosphate aminotransferase

Notes GENE_ASSOCIATION: (BU101_hisC)PROTEIN_ASSOCIATION: (Histidinol-phosphate aminotransferase (Imidazole acetol- phosphate transaminase)//HISTAMINOTRANS-RXN)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 2.6.1.9COFACTOR: _2__45__KETOGLUTARATEGLTSIDE: _2__45__KETOGLUTARATESIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

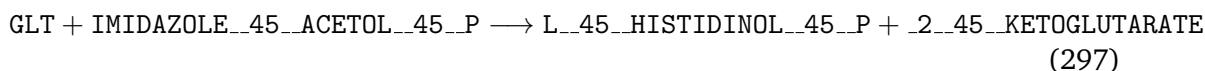


Table 153: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GLT	L-glutamate	L__45__- _HISTIDINOL- _phosphate _45__P	L-histidinol- phosphate
IMIDAZOLE- _45__- _ACETOL- _45__P	imidazole acetol- phosphate	_2__45__- _KETOGLUTARATE	2-ketoglutarate

Kinetic Law

$$v_{149} = \text{not specified} \quad (298)$$

5.150. Reaction UDP__45__NACMURALGLDAPLIG__45__RXN

This is a reversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanyl-D-glutamate–2,6-diaminopimelate ligase

Notes GENE_ASSOCIATION: (BU221_murE)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoylalanyl-D-glutamate–2,6-diaminopimelate ligase (UDP-N-acetylmuramyl-tripeptide synthetase) (Meso- diaminopimelate-adding enzyme) (UDP-MurNAc-tripeptide synthetase)//UDP-NACMURALGLDAPLIG-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 6.3.2.13COFAC-

TOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPGENERIC: falseTYPE: small-
HOLE: false

Reaction equation

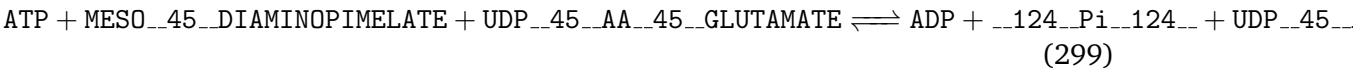


Table 154: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
MESO__45__	meso-	__124__	phosphate
DIAMINOPIMELATE	diaminopimelate	__Pi__	
UDP__45__	UDP-N-	__124__	
AA__45__	acetylmuramoyl-	UDP__45__	UDP-N-
GLUTAMATE	L-alanyl-D-	__45__	acetylmuramoyl-
	glutamate	AAGM__45__	L-alanyl-D-
		DIAMINOHEPTANEDIOATE	glutamyl-
			di-aminoheptanedioate

Kinetic Law

v_{150} = not specified (300)

5.151. Reaction DEOXYINOPHOSPHOR__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU541_deoD)PROTEIN ASSOCIATION: (Purine nucleo-
side phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-
RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: salvage pathways of adenine, hypox-
anthine, and their nucleosidesSUBSYSTEM: purine deoxyribonucleosides degrada-
tionPROTEIN_CLASS: NASIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE:
false

Reaction equation

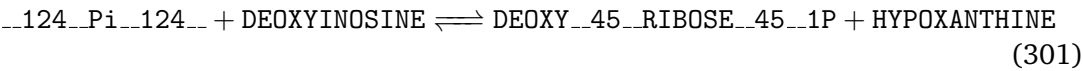


Table 155: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
124- _Pi_- _124_	phosphate	DEOXY- _45_- RIBOSE- _45_1P	deoxyribose-1- phosphate
DEOXYINOSINE	deoxyinosine	HYPOXANTHINE	hypoxanthine

Kinetic Law

$$v_{151} = \text{not specified} \quad (302)$$

5.152. Reaction ACETOOHBUTSYN_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Acetolactate synthase

Notes GENE_ASSOCIATION: (BU225_ilvH) or (BU226_ilvI)PROTEIN_ASSOCIATION: (Acetolactate synthase small subunit (AHAS) (Acetohydroxy- acid synthase small subunit) (ALS)//ACETOLACTSYN-RXN//ACETOOHBUTSYN-RXN//Acetolactate synthase) or (Acetolactate synthase large subunit (AHAS) (Acetohydroxy- acid synthase large subunit) (ALS)//ACETOLACTSYN-RXN//ACETOOHBUTSYN-RXN//Acetolactate synthase)SUBSYSTEM: isoleucine biosynthesis IIISUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: isoleucine biosynthesis from threoninePROTEIN_CLASS: 2.2.1.6SIDE: PYRUVATESIDE: CARBON_45_DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

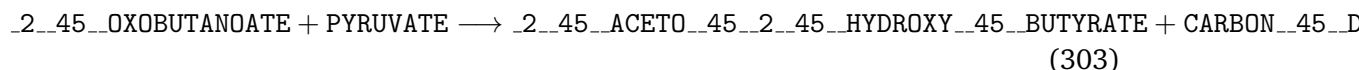


Table 156: Overview of participating species.

Id	Reactants Name	Id	Products Name
_2_45_- _OXOBUTANOATE	2-oxobutanoate	_2_45_- _ACETO- _45_2- _45_- _HYDROXY- _45_- _BUTYRATE	2-aceto-2- hydroxy-butyrate
PYRUVATE	pyruvate	CARBON- _45_- _DIOXIDE	CO ₂

Kinetic Law

$$v_{152} = \text{not specified} \quad (304)$$

5.153. Reaction UDPNACETYLGLUCOSAMENOLPYRTRANS_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name UDP-N-acetylglucosamine 1-carboxyvinyltransferase

Notes GENE_ASSOCIATION: (BU386_murA)PROTEIN_ASSOCIATION: (UDP-N-acetylglucosamine 1-carboxyvinyltransferase (Enoylpyruvate transferase) (UDP-N-acetylglucosamine enolpyruvyl transferase) (EPT)//UDPNACETYLGLUCOSAMENOLPYRTRANS-RXN//UDP-N-acetylglucosamine 1-carboxyvinyltransferase)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 2.5.1.7SIDE: _124_Pi_124_SIDE: PHOSPHO_45_ENOL_45_PYRUVATEG falseTYPE: smallHOLE: false

Reaction equation

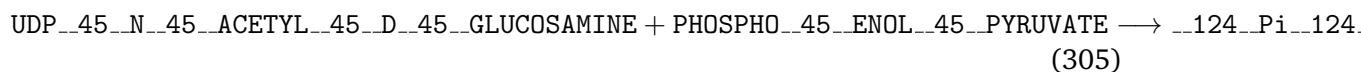


Table 157: Overview of participating species.

Id	Reactants Name	Id	Products Name
UDP_-- _45_--N-- _45_-- _ACETYL-- _45_--D-- _45_-- _GLUCOSAMINE	UDP-N-acetyl-D-glucosamine	_124_-- _Pi_-- _124_--	phosphate
PHOSPHO_-- _45_-- _ENOL-- _45_-- _PYRUVATE	phosphoenolpyruvate	UDP_-- _45_-- _ACETYL-- _45_-- _CARBOXYVINYL-- _45_-- _GLUCOSAMINE	UDP-GlcNAc-enolpyruvate

Kinetic Law

$$v_{153} = \text{not specified} \quad (306)$$

5.154. Reaction ADENYL_45_KIN_45_RXN

This is an irreversible reaction of two reactants forming one product.

Name Adenylate kinase

Notes GENE_ASSOCIATION: (BU484_adk)PROTEIN_ASSOCIATION: (Adenylate kinase (ATP-AMP transphosphorylase)//ADENYL-KIN-RXN//Adenylate kinase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis ISUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.7.4.3COFACTOR: ADPCOFACTOR: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

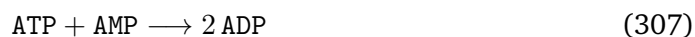


Table 158: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	ADP	ADP
AMP	AMP		

Kinetic Law

$$v_{154} = \text{not specified} \quad (308)$$

5.155. Reaction GLYOXII_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Hydroxyacylglutathione hydrolase

Notes GENE_ASSOCIATION: (BU246_gloB)PROTEIN_ASSOCIATION: (Hydroxyacylglutathione hydrolase (Glyoxalase II) (Glx II)//GLYOXII-RXN//Hydroxyacylglutathione hydrolase)SUBSYSTEM: methylglyoxal degradation IPROTEIN_CLASS: 3.1.2.6SIDE: WATERSIDE: GLUTATHIONEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

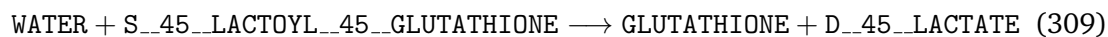


Table 159: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	GLUTATHIONE	Glutathione
S_45_- _LACTOYL- _45_- _GLUTATHIONE	S-lactoyl- glutathione	D_45_- _LACTATE	D-lactate

Kinetic Law

$$v_{155} = \text{not specified} \quad (310)$$

5.156. Reaction PPENTOMUT__45__RXN

This is a reversible reaction of one reactant forming one product.

Name Phosphopentomutase

Notes GENE_ASSOCIATION: (BU542_deoB)PROTEIN_ASSOCIATION: (Phosphopentomutase (Phosphodeoxyribomutase)//D-PPENTOMUT-RXN//PPENTOMUT-RXN//Phosphopentomutase)SUBSYSTEM: PRPP biosynthesis IISUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: degradation of purine ribonucleosidesSUBSYSTEM: degradation of pyrimidine ribonucleosidesPROTEIN_CLASS: 5.4.2.7GENERIC: falseTYPE: smallHOLE: false

Reaction equation

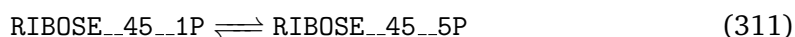


Table 160: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
RIBOSE-__45__1P	ribose-1-phosphate	RIBOSE-__45__5P	D-ribose-5-phosphate

Kinetic Law

$$v_{156} = \text{not specified} \quad (312)$$

5.157. Reaction NACGLCTRANS__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Undecaprenyldiphospho-muramoylpentapeptide β-N- acetylglucosaminyltransferase

Notes GENE_ASSOCIATION: (BU216_murG)PROTEIN_ASSOCIATION: (UDP-N-acetylglucosamine-N-acetylmuramyl-(pentapeptide) pyrophosphoryl-undecaprenol N-acetylglucosamine transferase (Undecaprenyl-PP-MurNAc-pentapeptide-UDPGlcNAc GlcNAc transferase)//NACGLCTRANS__45__RXN)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 2.4.1.227COFACTOR: UDPCOFACTOR: UDP__45__N__45__ACETYL__45__D__45__GLUCOSAMINEGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 161: Overview of participating species.

Id	Reactants Name	Id	Products Name
UDP_- _45_N- _45_- _ACETYL- _45_D- _45_- _GLUCOSAMINE	UDP-N-acetyl-D-glucosamine	UDP	UDP
C5	N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenol	C6	N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine

Kinetic Law

$$v_{157} = \text{not specified} \quad (314)$$

5.158. Reaction CARBPSYN_45_RXN

This is an irreversible reaction of four reactants forming four products.

Name carbamoyl-phosphate synthetase (glutamine-hydrolysing)

Notes GENE_ASSOCIATION: (BU145_carA) or (BU144_carB) PROTEIN_ASSOCIATION: (Carbamoyl-phosphate synthase small chain (Carbamoyl- phosphate synthetase glutamine chain)//CARBPSYN-RXN) or (Carbamoyl-phosphate synthase large chain (Carbamoyl- phosphate synthetase ammonia chain)//CARBPSYN-RXN) SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphate SUBSYSTEM: super-pathway of histidine, purine and pyrimidine biosynthesis SUBSYSTEM: arginine

biosynthesis IIISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesSUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 6.3.5.5COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: WATERSIDE: ADPSIDE: __124__Pi__124__SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

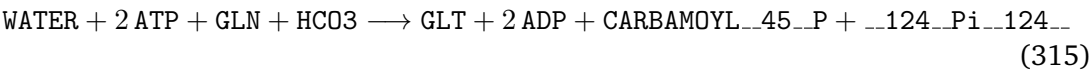


Table 162: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	GLT	L-glutamate
ATP	ATP	ADP	ADP
GLN	L-glutamine	CARBAMOYL-carbamoyl-	
		_45_P	phosphate
HCO3	HCO3-	_124-	phosphate
		Pi-	
		_124__	

Kinetic Law

$$v_{158} = \text{not specified}$$
(316)

5.159. Reaction DXS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU464_dxs)PROTEIN ASSOCIATION: (1-deoxy-D-xylulose-5-phosphate synthase (1-deoxyxylulose- 5-phosphate synthase) (DXP synthase) (DXPS)//DXS-RXN//1-deoxy-D-xylulose-5-phosphate synthase)SUBSYSTEM: pyridoxal 5'-phosphate biosynthesisSUBSYSTEM: methylerythritol phosphate pathway-SUBSYSTEM: thiamine biosynthesisPROTEIN_CLASS: 2.2.1.7SIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

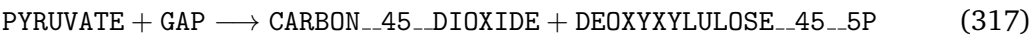


Table 163: Overview of participating species.

Id	Reactants Name	Id	Products Name
PYRUVATE	pyruvate	CARBON- __45_- DIOXIDE	CO2
GAP	D- glyceraldehyde-3- phosphate	DEOXYXYLULOSE- __45_5P	Deoxy-D- xylulose 5- phosphate

Kinetic Law

$$v_{159} = \text{not specified} \quad (318)$$

5.160. Reaction L__45__GLN__45__FRUCT__45__6__45__P__45__AMINOTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Glucosamine–fructose-6-phosphate aminotransferase (isomerizing)

Notes GENE_ASSOCIATION: (BU026_glmS)PROTEIN_ASSOCIATION: (Glucosamine–fructose-6-phosphate aminotransferase [isomerizing] (Hexosephosphate aminotransferase) (D-fructose-6- phosphate amidotransferase) (GFAT) (L-glutamine-D-fructose-6-phosphate amidotransferase) (Glucosamine-6-phosphate synthase)//L-GLN-FRUCT-6-P-AMINOTRANS-RXN)SUBSYSTEM: UDP-N-acetyl-D-glucosamine biosynthesis IPROTEIN_CLASS: 2.6.1.16SIDE: GLNSIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

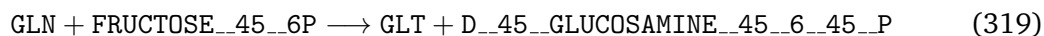


Table 164: Overview of participating species.

Id	Reactants Name	Id	Products Name
GLN	L-glutamine	GLT	L-glutamate
FRUCTOSE- __45__6P	fructose-6- phosphate	D__45_- GLUCOSAMINE- __45__6- __45__P	D-glucosamine-6- phosphate

Kinetic Law

$$v_{160} = \text{not specified} \quad (320)$$

5.161. Reaction _3_45_ISOPROPYLMALDEHYDROG_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name 3-isopropylmalate dehydrogenase

Notes GENE_ASSOCIATION: (BUpl05_leuB)PROTEIN_ASSOCIATION: (3-isopropylmalate dehydrogenase (Beta-IPM dehydrogenase) (IMDH) (3-IPM-DH)//3-ISOPROPYLMALDEHYDROG-RXN//3-isopropylmalate dehydrogenase)SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: leucine biosynthesisPROTEIN_CLASS: 1.1.1.85COFACTOR: NADCOFACTOR: NADHSIDE: PROTONSIDE: NADSIDE: NAD-HGENERIC: falseTYPE: smallHOLE: false

Reaction equation

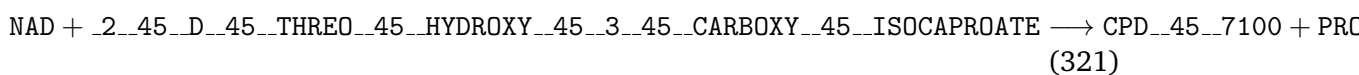


Table 165: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	CPD_45_7100	2-isopropyl-3-oxosuccinate
_2_45_D_45_THREO_45_HYDROXY_45_3_45_CARBOXY_45_ISOCAPROATE	3-isopropylmalate	PROTON	H+
		NADH	NADH

Kinetic Law

$$v_{161} = \text{not specified} \quad (322)$$

5.162. Reaction SERINE__45___45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Serine-tRNA ligase

Notes GENE_ASSOCIATION: (BU313_serS)PROTEIN_ASSOCIATION: (Seryl-tRNA synthetase (Seryl-tRNA(Ser/Sec) synthetase) (Serine-tRNA ligase) (SerRS)//RXN0-2161//SERINE-TRNA-LIGASE-RXN//Serine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.11COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

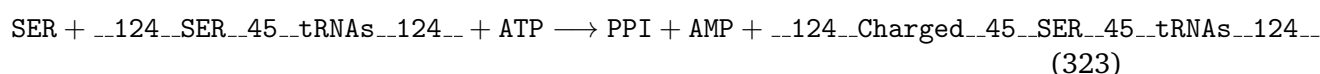


Table 166: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
SER	L-serine	PPI	diphosphate
__124__SER__45__tRNAs__124__	tRNAs _{ser}	AMP	AMP
ATP	ATP	__124__Charged__45__SER__45__tRNAs__124__	L-seryl-tRNAs _{ser}

Kinetic Law

$$v_{162} = \text{not specified} \quad (324)$$

5.163. Reaction HEMEOSYN__45__RXN

This is a reversible reaction of three reactants forming two products.

Name heme o biosynthesis

Notes GENE_ASSOCIATION: (BU468_cyoE)PROTEIN_ASSOCIATION: (Protoheme IX farnesyltransferase (Heme O synthase))SUBSYSTEM: NAPROTEIN.CLASS: 2.5.1.-
GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 167: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FARNESYL__45__PP	(E,E)-farnesyl diphosphate	PPI	diphosphate
WATER	H2O	HEME_O	heme o
PROTOHEME	protoheme IX		

Kinetic Law

$$v_{163} = \text{not specified} \quad (326)$$

5.164. Reaction GLUTCYSLIG__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Glutamate–cysteine ligase

Notes GENE_ASSOCIATION: (BU407_gshA)PROTEIN_ASSOCIATION: (Glutamate–cysteine ligase (Gamma-glutamylcysteine synthetase) (Gamma-ECS) (GCS)//GLUTCYSLIG-RXN//Glutamate–cysteine ligase)SUBSYSTEM: glutathione biosynthesisPROTEIN.CLASS: 6.3.2.2COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADP-SIDE: __124__Pi__124__SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

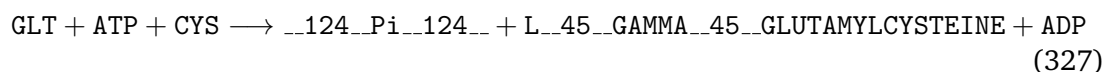


Table 168: Overview of participating species.

Id	Reactants Name	Id	Products Name
GLT	L-glutamate	__124- __Pi_- _124__	phosphate
ATP	ATP	L__45_- _GAMMA- _45_- _GLUTAMYL CYSTEINE	L-γ- glutamylcysteine
CYS	L-cysteine	ADP	ADP

Kinetic Law

$$v_{164} = \text{not specified} \quad (328)$$

5.165. Reaction GLYOHMETRANS__45__RXN

This is a reversible reaction of two reactants forming three products.

Name glycine hydroxymethyltransferase

Notes GENE_ASSOCIATION: (BU289_glyA)PROTEIN_ASSOCIATION: (Serine hydroxymethyltransferase (Serine methylase) (SHMT)//GLYOHMETRANS-RXN)SUBSYSTEM: formaldehyde assimilation I (serine pathway)SUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: glycine biosynthesis ISUBSYSTEM: superpathway of serine and glycine biosynthesis ISUBSYSTEM: folate polyglutamylation ISUBSYSTEM: folate transformationsPROTEIN_CLASS: 2.1.2.1COFACTOR: METHYLENE__45__THFCOFACTOR: THFSIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 169: Overview of participating species.

Id	Reactants Name	Id	Products Name
SER	L-serine	METHYLENE-5,10-methylene- __45_- _THF	THF

Id	Reactants Name	Id	Products Name
THF	tetrahydrofolate	WATER GLY	H2O glycine

Kinetic Law

$$v_{165} = \text{not specified} \quad (330)$$

5.166. Reaction ACETYLORNTRANSAM__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Acetylornithine aminotransferase

Notes GENE_ASSOCIATION: (BU534_argD)PROTEIN_ASSOCIATION: (Acetylornithine/succinyldiaminop
aminotransferase (ACOAT) (Succinyldiaminopimelate transferase) (DapATase)//ACETYLORNTRANS
RXN//SUCCINYLDIAMINOPIMTRANS-RXN)SUBSYSTEM: ornithine biosynthesis-
SUBSYSTEM: arginine biosynthesis IIISUBSYSTEM: arginine biosynthesis ISUB-
SYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 2.6.1.11COFAC-
TOR: _2__45__KETOGLUTARATECOFACTOR: GLTSIDE: _2__45__KETOGLUTARATEGENERIC:
falseTYPE: smallHOLE: false

Reaction equation

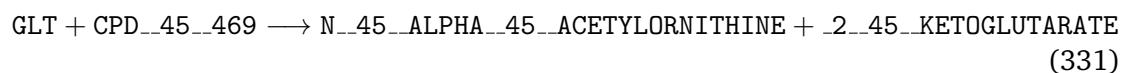


Table 170: Overview of participating species.

Id	Reactants Name	Id	Products Name
GLT	L-glutamate	N__45_- _ALPHA- __45_- _ACETYLORNITHINE	N-acetyl-L- ornithine
CPD_- _45__469	N-acetyl-L- glutamate semialdehyde	5- _2__45_- _KETOGLUTARATE	2-ketoglutarate

Kinetic Law

$$v_{166} = \text{not specified} \quad (332)$$

5.167. Reaction ACETYLGLUTKIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Acetylglutamate kinase

Notes GENE_ASSOCIATION: (BU049_argB)PROTEIN_ASSOCIATION: (Acetylglutamate kinase (NAG kinase) (AGK) (N-acetyl-L- glutamate 5-phosphotransferase)//ACETYLGLUTKIN-RXN//Acetylglutamate kinase)SUBSYSTEM: ornithine biosynthesisSUBSYSTEM: arginine biosynthesis IISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 2.7.2.8COFACTOR: ADPCOFACITOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 171: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ACETYL- __45_- _GLU	N-acetyl-L- glutamate	N__45_- _ACETYL- __45_- _GLUTAMYL- __45__P	N-acetylglutamyl- phosphate
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{167} = \text{not specified} \quad (334)$$

5.168. Reaction RXN__45__7562

This is a reversible reaction of two reactants forming two products.

Name Acetylornithine aminotransferase

Notes GENE ASSOCIATION: (BU534_argD)PROTEIN ASSOCIATION: (Acetylornithine/succinyldiaminop
aminotransferase (ACOAT) (Succinyldiaminopimelate transferase) (DapATase)//ACETYLORNTRANS
RXN//SUCCINYLDIAMINOPIMTRANS-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 2.6.1.11CO-
FACTOR: _2__45__KETOGLUTARATECOFACTOR: GLTGENERIC: falseTYPE: small-
HOLE: false

Reaction equation

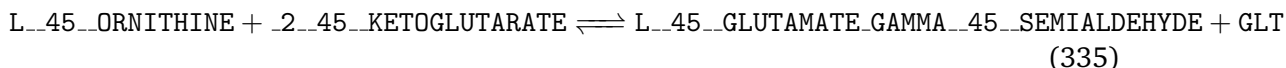


Table 172: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L_45_- _ORNITHINE	L-ornithine	L_45_- _GLUTAMATEγ- _GAMMA- _45_- _SEMIALDEHYDE	L-glutamate semialdehyde
_2_45_- _KETOGLUTARATE	2-ketoglutarate	GLT	L-glutamate

Kinetic Law

$$v_{168} = \text{not specified} \tag{336}$$

5.169. Reaction RXN_45_7800

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE ASSOCIATION: NAPROTEIN ASSOCIATION: NASUBSYSTEM: superpath-
way of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: leucine biosynthe-
sisPROTEIN_CLASS: NASIDE: CARBON_45_DIOXIDEGENERIC: falseTYPE: small-
HOLE: false

Reaction equation



Table 173: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_45_7100	2-isopropyl-3-oxosuccinate	_2K_45_4CH3_45_PENTANOATE CARBON_45_DIOXIDE	2-ketoisocaproate CO2

Kinetic Law

$$v_{169} = \text{not specified} \quad (338)$$

5.170. Reaction 4_46_2_46_99_46_18_45_RXN

This is a reversible reaction of two reactants forming one product.

Name DNA-(apurinic or apyrimidinic site) lyase

Notes GENE_ASSOCIATION: (BU119_nth)PROTEIN_ASSOCIATION: (Endonuclease III (DNA-(apurinic or apyrimidinic site) lyase)//RXN0-2601//DNA-(apurinic or apyrimidinic site) lyase)SUBSYSTEM: NAPROTEIN_CLASS: 4.2.99.18GENERIC: trueTYPE: macroHOLE: false

Reaction equation

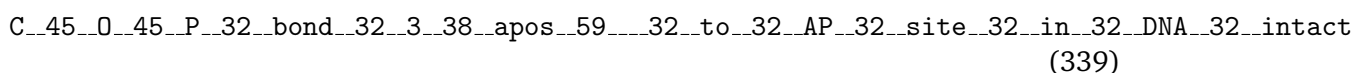


Table 174: Overview of participating species.

Id	Reactants Name	Id	Products Name
C_45_-	NA	C_45_-	NA
_O_45_-		_O_45_-	
_P_32-		_P_32-	
_bond-		_bond-	
32-		_32_-	
_3_38-		_3_38-	
_apos-		_apos-	
59-		_59_-	
_32_to-		_32_to-	
32-		_32_-	
_AP_32-		_AP_32-	
_site-		_site-	
32-		_32_-	
_in_32-		_in_32-	
_DNA-		_DNA-	
32-		_32_is-	
_intact		_32_-	
		_broken-	
		46-	
		32-	
		_3_38-	
		_apos-	
		59-	
		45-	
		_terminal-	
		32-	
		_unsaturated-	
		32-	
		_sugar-	
		32-	
		and-	
		_32_a-	
		32-	
		_product-	
		32-	
		with-	
		_32_a-	
		32-	
		_terminal-	
		32-	
		_5_38-	
		_apos-	
		59-	
		45-	
		_phosphate	

Id	Reactants Name	Id	Products Name
__124- _DNA- _45_- _containing- _45_- _abasic- _45_- _Sites_- _124__	a DNA containing abasic site		

Kinetic Law

$$v_{170} = \text{not specified} \quad (340)$$

5.171. Reaction CYSTEINE_45___45__TRNA_45__LIGASE_45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Cysteine-tRNA ligase

Notes GENE_ASSOCIATION: (BU487_cysS)PROTEIN_ASSOCIATION: (Cysteinyl-tRNA synthetase (Cysteine-tRNA ligase) (CysRS)//CYSTEINE-TRNA-LIGASE-RXN//Cysteine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.16CO-FACTOR: PPICOFATOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

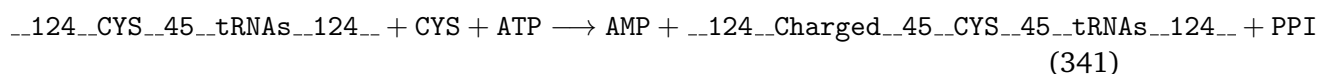


Table 175: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- _CYS- _45_- _tRNAs_- _124__	tRNAcys	AMP	AMP

Reactants		Products	
Id	Name	Id	Name
CYS	L-cysteine	__124_- _Charged- _45_- _CYS- _45_- _tRNAs_- _124__	L-cysteinyl- tRNAcys
ATP	ATP	PPI	diphosphate

Kinetic Law

$$v_{171} = \text{not specified} \quad (342)$$

5.172. Reaction __2__46__7__46__3__46__9__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Phosphoenolpyruvate–protein phosphatase

Notes GENE_ASSOCIATION: (BU064_ptsI)PROTEIN_ASSOCIATION: (Phosphoenolpyruvate-
protein phosphotransferase (Phosphotransferase system, enzyme I))SUBSYSTEM:
NAPROTEIN_CLASS: 2.7.3.9GENERIC: trueTYPE: macroHOLE: false

Reaction equation

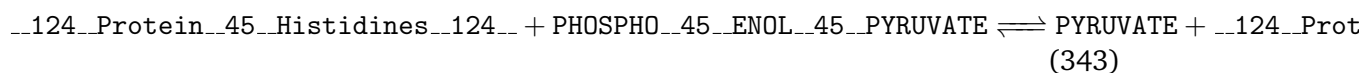


Table 176: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- _Protein- _45_- _Histidines- _124__	a protein histi- dine	PYRUVATE	pyruvate

Id	Reactants Name	Id	Products Name
PHOSPHO- _45_- _ENOL- _45_- _PYRUVATE	phosphoenolpyruvate	124_- a Protein- _45_3- _45_- _phospho- _45_L- _45_- _histidines- _124_-	protein-N- π-phospho-L- histidine

Kinetic Law

$$v_{172} = \text{not specified}$$

(344)

5.173. Reaction 1_46_17_46_1_46_2_45_RXN

This is a reversible reaction of three reactants forming two products.

Name 4-hydroxy-3-methylbut-2-enyl diphosphate reductase

Notes GENE_ASSOCIATION: (BU147_ispH)PROTEIN_ASSOCIATION: (4-hydroxy-3-methylbut-2-enyl diphosphate reductase//ISPH2-RXN//RXN0-884//4-hydroxy-3-methylbut-2-enyl diphosphate reductase)SUBSYSTEM: NAPROTEIN_CLASS: 1.17.1.2CO-FACTOR: NAD_45_P_45_OR_45_NOPCOFACTOR: NADH_45_P_45_OR_45_NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

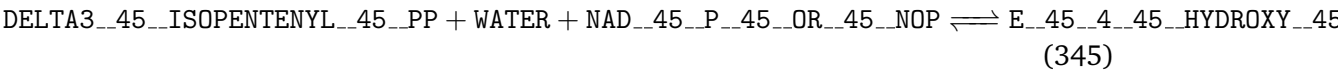


Table 177: Overview of participating species.

Id	Reactants Name	Id	Products Name
DELTA3- _45_- _ISOPENTENYL- _45_PP	isopentenyl diphosphate	E_45_- _4_45_- _HYDROXY- _45_3- _45_- _METHYLBUT- _45_- _2_45_- _EN_- _45_1_- _45_YL- _45_- _DIPH	(E)-4-hydroxy- 3-methylbut 2-en-1-yl diphos- phate
WATER	H2O	NADH_- _45_P_- _45_OR- _45_- _NOP	NAD(P)H
NAD_- _45_P_- _45_OR- _45_- _NOP	NAD(P) +		

Kinetic Law

$$v_{173} = \text{not specified} \quad (346)$$

5.174. Reaction AMPSYN_45_RXN

This is an irreversible reaction of one reactant forming two products.

Name Adenylosuccinate lyase

Notes GENE_ASSOCIATION: (BU263_purB)PROTEIN_ASSOCIATION: (Adenylosuccinate lyase (Adenylosuccinase) (ASL)//AICARSYN-RXN//AMPSYN-RXN//Adenylosuccinate lyase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis IPROTEIN_CLASS: 4.3.2.2SIDE: FUMGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 178: Overview of participating species.

Id	Reactants Name	Id	Products Name
ADENYLOSUCC	adenylo- succinate	FUM	fumarate
		AMP	AMP

Kinetic Law

v₁₇₄ = not specified (348)

5.175. Reaction RXN__45__8675

This is an irreversible reaction of two reactants forming two products.

Name Uroporphyrinogen-III C-methyltransferase

Notes GENE_ASSOCIATION: (BU425_cysG)PROTEIN_ASSOCIATION: (Siroheme syn-
thase [Includes: Uroporphyrinogen-III C-methyltransferase (Urogen III methylase)
(SUMT) (Uroporphyrinogen III methylase) (UROM); Precorrin-2 dehydrogenase ;
Sirohydrochlorin ferrochelata se]//DIMETHUROPORDEHYDROG-RXN//RXN-8675//SIROHEME-
FERROCHELAT-RXN//UROPORIIIMETHYLTRANSA-RXN//Uroporphyrinogen-III C-
methyltransferase//Precorrin-2 dehydrogenase//Sirohydrochlorin ferrochelata se)SUB-
SYSTEM: adenosylcobalamin biosynthesis II (late cobalt incorporation)SUBSYSTEM:
siroheme biosynthesisSUBSYSTEM: adenosylcobalamin biosynthesis I (early cobalt
insertion)PROTEIN_CLASS: 2.1.1.107COFACTOR: ADENOSYL__45__HOMO__45__CYSCOFAC-
TOR: S__45__ADENOSYLMETHIONINESIDE: ADENOSYL__45__HOMO__45__CYSSIDE: S__45__ADENOSYLMETH-
IONINEfalseTYPE: smallHOLE: false

Reaction equation

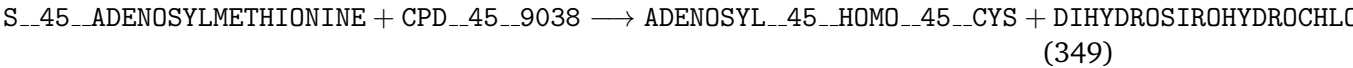


Table 179: Overview of participating species.

Id	Reactants Name	Id	Products Name
S__45_- _ADENOSYL- _HOMO- _45_- _9038	S-adenosyl-L- homocysteine precorrin-1	ADENOSYL- __45_- _HOMO- _45_- _CYS DIHYDROSIPHO HYDROLYZORIN	S-adenosyl-L- homocysteine precorrin-1

Kinetic Law

$$v_{175} = \text{not specified} \quad (350)$$

5.176. Reaction ALANINE__45___45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Alanine-tRNA ligase

Notes GENE_ASSOCIATION: (BU403_alaS)PROTEIN_ASSOCIATION: (Alanyl-tRNA synthetase (Alanine-tRNA ligase) (AlaRS)//ALANINE-TRNA-LIGASE-RXN//Alanine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.7COFACTOR: PPICOFACOTR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

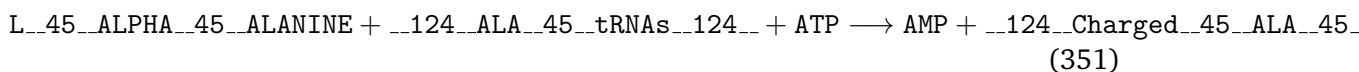


Table 180: Overview of participating species.

Id	Reactants Name	Id	Products Name
L__45_- _ALPHA- __45_- _ALANINE	L-alanine	AMP	AMP

Reactants		Products	
Id	Name	Id	Name
__124_- __ALA_- __45_- __tRNAs_- __124__	tRNAala	__124_- __Charged_- __45_- __ALA_- __45_- __tRNAs_- __124__	L-alanyl-tRNAala
ATP	ATP	PPI	diphosphate

Kinetic Law

$$v_{176} = \text{not specified}$$

(352)

5.177. Reaction RXN0__45__1134

This is an irreversible reaction of two reactants forming two products.

Name Pyruvate dehydrogenase (lipoamide)

Notes GENE_ASSOCIATION: (BU205_aceE)PROTEIN_ASSOCIATION: (Pyruvate dehydrogenase E1 component//RXN0-1134)SUBSYSTEM: acetyl-CoA biosynthesis (from pyruvate)PROTEIN_CLASS: 1.2.4.1SIDE: CARBON__45__DIOXIDEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

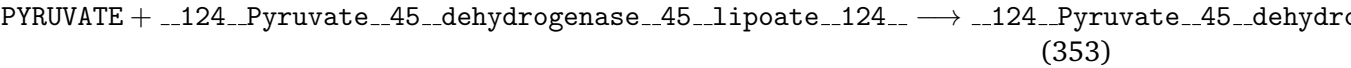


Table 181: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PYRUVATE	pyruvate	__124_- __Pyruvate-acetyltrans- __45_- __dehydrogenase__ __45_- __acetylDHlipoyl- __124__	lipoate N6-(S-acetyldihydrolipoyl)lysine

Reactants			Products	
Id	Name		Id	Name
__124_- Pyruvate- __45_- dehydrogenase- __45_- lipoate- __124__	lipoate	acetyl- N6- (lipoyl)lysine	CARBON- __45_- DIOXIDE	CO2

Kinetic Law

$$v_{177} = \text{not specified} \quad (354)$$

5.178. Reaction RXN0__45__1133

This is an irreversible reaction of two reactants forming two products.

Name Dihydrolipoamide S-acetyltransferase

Notes GENE_ASSOCIATION: (BU206_aceF)PROTEIN_ASSOCIATION: (Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex (E2) (Dihydrolipoamide acetyltransferase component of pyruvate dehydrogenase complex)//RXN0-1133//Dihydrolipoyllysine-residue acetyltransferase)SUBSYSTEM: acetyl-CoA biosynthesis (from pyruvate)PROTEIN_CLASS: 2.3.1.12COFACTOR: CO__45__ACOFACOR: ACETYL__45__COASIDE: CO__45__AGENERIC: trueTYPE: macroHOLE: false

Reaction equation

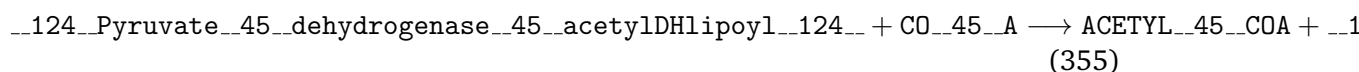


Table 182: Overview of participating species.

Reactants			Products	
Id	Name		Id	Name
__124_- Pyruvate- __45_- dehydrogenase- __45_- acetylDhlipoyl- __124__	lipoate	acetyltrans- ferase N6-(S- acetyl)lipoyl	ACETYL- __45_- COA	acetyl-CoA

Reactants		Products	
Id	Name	Id	Name
CO__45_- _A	coenzyme A	__124_- _Pyruvate-transferase _45_- _dehydrogenase- _45_- _dihydrolipoate- _124__	acetyl- N6- (dihydrolipoyl)lysine

Kinetic Law

$$v_{178} = \text{not specified} \quad (356)$$

5.179. Reaction RXN0__45__1132

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-SYSTEM: acetyl-CoA biosynthesis (from pyruvate)PROTEIN_CLASS: 1.8.1.4CO-FACTOR: NADCOFACTOR: NADHSIDE: PROTONSIDE: NADSIDE: NADHGENERIC: trueTYPE: macroHOLE: false

Reaction equation

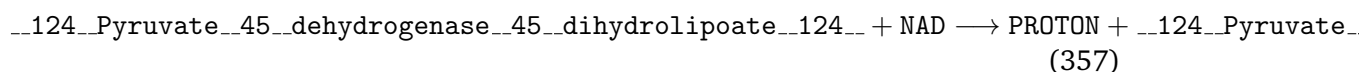


Table 183: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- _Pyruvate-transferase _45_- _dehydrogenase- _45_- _dihydrolipoate- _124__	lipoate acetyl- N6- (dihydrolipoyl)lysine	PROTON	H+

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	__124_- Pyruvate-transferase __45_- dehydrogenase- __45_- lipoate- __124__	lipoate acetyl- N6- (lipoyl)lysine
		NADH	NADH

Kinetic Law

$$v_{179} = \text{not specified} \quad (358)$$

5.180. Reaction TYROSINE__45___45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Tyrosine–tRNA ligase

Notes GENE_ASSOCIATION: (BU121_tyrS)PROTEIN_ASSOCIATION: (Tyrosyl-tRNA synthetase (Tyrosine–tRNA ligase) (TyrRS)//TYROSINE-TRNA-LIGASE-RXN//Tyrosine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.1CO-FACTOR: PPICOFATOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

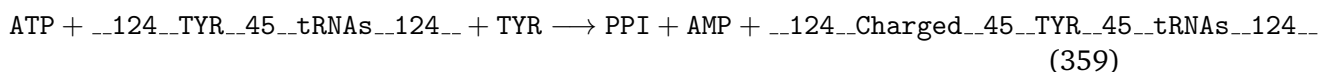


Table 184: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	PPI	diphosphate
__124_- __TYR- __45_- tRNAs_- _124__	tRNA _{tyr}	AMP	AMP

Id	Reactants Name	Id	Products Name
TYR	L-tyrosine	__124_- _Charged- _45_- _TYR- _45_- _tRNAs_- _124__	L-tyrosyl-tRNA ^{tyr}

Kinetic Law

$$v_{180} = \text{not specified} \quad (360)$$

5.181. Reaction RXN0__45__5199

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: degradation of purine ribonucleosidesSUBSYSTEM: salvage pathways of guanine, xanthine, and their nucleosidesPROTEIN_CLASS: 2.4.2.1SIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 185: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _Pi_- _124__	phosphate	RIBOSE- __45__1P	ribose-1-phosphate
GUANOSINE	guanosine	GUANINE	guanine

Kinetic Law

$$v_{181} = \text{not specified} \quad (362)$$

5.182. Reaction FLAVONADPREDUCT__45__RXN

This is a reversible reaction of two reactants forming three products.

Name Ferredoxin–NADP(+) reductase

Notes GENE_ASSOCIATION: (BU581_fpr)PROTEIN_ASSOCIATION: (Ferredoxin–NADP reductase (FNR) (Flavodoxin reductase) (FLXR) (FLDR)//FLAVONADPREDUCT-RXN)SUBSYSTEM: NAPROTEIN.CLASS: 1.18.1.2COFACTOR: NADPHCOFACTOR: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

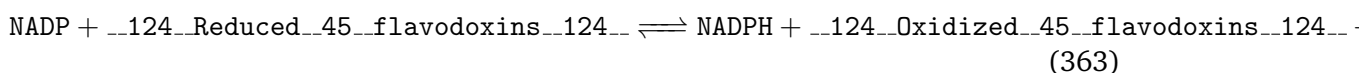


Table 186: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADP	NADP+	NADPH	NADPH
__124_-	a reduced flavo-	__124_-	an oxidized flavo-
Reduced-	doxin	Oxidized-	doxin
__45_-		__45_-	
flavodoxins-		flavodoxins-	
__124__		__124__	
		PROTON	H+

Kinetic Law

$$v_{182} = \text{not specified} \quad (364)$$

5.183. Reaction TETHYDPICSUCC__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name 2,3,4,5-tetrahydropyridine-2-carboxylate N-succinyltransferase

Notes GENE_ASSOCIATION: (BU229_dapD)PROTEIN_ASSOCIATION: (2,3,4,5-tetrahydropyridine-2,6-dicarboxylate N-succinyltransferase (Tetrahydrodipicolinate N-succinyltransferase)

(THP succinyltransferase) (Tetrahydropicolinate succinylase)//TETHYDPICSUCC-RXN//2,3,4,5-tetrahydropyridine-2,6-dicarboxylate N-succinyltransferase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 2.3.1.117COFACTOR: CO_45_ACOFACTOR: SUC_45_COASIDE: WATERSIDE: CO_45_ASIDE: SUC_45_COAGENERIC: false-
TYPE: smallHOLE: false

Reaction equation

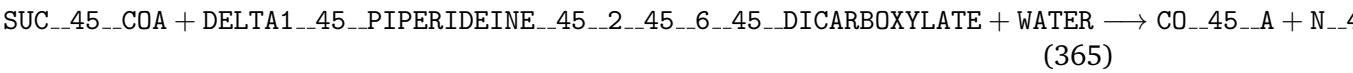


Table 187: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
SUC_45_COA	succinyl-CoA	CO_45_A	coenzyme A
DELTA1_45_PIPERIDEINE_45_2_45_6_45_DICARBOXYLATE	tetrahydrodipicolinate	N_45_2_45_6_45_KETOPIMELATE	N-succinyl-2-amino-6-ketopimelate
WATER	H2O		

Kinetic Law

v₁₈₃ = not specified (366)

5.184. Reaction 3_45_OXOACYL_45_ACP_45_REDUCT_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name 3-oxoacyl-[acyl-carrier protein] reductase

Notes GENE_ASSOCIATION: (BU351_fabG)PROTEIN_ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] reductase (3-ketoacyl- acyl carrier protein reductase)//3-OXOACYL-ACP-REDUCT-RXN//3-oxoacyl-[acyl-carrier-protein] reductase)SUBSYSTEM: superpathway of fatty acid biosynthesisSUBSYSTEM: fatty acid elongation – saturatedPROTEIN_CLASS: 1.1.1.100COFACTOR: NADPHCOFACTOR: NADPSIDE: NADPH-SIDE: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation



Table 188: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	NADP	NADP+
B_45_-	a β-	OH_45_-	a (3R)-3-
_KETOACYL-	ketoacyl-[acp]	_ACYL-	hydroxyacyl-
45-		_45_ACP	[acp]
_ACP			

Kinetic Law

$$v_{184} = \text{not specified} \quad (368)$$

5.185. Reaction DIHYDROFOLATEREDUCT__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Dihydrofolate reductase

Notes GENE ASSOCIATION: (BU143_foIA) PROTEIN ASSOCIATION: (Dihydrofolate reductase//DIHYDROFOLATEREDUCT-RXN//Dihydrofolate reductase) SUBSYSTEM: tetrahydrofolate biosynthesis I SUBSYSTEM: formylTHF biosynthesis II PROTEIN CLASS: 1.5.1.3 COFACTOR: NADPH COFACTOR: NADP SIDE: NADPH SIDE: NADP GENERIC: false TYPE: small HOLE: false

Reaction equation



Table 189: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DIHYDROFOLATE	Dihydrofolate	NADP	NADP+
NADPH	NADPH	THF	tetrahydrofolate

Kinetic Law

$$v_{185} = \text{not specified} \quad (370)$$

5.186. Reaction THRESYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Threonine synthase

Notes GENE_ASSOCIATION: (BU192_thrC)PROTEIN_ASSOCIATION: (Threonine synthase//THRESYN-RXN//Threonine synthase)SUBSYSTEM: threonine biosynthesis from homoserinePROTEIN_CLASS: 4.2.3.1SIDE: WATERSIDE: __124__Pi__124__GENERIC: false-TYPE: smallHOLE: false

Reaction equation

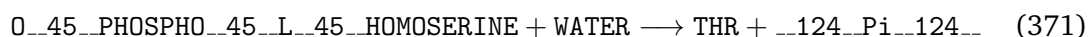


Table 190: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
O__45__- __PHOSPHO- __45__L- __45__- __HOMOSERINE	O-phospho-L-homoserine	THR	L-threonine
WATER	H2O	__124__- __Pi__- __124__	phosphate

Kinetic Law

$$v_{186} = \text{not specified} \quad (372)$$

5.187. Reaction _2__46__7__46__7__46__60__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name 2-C-methyl-D-erythritol 4-phosphate cytidylyltransferase

Notes GENE_ASSOCIATION: (BU420_ispD)PROTEIN_ASSOCIATION: (2-C-methyl-D-erythritol 4-phosphate cytidylyltransferase (4-diphosphocytidyl-2C-methyl-D-erythritol

synthase) (MEP cytidyltransferase) (MCT)//2.7.7.60-RXN//2-C-methyl-D-erythritol 4-phosphate cytidyltransferase)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 2.7.7.60SIDE: PPISIDE: CTPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

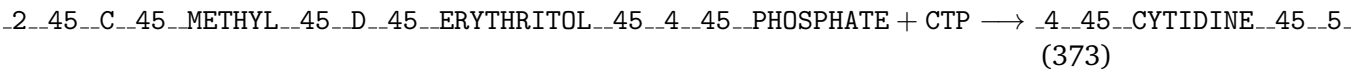


Table 191: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
2_45_C_45_METHYL_45_D_45_ERYTHRITOL_45_4_45_PHOSPHATE	2-C-methyl-D-erythritol-4-phosphate	4_45_CYTIDINE_45_5_45_DIPHOSPHATE	4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol
CTP	CTP	PPI	diphosphate

Kinetic Law

v_{187}

= not specified

(374)

5.188. Reaction DCTP_45_DEAM_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name dCTP deaminase

Notes GENE_ASSOCIATION: (BU108_dcd)PROTEIN_ASSOCIATION: (Deoxycytidine triphosphate deaminase (dCTP deaminase)//DCTP-DEAM-RXN//dCTP deaminase)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesPROTEIN_CLASS: 3.5.4.13SIDE: AMMONIASIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 192: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	DUTP	dUTP
DCTP	dCTP	AMMONIA	ammonia

Kinetic Law

$$v_{188} = \text{not specified} \quad (376)$$

5.189. Reaction MALONYL__45__ACPDECARBOX__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU092_fabB)PROTEIN_ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] synthase 1 (3-oxoacyl- [acyl-carrier-protein] synthase I) (Beta-ketoacyl-ACP synthase I) (KAS I)//3-OXOACYL-ACP-SYNTH-BASE-RXN//3-OXOACYL-ACP-SYNTH-RXN//MALONYL-ACPDECARBOX-RXN)SUBSYSTEM: fatty acid biosynthesis - initial steps ISUBSYSTEM: superpathway of fatty acid biosynthesisPROTEIN_CLASS: 2.3.1.41SIDE: CARBON__45__DIOXIDEGENERIC: trueTYPE: macroHOLE: false

Reaction equation



Table 193: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
MALONYL- __45_- _ACP	a malonyl-[acp]	CARBON- __45_- _DIOXIDE	CO2
		ACETYL- __45_- _ACP	an acetyl-[acp]

Kinetic Law

$$v_{189} = \text{not specified} \quad (378)$$

5.190. Reaction HOLO__45__ACP__45__SYNTH__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Holo-[acyl-carrier protein] synthase

Notes GENE_ASSOCIATION: (BU256_acpS)PROTEIN_ASSOCIATION: (Holo-[acyl-carrier-protein] synthase (Holo-ACP synthase) (4'-phosphopantetheinyl transferase acpS)//HOLO-ACP-SYNTH-RXN//Holo-[acyl-carrier-protein] synthase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.8.7GENERIC: trueTYPE: macroHOLE: false

Reaction equation

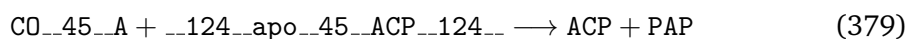


Table 194: Overview of participating species.

Id	Reactants Name	Id	Products Name
C0__45__ _A	coenzyme A	ACP	a holo-[acp]
_124__ apo__ _45__ ACP__ _124__	an apo-[acp]	PAP	adenosine-3',5'- bisphosphate

Kinetic Law

$$v_{190} = \text{not specified} \quad (380)$$

5.191. Reaction RIBOFLAVINSYNDEAM__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU461_ribD1)PROTEIN_ASSOCIATION: (Diaminohydroxyphosphoribosyl pyrimidine deaminase (DRAP deaminase) (Riboflavin-specific deaminase))SUB-

SYSTEM: flavin biosynthesisPROTEIN_CLASS: 3.5.4.26SIDE: AMMONIASIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

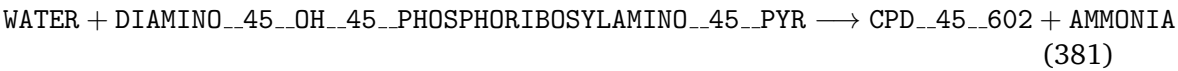


Table 195: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	CPD_45_602	5-amino-6-(5'-phosphoribosylamino)uracil
DIAMINO_45_OH_45_PHOSPHORIBOSYLAMINO_45_PYR	2,5-diamino-6-(ribosylamino)-4-(3H)-pyrimidinone	AMMONIA	ammonia

Kinetic Law

v191 = not specified (382)

5.192. Reaction RXN0_45_1147

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU303_sucB)PROTEIN_ASSOCIATION: (Dihydrolipoyllysine-residue succinyltransferase component of 2- oxoglutarate dehydrogenase complex (E2) (Dihydrolipoamide succinyltransferase component of 2-oxoglutarate dehydrogenase complex)//RXN0-1147//Dihydrolipoyllysine-residue succinyltransferase)SUBSYSTEM: 2-ketoglutarate dehydrogenase complexPROTEIN_CLASS: 2.3.1.61CO-FACTOR: CO_45_ACOFACTOR: SUC_45_COASIDE: CO_45_ASIDE: SUC_45_COAGENERIC: trueTYPE: macroHOLE: false

Reaction equation

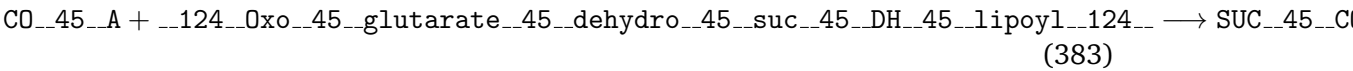


Table 196: Overview of participating species.

Id	Reactants Name	Id	Products Name
CO__45_- _A	coenzyme A	SUC_- _45_-COA	succinyl-CoA
__124_- _0xo_- _45_-	dihydrolipoyltranssuccinylase N6-(S- succinyl)dihydrolipoyllysine	__124_- _0xo_- _45_-	dihydrolipoyltranssuccinylase N6- (dihydrolipoyl)lysine
glutarate- _45_- _dehydro_- _45_- _suc_- _45_-DH- _45_- _lipoyl_- _124_-		_glutarate_- _45_- _dehydrogenase_- _45_- _DH_- _45_- _lipoyl_- _124_-	

Kinetic Law

$$v_{192} = \text{not specified} \quad (384)$$

5.193. Reaction TRYPSYN__45__RXN

This is a reversible reaction of two reactants forming three products.

Name Tryptophan synthase

Notes GENE_ASSOCIATION: (BU278_trpB) or (BU277_trpA)PROTEIN_ASSOCIATION: (Tryptophan synthase beta chain//RXN0-2382//TRYPSYN-RXN//Tryptophan synthase) or (Tryptophan synthase alpha chain//TRYPSYN-RXN//Tryptophan synthase)SUBSYSTEM: NAPROTEIN_CLASS: 4.2.1.20GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 197: Overview of participating species.

Id	Reactants Name	Id	Products Name
INDOLE- __45__3- __45_- _GLYCEROL- __45__P SER	indole-3-glycerol- phosphate L-serine	TRP	L-tryptophan
		GAP	D- glyceraldehyde-3- phosphate
		WATER	H2O

Kinetic Law

$$v_{193} = \text{not specified} \quad (386)$$

5.194. Reaction DUTP__45__PYROP__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name dUTP pyrophosphatase

Notes GENE_ASSOCIATION: (BU560_dut)PROTEIN_ASSOCIATION: (Deoxyuridine 5'-triphosphate nucleotidohydrolase (dUTPase) (dUTP pyrophosphatase)//DUTP-PYROP-RXN)SUBSYSTEM: de novo biosynthesis of pyrimidine deoxyribonucleotidesPROTEIN_CLASS: 3.6.1.23SIDE: WATERSIDE: PPIGENERIC: falseTYPE: smallHOLE: false

Reaction equation

Table 198: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	PPI	diphosphate
DUTP	dUTP	DUMP	dUMP

Kinetic Law

$$v_{194} = \text{not specified} \quad (388)$$

5.195. Reaction RXN__45__7958

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU175_ackA)PROTEIN_ASSOCIATION: (Acetate kinase (Acetokinase)//ACETATEKIN-RXN//Acetate kinase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.2.1COFACTOR: ADPCOFACTOR: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 199: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	PROPIONYL-propionyl-P__45__P	
PROPIONATE	propionate	ADP	ADP

Kinetic Law

$$v_{195} = \text{not specified} \quad (390)$$

5.196. Reaction RXN__45__5985

This is an irreversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU291_bioB)PROTEIN_ASSOCIATION: (Biotin synthase (Biotin synthetase)//2.8.1.6-RXN//Biotin synthase)SUBSYSTEM: biotin biosynthesis IIPROTEIN_CLASS: 2.8.1.6GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 200: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_- _45_- _5662	9- mercaptodethiobiotin	BIOTIN	biotin

Kinetic Law

$$v_{196} = \text{not specified} \quad (392)$$

5.197. Reaction RXN__45__5984

This is an irreversible reaction of three reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU291_bioB)PROTEIN ASSOCIATION: (Biotin synthase (Biotin synthetase)//2.8.1.6-RXN//Biotin synthase)SUBSYSTEM: biotin biosynthesis IIPROTEIN_CLASS: 2.8.1.6SIDE: __124__Sulfurated__45__Sulfur__45__Acceptors__124__SIDE: __124__Unsulfurated__45__Sulfur__45__Acceptors__124__SIDE: CPD__45__249GENERIC: trueTYPE: smallHOLE: false

Reaction equation

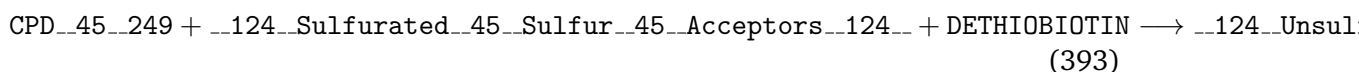


Table 201: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_- _45__249	a sulfur donor	__124_- _Unsulfurated__ _45_- _Sulfur- _45_- _Acceptors- _124__	an unsulfurated sulfur acceptor

Reactants		Products	
Id	Name	Id	Name
__124_- _Sulfurated_	a sulfurated sul-	CPD_- _45_- _5662	9- mercaptodethiobiotin
__45_- _Sulfur_- __45_- _Acceptors_- __124_- DETHIOBIOTIN	for donor tetrahiobiotin		

Kinetic Law

$$v_{197} = \text{not specified} \quad (394)$$

5.198. Reaction RXN__45__2881

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: NAPROTEIN_ASSOCIATION: NASUBSYSTEM: formalde-
hyde oxidation V (tetrahydrofolate pathway)PROTEIN_CLASS: NACOFACOR: METHY-
LENE__45__THFCOFACOR: THFSIDE: WATERSIDE: THFGENERIC: falseTYPE: small-
HOLE: false

Reaction equation

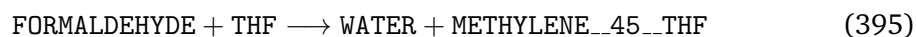


Table 202: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FORMALDEHYDE	formaldehyde	WATER	H2O
THF	tetrahydrofolate	METHYLENE-5,10-methylene- __45_- _THF	THF

Kinetic Law

$$v_{198} = \text{not specified}$$

(396)

5.199. Reaction METHIONYL_45_TRNA_45_FORMYLTRANSFERASE_45_RXN

This is a reversible reaction of three reactants forming two products.

Name Methionyl-tRNA formyltransferase

Notes GENE_ASSOCIATION: (BU497_fmt)PROTEIN_ASSOCIATION: (Methionyl-tRNA formyltransferase//METHIONYL-TRNA-FORMYLTRANSFERASE-RXN//Methionyl-tRNA formyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.1.2.9COFACTOR: THFCOFACTOR: 10_45_FORMYL_45_THFGENERIC: trueTYPE: macroHOLE: false

Reaction equation

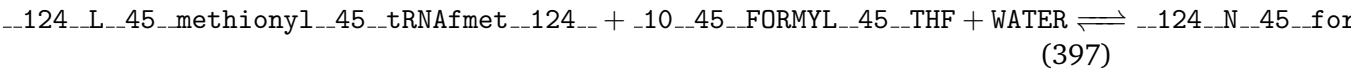


Table 203: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- L_45_- methionyl- methionyl- 45_- tRNAfmet- 124__	L-methionyl-tRNAfmet	__124_- N_45_- formyl- formyl- 45_- L- 45_- methionyl- 45_- tRNAfmet- 124__	N-formyl-L-methionyl-tRNAfmet
10- 45_- FORMYL- 45_- THF WATER	10-formyl-tetrahydrofolate	THF	tetrahydrofolate
	H2O		

Kinetic Law

$$v_{199} = \text{not specified}$$

(398)

5.200. Reaction DAHPSYN__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name 2-dehydro-3-deoxyphosphoheptonate aldolase

Notes GENE ASSOCIATION: (BU124_aroH)PROTEIN ASSOCIATION: (Phospho-2-dehydro-3-deoxyheptonate aldolase, Trp-sensitive (Phospho-2-keto-3-deoxyheptonate aldolase) (DAHP synthetase) (3-deoxy-D-arabino-heptulosonate 7-phosphate synthase)//DAHPSYN-RXN)SUBSYSTEM: chorismate biosynthesisPROTEIN_CLASS: 2.5.1.54SIDE: WATERSIDE: __124__Pi__124__SIDE: PHOSPHO__45__ENOL__45__PYRUVATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

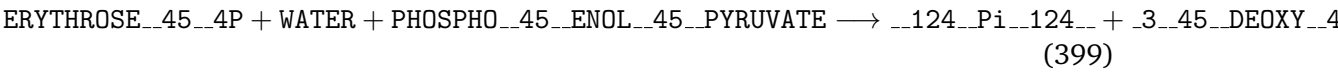


Table 204: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ERYTHROSE-D-erythrose-4- __45__4P	phosphate	__124__ __Pi__ _124__	phosphate
WATER	H2O	_3__45__ _DEOXY__ __45__D__ __45__ _ARABINO__ __45__ _HEPTULOSONATE__ __45__7__ __45__P	3-deoxy- D-arabino- heptulosonate-7- phosphate
PHOSPHO__45__ _ENOL__ __45__ _PYRUVATE	phosphoenolpyruvate		

Kinetic Law

v_{200} = not specified (400)

5.201. Reaction ADENYLOSUCCINATE__45__SYNTHASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name adenylosuccinate synthetase

Notes GENE_ASSOCIATION: (BU566_purA)PROTEIN_ASSOCIATION: (Adenylosuccinate synthetase (IMP–aspartate ligase) (AdSS) (AMPSase)//ADENYLOSUCCINATE-SYNTHASE-RXN)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis IPROTEIN_CLASS: 6.3.4.4COFACTOR: __124__Pi__124__COFACTOR: GDPCOFACTOR: GTPSIDE: __124__Pi__124__SIDE: L__45__ASPARTATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

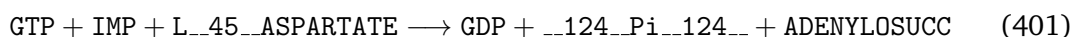


Table 205: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GTP	GTP	GDP	GDP
IMP	inosine-5'-phosphate	__124- __Pi- _124__	phosphate
L__45_- _ASPARTATE	L-aspartate	ADENYLOSUCc	adenylo-succinate

Kinetic Law

$$v_{201} = \text{not specified} \quad (402)$$

5.202. Reaction RXN0__45__2661

This is a reversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU552_mutY)PROTEIN_ASSOCIATION: (A/G-specific adenine glycosylase)SUBSYSTEM: NAPROTEIN_CLASS: NAGENERIC: trueTYPE: macroHOLE: false

Reaction equation

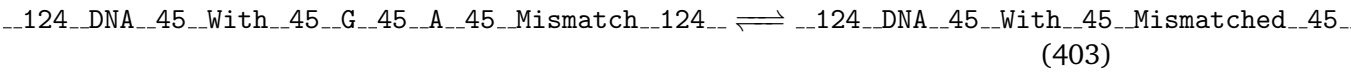


Table 206: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- __DNA- __45_- __With- __45__G- __45__A- __45_- __Mismatch- __124__	DNA with G-A mismatch	__124- __DNA- __45_- __With- __45_- __Mismatched- __45_- __Adenine- __124__	DNA with removed adenine mismatch leaving an AP site

Kinetic Law

$v_{202} = \text{not specified}$

(404)

5.203. Reaction HISTPRATPHYD__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Phosphoribosyl-ATP pyrophosphatase

Notes GENE ASSOCIATION: (BU106_hisI)PROTEIN ASSOCIATION: (Histidine biosynthesis bifunctional protein hisIE [Includes: Phosphoribosyl-AMP cyclohydrolase (PRA-CH); Phosphoribosyl-ATP pyrophosphatase (PRA-PH)]//HISTCYCLOHYD-RXN//HISTPRATPHYRXN//Phosphoribosyl-AMP cyclohydrolase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 3.6.1.31SIDE: WATERSIDE: PPIGENERIC: falseTYPE: smallHOLE: false

Reaction equation

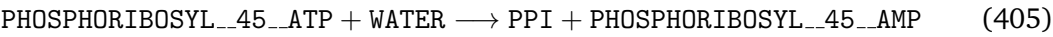


Table 207: Overview of participating species.

Id	Reactants Name	Id	Products Name
PHOSPHORIBOSYL- __45_- _ATP	ATP	PPI	diphosphate
WATER	H2O	PHOSPHORIBOSYL- __45_- _AMP	AMP

Kinetic Law

$$v_{203} = \text{not specified} \quad (406)$$

5.204. Reaction RXN__45__6182

This is an irreversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU573_pgi)PROTEIN_ASSOCIATION: (Glucose-6-phosphate isomerase (GPI) (Phosphoglucose isomerase) (PGI) (Phosphohexose isomerase) (PHI)//PGLUCISOM-RXN//Glucose-6-phosphate isomerase)SUBSYSTEM: NAPRO-TEIN_CLASS: 5.3.1.9GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 208: Overview of participating species.

Id	Reactants Name	Id	Products Name
ALPHA- __45_- _GLC- _45__6_- _45__P	α-D- glucose phosphate	FRUCTOSE- __45__6P	fructose-6- phosphate

Kinetic Law

$$v_{204} = \text{not specified} \quad (408)$$

5.205. Reaction RXNO__45__2141

This is an irreversible reaction of three reactants forming four products.

Name NA

Notes GENE_ASSOCIATION: (BU092_fabB)PROTEIN_ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] synthase 1 (3-oxoacyl- [acyl-carrier-protein] synthase I) (Beta-ketoacyl-ACP synthase I) (KAS I)//3-OXOACYL-ACP-SYNTH-BASE-RXN//3-OXOACYL-ACP-SYNTH-RXN//MALONYL-ACPDECARBOX-RXN)SUBSYSTEM: superpathway of fatty acid biosynthesisSUBSYSTEM: fatty acid elongation – unsaturatedPROTEIN_CLASS: NASIDE: MALONYL__45__ACPSIDE: __124__Cis__45__delta__45__3__45__decenoyl__45__ACPSIDE: CARBON__45__DIOXIDEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

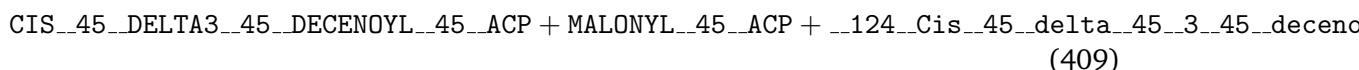


Table 209: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CIS- __45_- _DELTA3- __45_- _DECENOYL- __45_- _ACP	cis-Δ3-decenoyl-ACP	ACP	a holo-[acp]
MALONYL- __45_- _ACP	a malonyl-[acp]	CARBON- __45_- _DIOXIDE	CO2

Reactants		Products	
Id	Name	Id	Name
__124- __Cis- __45- __delta- __45__3- __45- __decenoyl- __45- __ACPs- __124__	a cis-Δ3- decenoyl-[acp]	__124_- __b__45- __Keto- __45_- __cis- __45__D5- __45_- __dodecenoyl- __45_- __ACPs- __124__ BETA- __45_- __KET0- __45_- __CIS- __45_- __DELTA5- __45_- __DODECENOYL- __45_- __ACP	a β-keto- cis-Δ5- dodecenoyl-[acp]

Kinetic Law

$$v_{205} = \text{not specified}$$

(410)

5.206. Reaction __1__46__18__46__1__46__2__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Ferredoxin–NADP(+) reductase

Notes GENE_ASSOCIATION: (BU581_fpr)PROTEIN_ASSOCIATION: (Ferredoxin–NADP reductase (FNR) (Flavodoxin reductase) (FLXR) (FLDR)//FLAVONADPREDUCT-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 1.18.1.2COFACTOR: NADPHCOFACTOR: __124__Reduced__45__ferredoxins__124__COFACTOR: __124__Oxidized__45__ferredoxins__124__COFACTNADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

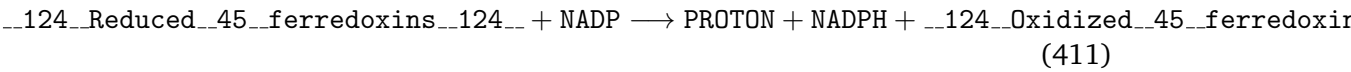


Table 210: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_-Reduced__45_ferredoxins__124__	a reduced ferredoxin	PROTON	H+
NADP	NADP+	NADPH	NADPH
		__124_-Oxidized__45_ferredoxins__124__	an oxidized ferredoxin

Kinetic Law

v_{206} = not specified

(412)

5.207. Reaction RXN0__45__2142

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU351_fabG)PROTEIN_ASSOCIATION: (3-oxoacyl-[acyl-carrier-protein] reductase (3-ketoacyl- acyl carrier protein reductase)//3-OXOACYL-ACP-REDUCT-RXN//3-oxoacyl-[acyl-carrier-protein] reductase)SUBSYSTEM: superpathway of fatty acid biosynthesisSUBSYSTEM: fatty acid elongation – unsaturatedPROTEIN_CLASS: NACOFACITOR: NADPHCOFACTOR: NADPSIDE: NADPH-SIDE: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

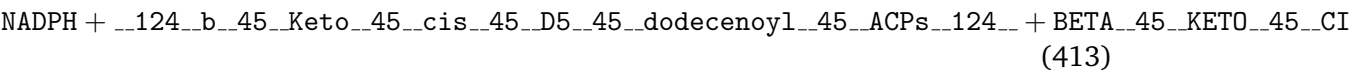


Table 211: Overview of participating species.

Id	Reactants Name	Id	Products Name
NADPH	NADPH	__124_- _b__45_- _Hydroxy- _45_- _cis_- _45__D5- _45_- _dodecenoyl- _45_- _ACPs_- _124__	a β-hydroxy- cis Δ5- dodecenoyl-[acp]
__124_- _b__45_- _Keto- _45_- _cis_- _45__D5- _45_- _dodecenoyl- _45_- _ACPs_- _124__	a β-keto- cis-Δ5- dodecenoyl-[acp]	BETA- _45_- _HYDROXY- _45_- _CIS- _45_- _DELTA5- _45_- _DODECENOYL- _45_- _ACP	β-hydroxy- cis-Δ5- dodecenoyl-ACP
BETA- _45_- _KETO- _45_- _CIS- _45_- _DELTA5- _45_- _DODECENOYL- _45_- _ACP	β-keto- cis-Δ5- dodecenoyl-ACP	NADP	NADP+

Kinetic Law

$$v_{207} = \text{not specified} \quad (414)$$

5.208. Reaction RXN0_45_2145

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU265_fabI)PROTEIN_ASSOCIATION: (Enoyl-[acyl-carrier-protein] reductase [NADH] (NADH- dependent enoyl-ACP reductase)//ENOYL-ACP-REDUCT-NADH-RXN)SUBSYSTEM: superpathway of fatty acid biosynthesisSUBSYSTEM: fatty acid elongation – unsaturatedPROTEIN_CLASS: NACOFAC-TOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

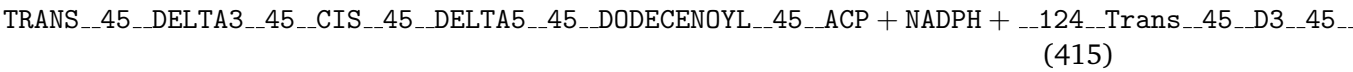


Table 212: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
TRANS_45_DELTA3_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP	trans-Δ3-cis-Δ5-dodecenoyl-ACP	CIS_45_DELTA5_45_DODECENOYL_45_ACP	cis-Δ5-dodecenoyl-ACP
NADPH	NADPH	NADP	NADP+
_124_Trans_45_D3_45_cis_45_D5_45_dodecenoyl_45_ACPs_124	a trans-Δ3-cis-Δ5-dodecenoyl-[acp]	_124_Cis_45_Delta5_45_dodecenoyl_45_ACPs_124	a cis-Δ5-dodecenoyl-[acp]

Reactants		Products	
Id	Name	Id	Name

Kinetic Law

$$v_{208} = \text{not specified} \quad (416)$$

5.209. Reaction DETHIOBIOTIN__45__SYN__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name dethiobiotin synthetase

Notes GENE_ASSOCIATION: (BU290_bioD)PROTEIN_ASSOCIATION: (Dethiobiotin synthetase (Dethiobiotin synthase) (DTB synthetase) (DTBS)//DETHIOBIOTIN-SYN-RXN//Dethiobiotin synthase)SUBSYSTEM: biotin biosynthesis IISUBSYSTEM: biotin biosynthesis ISUBSYSTEM: Methionine cycle IIPROTEIN_CLASS: 6.3.3.3COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: ATPSIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

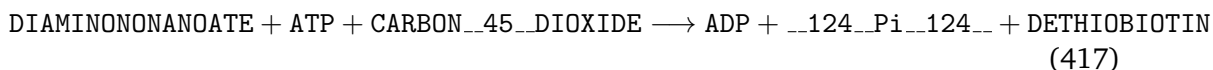


Table 213: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DIAMINONONANOATE	diaminopelargonate	ADP	ADP
ATP	ATP	__124__Pi__124__	phosphate
CARBON__45__DIOXIDE	CO2	DETHIOBIOTIN	dethiobiotin

Kinetic Law

$$v_{209} = \text{not specified} \quad (418)$$

5.210. Reaction ENOYL_45_ACP_45_REDUCT_45_NADPH_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name Enoyl-[acyl-carrier protein] reductase (NADPH, B-specific)

Notes GENE ASSOCIATION: (BU265_fabI)PROTEIN ASSOCIATION: (Enoyl-[acyl-carrier-protein] reductase [NADH] (NADH- dependent enoyl-ACP reductase)//ENOYL-ACP-REDUCT-NADH-RXN)SUBSYSTEM: superpathway of fatty acid biosynthesis-SUBSYSTEM: fatty acid elongation – saturatedPROTEIN_CLASS: 1.3.1.10COFACTOR: NADPHCOFACTOR: NADPSIDE: _124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_SIDE: NADPHSIDE: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

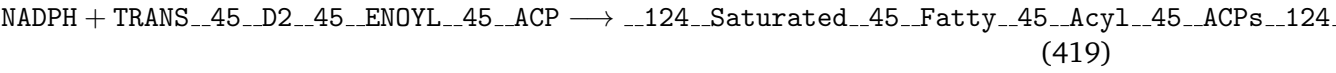


Table 214: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	_124_	a 2,3,4-saturated
		_Saturated	fatty acyl-[acp]
		45	
		_Fatty-	
		45	
		_Acyl-	
		45	
		ACPs	
		124	
TRANS_45_D2_45_	a trans-Δ2-	ACYL_45_ACP	an acyl-[acp]
_ENOYL_45_ACP	enoyl-acyl-[acp]		
		NADP	NADP+

Kinetic Law

v210 = not specified (420)

5.211. Reaction MANNPDEHYDROG__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Mannitol-1-phosphate 5-dehydrogenase

Notes GENE_ASSOCIATION: (BU571_mtId)PROTEIN_ASSOCIATION: (Mannitol-1-phosphate 5-dehydrogenase//MANNPDEHYDROG-RXN//Mannitol-1-phosphate 5-dehydrogenase)SUBSYSTEM: mannitol degradation IPROTEIN_CLASS: 1.1.1.17COFACTOR: NAD-COFACTOR: NADHSIDE: NADSIDE: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation

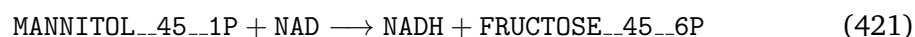


Table 215: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
MANNITOL- __45__1P	mannitol-1- phosphate	NADH	NADH
NAD	NAD+	FRUCTOSE- __45__6P	fructose-6- phosphate

Kinetic Law

$$v_{211} = \text{not specified} \quad (422)$$

5.212. Reaction CYT__45__UBIQUINOL__45__OXID__45__RXN

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU469_cyoD) or (BU472_cyoA) or (BU471_cyoB) or (BU470_cyoC)PROTEIN_ASSOCIATION: (Cytochrome o ubiquinol oxidase protein cyoD) or (Ubiquinol oxidase subunit 2 precursor (Ubiquinol oxidase polypeptide II) (Cytochrome o subunit 2) (Oxidase BO(3) subunit 2) (Cytochrome o ubiquinol oxidase subunit 2)) or (Ubiquinol oxidase subunit 1 (Ubiquinol oxidase polypeptide I) (Cytochrome o subunit 1) (Oxidase BO(3) subunit 1) (Cytochrome o ubiquinol oxidase subunit 1)) or (Cytochrome o ubiquinol oxidase subunit 3 (Cytochrome o ubiquinol oxidase subunit III))SUBSYSTEM: NAPROTEIN_CLASS: 1.10.2.-GENERIC: falseTYPE: smallHOLE: false

Reaction equation

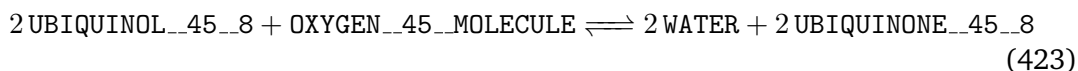


Table 216: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UBIQUINOL_45_8	ubiquinol-8	WATER	H2O
OXYGEN_45_-MOLECULE	oxygen	UBIQUINONE_45_8	ubiquinone-8

Kinetic Law

$$v_{212} = \text{not specified} \quad (424)$$

5.213. Reaction IMIDPHOSDEHYD_45_RXN

This is an irreversible reaction of one reactant forming two products.

Name Imidazoleglycerol-phosphate dehydratase

Notes GENE_ASSOCIATION: (BU102_hisB)PROTEIN_ASSOCIATION: (Histidine biosynthesis bifunctional protein hisB [Includes: Histidinol-phosphatase ; Imidazoleglycerol-phosphate dehydratase (IGPD)]//HISTIDPHOS-RXN//IMIDPHOSDEHYD-RXN//Histidinol-phosphatase//Imidazoleglycerol-phosphate dehydratase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 4.2.1.19SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

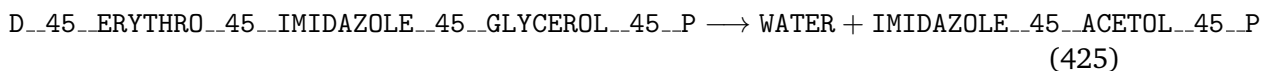


Table 217: Overview of participating species.

Id	Reactants Name	Id	Products Name
D__45_- _ERYTHRO- __45_- _IMIDAZOLE _45_- _GLYCEROL- __45__P	D-erythro- imidazole- glycerol- phosphate	WATER	H2O
		IMIDAZOLE- __45_- _ACETOL- __45__P	imidazole acetol- phosphate

Kinetic Law

$$v_{213} = \text{not specified} \quad (426)$$

5.214. Reaction ASPARTATE__45__SEMIALDEHYDE__45__DEHYDROGENASE__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Aspartate-semialdehyde dehydrogenase

Notes GENE_ASSOCIATION: (BU448_asd)PROTEIN_ASSOCIATION: (Aspartate-semialdehyde dehydrogenase (ASA dehydrogenase)//ASPARTATE-SEMIALDEHYDE-DEHYDROGENASE-RXN//Aspartate-semialdehyde dehydrogenase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis ISUBSYSTEM: homoserine biosynthesisPROTEIN_CLASS: 1.2.1.11COFACTOR: NADPH-COFACTOR: NADPSIDE: NADPHSIDE: __124__Pi__124__SIDE: NADPGENERIC: false-TYPE: smallHOLE: false

Reaction equation

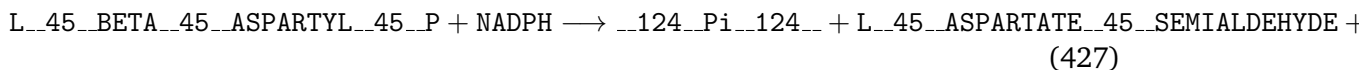


Table 218: Overview of participating species.

Id	Reactants Name	Id	Products Name
L__45_- _BETA- _45_- _ASPARTYL- _45__P NADPH	L-aspartyl-4- phosphate NADPH	_124- _Pi_- _124__ L__45_- _ASPARTATE _45_- _SEMIALDEHYDE NADP	phosphate L-aspartate- semialdehyde NADP+

Kinetic Law

$$v_{214} = \text{not specified} \quad (428)$$

5.215. Reaction RXN__45__6282

This is an irreversible reaction of two reactants forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU486_fold)PROTEIN_ASSOCIATION: (Bifunctional protein fold [Includes: Methylenetetrahydrofolate dehydrogenase ; Methenyltetrahydrofolate cyclohydrolase]//METHENYLTHFCYCLOHYDRO-RXN//METHYLENETHFDEHYDROGENATION-RXN//Methenyltetrahydrofolate cyclohydrolase)SUBSYSTEM: tetrahydrofolate biosynthesis IIPROTEIN_CLASS: 3.5.4.9SIDE: WATERGENERIC: trueTYPE: smallHOLE: false

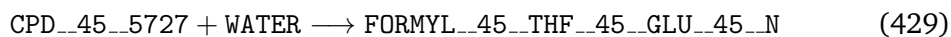
Reaction equation

Table 219: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD- _45- _5727	5,10-methenyl- tetrahydropteroyl- [γ- Glu](n)	FORMYL- _45- _THF- _45- _GLU- _45_N	an N10-formyl- tetrahydrofolate
WATER	H2O		

Kinetic Law

$$v_{215} = \text{not specified} \quad (430)$$

5.216. Reaction DIAMINOPIMDECARB__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Diaminopimelate decarboxylase

Notes GENE_ASSOCIATION: (BU438_lysA)PROTEIN_ASSOCIATION: (Diaminopimelate decarboxylase (DAP decarboxylase)//DIAMINOPIMDECARB-RXN//Diaminopimelate decarboxylase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 4.1.1.20SIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

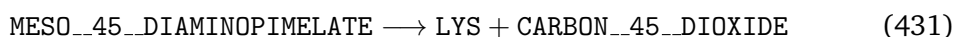


Table 220: Overview of participating species.

Id	Reactants Name	Id	Products Name
MESO- _45- _DIAMINOPIMELATE	meso- diaminopimelate	LYS	L-lysine
		CARBON- _45- _DIOXIDE	CO2

Kinetic Law

$$v_{216} = \text{not specified} \quad (432)$$

5.217. Reaction PRPPSYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name ribose-phosphate diphosphokinase

Notes GENE_ASSOCIATION: (BU169_prs)PROTEIN_ASSOCIATION: (Ribose-phosphate pyrophosphokinase (RPPK) (Phosphoribosyl pyrophosphate synthetase) (P-Rib-PP synthetase) (PRPP synthetase))SUBSYSTEM: PRPP biosynthesis ISUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.7.6.1CO-FACTOR: ATPCOFACTOR: AMPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

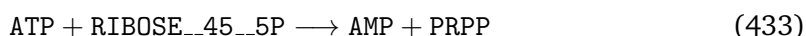


Table 221: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	AMP	AMP
RIBOSE-__45__5P	D-ribose-5-phosphate	PRPP	5-phosphoribosyl 1-pyrophosphate

Kinetic Law

$$v_{217} = \text{not specified} \quad (434)$$

5.218. Reaction DEOXYRIBODIPYRIMIDINE__45__PHOTOLYASE__45__RXN

This is a reversible reaction of one reactant forming one product.

Name Deoxyribodipyrimidine photolyase

Notes GENE_ASSOCIATION: (BU300_phrB)PROTEIN_ASSOCIATION: (Deoxyribodipyrimidine photo-lyase (DNA photolyase) (Photoreactivating enzyme)//Deoxyribodipyrimidine photo-lyase)SUBSYSTEM: NAPROTEIN_CLASS: 4.1.99.3GENERIC: trueTYPE: macro-HOLE: false

Reaction equation

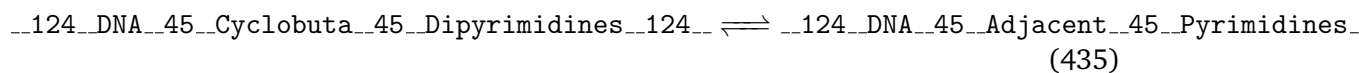


Table 222: Overview of participating species.

Id	Reactants Name	Id	Products Name
_124_DNA_45_Cyclobuta_45_Dipyrimidines_124_	a DNA cyclobutadipyrimidine	_124_DNA_45_Adjacent_45_Pyrimidines_124_	NA

Kinetic Law

$$v_{218} = \text{not specified} \quad (436)$$

5.219. Reaction RXN0_45_385

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU202_mutT)PROTEIN_ASSOCIATION: (Mutator mutT protein (7,8-dihydro-8-oxoguanine-triphosphatase) (8-oxo- dGTPase) (dGTP pyrophosphohydrolase))SUBSYSTEM: NAPROTEIN_CLASS: 3.6.1.-GENERIC: false-TYPE: smallHOLE: false

Reaction equation

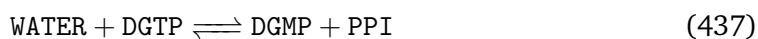


Table 223: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	DGMP	dGMP
DGTP	dGTP	PPI	diphosphate

Kinetic Law

$$v_{219} = \text{not specified} \quad (438)$$

5.220. Reaction FPPSYN__45__RXN

This is a reversible reaction of two reactants forming two products.

Name geranyltranstransferase

Notes GENE_ASSOCIATION: (BU465_ispA)PROTEIN_ASSOCIATION: (Geranyltranstransferase (Farnesyl-diphosphate synthase) (FPP synthase)//FPPSYN-RXN//Geranyltranstransferase)SUBSYSTEM: geranylgeranyldiphosphate biosynthesis II (plastidic)SUBSYSTEM: trans,trans-farnesyl diphosphate biosynthesisPROTEIN_CLASS: 2.5.1.10SIDE: PPI-GENERIC: falseTYPE: smallHOLE: false

Reaction equation

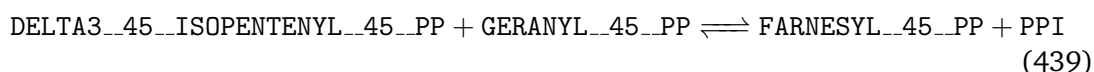


Table 224: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DELTA3- __45_- ISOPENTENYL- __45__PP	isopentenyl diphosphate	FARNESYL- __45__PP	(E,E)-farnesyl diphosphate
GERANYL- __45__PP	geranyl- diphosphate	PPI	diphosphate

Kinetic Law

$$v_{220} = \text{not specified} \quad (440)$$

5.221. Reaction RXN__45__8001

This is a reversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU100_hisD)PROTEIN_ASSOCIATION: (Histidinol dehydrogenase (HDH)//HISTALDEHYD-RXN//HISTOLDEHYD-RXN//Histidinol de-

hydrogenase)SUBSYSTEM: NAPROTEIN_CLASS: 1.1.1.23COFACTOR: NADCOFACTOR: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 225: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
HISTIDINOL	histidinol	HIS	L-histidine
NAD	NAD+	PROTON	H+
		NADH	NADH

Kinetic Law

$$v_{221} = \text{not specified} \tag{442}$$

5.222. Reaction PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Pantoate-β-alanine ligase

Notes GENE_ASSOCIATION: (BU196_panC)PROTEIN_ASSOCIATION: (Pantothenate synthetase (PS) (Pantoate-β-alanine ligase) (Pantoate-activating enzyme)//PANTOATE-BETA-ALANINE-LIG-RXN//Pantoate-β-alanine ligase)SUBSYSTEM: pantothenate biosynthesis IPROTEIN_CLASS: 6.3.2.1COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

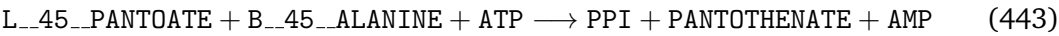


Table 226: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
L_45_PANTOATE	L-pantoate	PPI	diphosphate

Reactants		Products	
Id	Name	Id	Name
B__45_- _ALANINE	β-alanine	PANTOTHENATE	Pantothenate
ATP	ATP	AMP	AMP

Kinetic Law

$$v_{222} = \text{not specified} \quad (444)$$

5.223. Reaction DAPASYN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Adenosylmethionine-8-amino-7-oxononanoate aminotransferase

Notes GENE_ASSOCIATION: (BU292_bioA)PROTEIN_ASSOCIATION: (Adenosylmethionine-8-amino-7-oxononanoate aminotransferase (7,8-diamino-pelargonic acid aminotransferase) (DAPA aminotransferase)//DAPASYN-RXN)SUBSYSTEM: biotin biosynthesis IISUBSYSTEM: biotin biosynthesis ISUBSYSTEM: Methionine cycle IIPROTEIN_CLASS: 2.6.1.62SIDE: S__45__ADENOSYL__45__4__45__METHYLTHIO__45__2__45__OXOBUTANOATEfalseTYPE: smallHOLE: false

Reaction equation

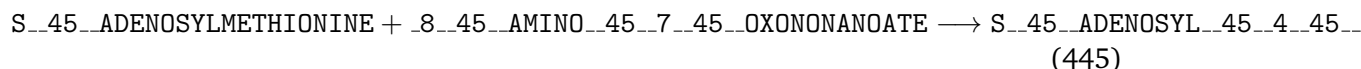


Table 227: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S__45_- _ADENOSYLMETHIONINE	S-adenosyl-L-methionine	S__45_- _ADENOSYL__45__4__45_- _METHYLTHIO__45__2__45_- _OXOBUTANOATE	S-adenosyl-4-methylthio-2-oxobutanoate

Id	Reactants Name	Id	Products Name
8_45_7- AMINO- 45_7- 45_- OXONONANOATE	7-keto-8- aminopelargonate	DIAMINONONANOATE 7_8_9- diaminopelargonate	

Kinetic Law

$$v_{223} = \text{not specified} \quad (446)$$

5.224. Reaction ACSELY_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Cysteine synthase

Notes GENE_ASSOCIATION: (BU066_cysK)PROTEIN_ASSOCIATION: (Cysteine synthase (O-acetylserine sulphydrylase) (O- acetylserine (Thiol)-lyase) (CSase)//ACSELY_RXN//Cysteine synthase)SUBSYSTEM: superpathway of cysteine biosynthesis-SUBSYSTEM: cysteine biosynthesis IPROTEIN_CLASS: 2.5.1.47SIDE: ACETGENERIC: falseTYPE: smallHOLE: false

Reaction equation

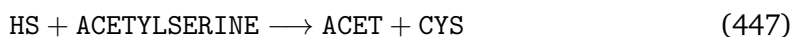


Table 228: Overview of participating species.

Id	Reactants Name	Id	Products Name
HS	hydrogen sulfide	ACET	acetate
ACETYL SERINE	Acetyl-L-serine	CYS	L-cysteine

Kinetic Law

$$v_{224} = \text{not specified} \quad (448)$$

5.225. Reaction XANPRIBOSYLTRAN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Xanthine-guanine phosphoribosyltransferase

Notes GENE_ASSOCIATION: (BU251_gpt)PROTEIN_ASSOCIATION: (Xanthine phosphoribosyltransferase (Xanthine-guanine phosphoribosyltransferase) (XGPRT)//XANPRIBOSYLTRANRXN//Xanthine phosphoribosyltransferase)SUBSYSTEM: salvage pathways of guanine, xanthine, and their nucleosidesPROTEIN_CLASS: 2.4.2.22SIDE: PPISIDE: PRPPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 229: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PPI	diphosphate
XANTHINE	xanthine	XANTHOSINE__45__5__45__PHOSPHATE	xanthosine-5-phosphate

Kinetic Law

$$v_{225} = \text{not specified} \quad (450)$$

5.226. Reaction RIB5PISOM__45__RXN

This is a reversible reaction of one reactant forming one product.

Name Ribose 5-phosphate epimerase

Notes GENE_ASSOCIATION: (BU411_rpiA)PROTEIN_ASSOCIATION: (Ribose-5-phosphate isomerase A (Phosphoriboisomerase A) (PRI)//RIB5PISOM-RXN//Ribose-5-phosphate isomerase)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (non-oxidative branch)SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 5.3.1.6GENERIC: falseTYPE: smallHOLE: false

Reaction equation

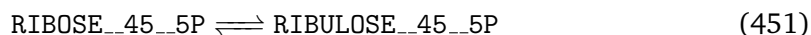


Table 230: Overview of participating species.

Id	Reactants Name	Id	Products Name
RIBOSE- _45_5P	D-ribose-5- phosphate	RIBULOSE- _45_5P	D-ribulose-5- phosphate

Kinetic Law

$$v_{226} = \text{not specified} \quad (452)$$

5.227. Reaction THIOREDOXIN_45_REDUCT_45_NADPH_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name Thioredoxin reductase (NADPH)

Notes GENE_ASSOCIATION: (BU314_trxB)PROTEIN_ASSOCIATION: (Thioredoxin reductase (TRXR)//THIOREDOXIN-REDUCT-NADPH-RXN)SUBSYSTEM: thioredoxin pathwayPROTEIN_CLASS: 1.8.1.9COFACTOR: NADPHCOFACTOR: _124_Red_45_Thioredoxin_124_ _124_Ox_45_Thioredoxin_124_COFACTOR: NADPSIDE: PROTONSIDE: NADPH-SIDE: NADPGENERIC: trueTYPE: macroHOLE: false

Reaction equation



Table 231: Overview of participating species.

Id	Reactants Name	Id	Products Name
NADP _124- _Red- _45_- _Thioredoxin- _124_	NADP+ a reduced thiore- doxin	PROTON _124- _Ox- _45_- _Thioredoxin- _124_	H+ an oxidized thioredoxin NADPH

Kinetic Law

v_{227}

= not specified

(454)

5.228. Reaction 2_46_8_46_1_46_6_45_RXN

This is an irreversible reaction of four reactants forming four products.

Name biotin synthase

Notes GENE_ASSOCIATION: (BU291_bioB)PROTEIN_ASSOCIATION: (Biotin synthase (Biotin synthetase)//2.8.1.6-RXN//Biotin synthase)SUBSYSTEM: biotin biosynthesis ISUBSYSTEM: Methionine cycle IIPROTEIN_CLASS: 2.8.1.6SIDE: _124_Sulfurated_45_Sulfur_124_Unsulfurated_45_Sulfur_45_Acceptors_124_SIDE: CH33ADOSIDE: CPD_45_249GENERICtrueTYPE: smallHOLE: false

Reaction equation

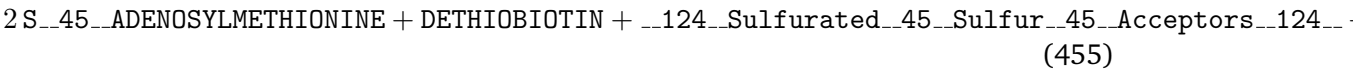


Table 232: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S_45_	S-adenosyl-L-methionine	_124_	an unsulfurated sulfur acceptor
_ADENOSYLMETHIONINE		_Unsulfurated_45_	
		_Sulfur_45_	
		_Acceptors_124_	
DETHIOBIOTIN	dethiobiotin	BIOTIN	biotin
124	a sulfurated sulfur donor	MET	L-methionine
_Sulfurated_45_			
_Sulfur_45_			
_Acceptors_124_			
CPD_45_249	a sulfur donor	CH33ADO	5'-deoxyadenosine

Kinetic Law

$$v_{228} = \text{not specified} \quad (456)$$

5.229. Reaction RXN__45__3341

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU107_gnd)PROTEIN_ASSOCIATION: (6-phosphogluconate dehydrogenase, decarboxylating//6PGLUCONDEHYDROG-RXN)SUBSYSTEM: formaldehyde oxidation IPROTEIN_CLASS: 1.1.1.44COFACTOR: NADCOFACTOR: NADHSIDE: NADSIDE: NADHSIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: small-HOLE: false

Reaction equation



Table 233: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	CARBON- __45_- DIOXIDE	CO2
CPD_- _45_- _2961	6-phospho-D- gluconate	RIBULOSE- __45__5P	D-ribulose-5- phosphate
		NADH	NADH

Kinetic Law

$$v_{229} = \text{not specified} \quad (458)$$

5.230. Reaction SERINE__45__0__45__ACETTRAN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Serine O-acetyltransferase

Notes GENE_ASSOCIATION: (BU054_cysE)PROTEIN_ASSOCIATION: (Serine acetyltransferase (SAT)//SERINE-O-ACETTRAN-RXN)SUBSYSTEM: superpathway of cysteine biosynthesisSUBSYSTEM: cysteine biosynthesis IPROTEIN_CLASS: 2.3.1.30COFACTOR: CO_45_ACOFACTOR: ACETYL_45_COASIDE: CO_45_ASIDE: ACETYL_45_COAGENERIC: falseTYPE: smallHOLE: false

Reaction equation

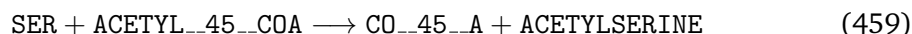


Table 234: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
SER	L-serine	CO_45_-A	coenzyme A
ACETYL_45_-COA	acetyl-CoA	ACETYLSERINE	Acetyl-L-serine

Kinetic Law

$$v_{230} = \text{not specified} \quad (460)$$

5.231. Reaction HISTOLDEHYD_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Histidinol dehydrogenase

Notes GENE_ASSOCIATION: (BU100_hisD)PROTEIN_ASSOCIATION: (Histidinol dehydrogenase (HDH)//HISTALDEHYD-RXN//HISTOLDEHYD-RXN//Histidinol dehydrogenase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 1.1.1.23COFACTOR: NADCOFACTOR: NADHSIDE: NADSIDE: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 235: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
HISTIDINOL	histidinol	HISTIDINAL	histidinal
NAD	NAD+	NADH	NADH

Kinetic Law

$$v_{231} = \text{not specified} \quad (462)$$

5.232. Reaction RIBOFLAVINSYNREDUC__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU462_ribD2)PROTEIN_ASSOCIATION: (5-amino-6-(5-phosphoribosylamino)uracil reductase (HTP reductase)//5-amino-6-(5-phosphoribosylamino)uracil reductase)SUBSYSTEM: flavin biosynthesisPROTEIN_CLASS: 1.1.1.193COFACTOR: NADPHCOFACTOR: NADPSIDE: PROTONSIDE: NADPHSIDE: NADPGENERIC: false-TYPE: smallHOLE: false

Reaction equation

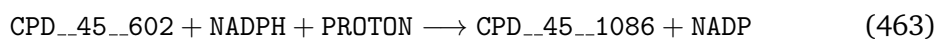


Table 236: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CPD_- _45__602	5-amino-6-(5'-phosphoribosylamino)uracil	CPD_- _1086	5-amino-6-(5'-phosphoribitylamino)uracil
NADPH	NADPH	NADP	NADP+
PROTON	H+		

Kinetic Law

$$v_{232} = \text{not specified} \quad (464)$$

5.233. Reaction RXN__45__3742

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE ASSOCIATION: (BU167_folC)PROTEIN ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolylpolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: folate polyglutamylation IIPROTEIN_CLASS: 6.3.2.17COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: ATPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

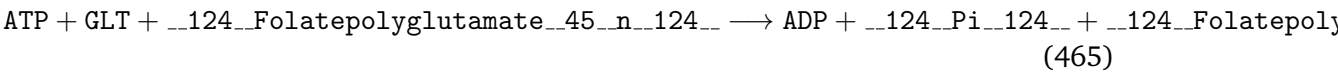


Table 237: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
GLT	L-glutamate	__124__Pi__124__	phosphate
__124__Folatepolyglutamate__45__n__124__	a folylpolyglutamate	__124__Folatepolyglutamate__45__n__124__	a folylpolyglutamate

Kinetic Law

$v_{233} = \text{not specified}$ (466)

5.234. Reaction RXN0__45__3161

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU383_rrmJ)PROTEIN ASSOCIATION: (Ribosomal RNA large subunit methyltransferase J (rRNA (uridine-2'-O-)-methyltransferase) (23S

rRNA m2U2552 methyltransferase))SUBSYSTEM: NAPROTEIN_CLASS: NACO-
FACTOR: ADENOSYL_45_HOMO_45_CYS
COFACTOR: S_45_ADENOSYLMETHIONINE
GENERIC: trueTYPE: macroHOLE: false

Reaction equation

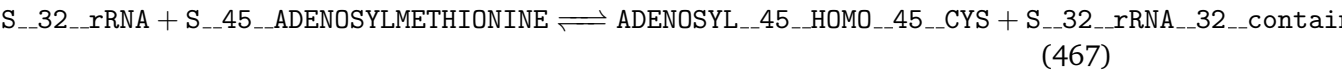


Table 238: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S_32_rRNA	NA	ADENOSYL_45_HOMO_45_CYS	S-adenosyl-L-homocysteine
S_45_ADENOSYLMETHIONINE	S-adenosyl-L-homocysteine	S_32_rRNA_32_containing_32_N2_45_methyluridine	NA

Kinetic Law

v_{234} = not specified (468)

5.235. Reaction SHIKIMATE_45_KINASE_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name shikimate-kinase

Notes GENE_ASSOCIATION: (BU539.aroK)PROTEIN_ASSOCIATION: (Shikimate kinase (SK)//SHIKIMATE-KINASE-RXN//Shikimate kinase)SUBSYSTEM: chorismate biosynthesisPROTEIN_CLASS: 2.7.1.71COFACTOR: ADPCOFACTOR: ATPSIDE: ADP-SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

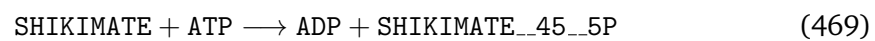


Table 239: Overview of participating species.

Id	Reactants Name	Id	Products Name
SHIKIMATE	shikimate	ADP	ADP
ATP	ATP	SHIKIMATE	shikimate-3- phosphate

Kinetic Law

$$v_{235} = \text{not specified} \quad (470)$$

5.236. Reaction METHENYLTHFCYCLOHYDRO__45__RXN

This is a reversible reaction of two reactants forming one product.

Name Methenyltetrahydrofolate cyclohydrolase

Notes GENE_ASSOCIATION: (BU486_fold)PROTEIN_ASSOCIATION: (Bifunctional protein fold [Includes: Methylenetetrahydrofolate dehydrogenase ; Methenyltetrahydrofolate cyclohydrolase]//METHENYLTHFCYCLOHYDRO-RXN//METHYLENETHFDEHYDROGENATION-RXN//Methenyltetrahydrofolate cyclohydrolase)SUBSYSTEM: reductive acetyl coenzyme A pathwaySUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: formaldehyde oxidation V (tetrahydrofolate pathway)SUBSYSTEM: folate transformation-sPROTEIN_CLASS: 3.5.4.9SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 240: Overview of participating species.

Id	Reactants Name	Id	Products Name
5_45- 10- 45- METHENYL- 45- THF WATER	5,10- methenyltetrahydrofolate H2O	10- 45- FORMYL- 45- THF	10-formyl- tetrahydrofolate

Kinetic Law

$$v_{236} = \text{not specified} \quad (472)$$

5.237. Reaction PSERTRANSAM__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Phosphoserine aminotransferase

Notes GENE_ASSOCIATION: (BU312_serC)PROTEIN_ASSOCIATION: (Phosphoserine aminotransferase (Phosphohydroxythreonine aminotransferase) (PSAT)//PSERTRANSAM-RXN//PSERTRANSAMPYR-RXN)SUBSYSTEM: superpathway of cysteine biosynthesisSUBSYSTEM: serine biosynthesisSUBSYSTEM: superpathway of serine and glycine biosynthesis IPROTEIN_CLASS: 2.6.1.52COFACTOR: _2__45__KETOGLUTARATECOFACTOR: GLTSIDE: _2__45__KETOGLUTARATESIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

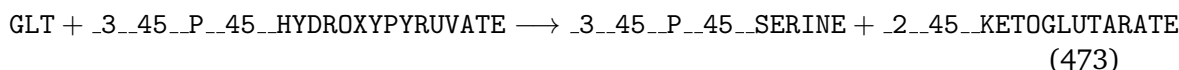


Table 241: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GLT	L-glutamate	_3_45_P_45_SERINE	3-phospho-serine
_3_45_P_45_HYDROXYPYRUVATE	3-phospho-hydroxypyruvate	_2_45_KETOGLUTARATE	2-ketoglutarate

Kinetic Law

$$v_{237} = \text{not specified} \quad (474)$$

5.238. Reaction D__45__PPENTOMUT__45__RXN

This is an irreversible reaction of one reactant forming one product.

Name Phosphopentomutase

Notes GENE_ASSOCIATION: (BU542_deoB)PROTEIN_ASSOCIATION: (Phosphopen-
tomutase (Phosphodeoxyribomutase)//D-PPENTOMUT-RXN//PPENTOMUT-RXN//Phosphopentomu
)SUBSYSTEM: purine deoxyribonucleosides degradationPROTEIN_CLASS: 5.4.2.7GENERIC:
falseTYPE: smallHOLE: false

Reaction equation

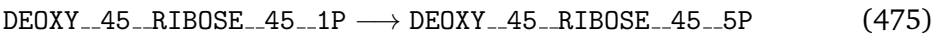


Table 242: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DEOXY- __45_- RIBOSE- __45__1P	deoxyribose-1- phosphate	DEOXY- __45_- RIBOSE- __45__5P	deoxyribose-5- phosphate

Kinetic Law

v_{238} = not specified (476)

5.239. Reaction HYPOXANPRIBOSYLTRAN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Hypoxanthine phosphoribosyltransferase

Notes GENE_ASSOCIATION: (BU195_hpt)PROTEIN_ASSOCIATION: (Hypoxanthine
phosphoribosyltransferase (HPRT)//GUANPRIBOSYLTRAN-RXN//HYPOXANPRIBOSYLTRAN-
RXN//Hypoxanthine phosphoribosyltransferase)SUBSYSTEM: NAPROTEIN_CLASS:
2.4.2.8GENERIC: falseTYPE: smallHOLE: false

Reaction equation

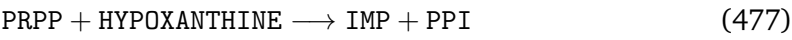


Table 243: Overview of participating species.

Id	Reactants Name	Id	Products Name
PRPP	5-phosphoribosyl 1-pyrophosphate	IMP	inosine-5'- phosphate
HYPOXANTHINE	hypoxanthine	PPI	diphosphate

Kinetic Law

$$v_{239} = \text{not specified} \quad (478)$$

5.240. Reaction PHOSGLYPHOS__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Phosphoglycerate kinase

Notes GENE_ASSOCIATION: (BU450_pgk)PROTEIN_ASSOCIATION: (Phosphoglycerate kinase//PHOSGLYPHOS-RXN//Phosphoglycerate kinase)SUBSYSTEM: glycolysis ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 2.7.2.3COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 244: Overview of participating species.

Id	Reactants Name	Id	Products Name
G3P	3- phosphoglycerate	DPG	1,3- diphosphateglycerate
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{240} = \text{not specified} \quad (480)$$

5.241. Reaction PROLINE_45_45_TRNA_45_LIGASE_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Proline-tRNA ligase

Notes GENE ASSOCIATION: (BU239_proS)PROTEIN ASSOCIATION: (Prolyl-tRNA synthetase (Proline-tRNA ligase) (ProRS)//PROLINE-TRNA-LIGASE-RXN//Proline-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.15COFACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

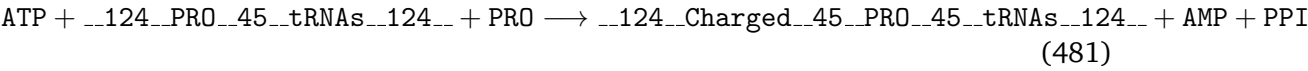


Table 245: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	_124_- _Charged- _45_- _PRO- _45_- _tRNAs_- _124_	L-prolyl-tRNApro
_124- _PRO- _45_- _tRNAs_- _124_	tRNApro	AMP	AMP
PRO	L-proline	PPI	diphosphate

Kinetic Law

v241 = not specified (482)

5.242. Reaction ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Aspartate-tRNA ligase

Notes GENE_ASSOCIATION: (BU316_aspS)PROTEIN_ASSOCIATION: (Aspartyl-tRNA synthetase (Aspartate-tRNA ligase) (AspRS)//ASPARTATE-TRNA-LIGASE-RXN//Aspartate-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.12CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

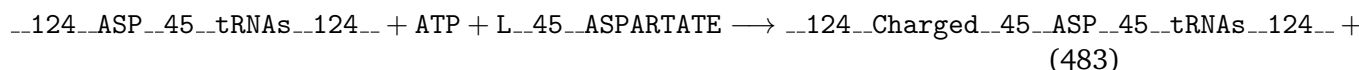


Table 246: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124__ __ASP__ __45__ __tRNAs__ __124__	tRNAasp	__124__ __Charged__ __45__ __ASP__ __45__ __tRNAs__ __124__	L-aspartyl- tRNAasp
ATP	ATP	PPI	diphosphate
L__45__ __ASPARTATE	L-aspartate	AMP	AMP

Kinetic Law

$$v_{242} = \text{not specified} \quad (484)$$

5.243. Reaction _2PGADEHYDRAT__45__RXN

This is a reversible reaction of one reactant forming two products.

Name Phosphopyruvate hydratase

Notes GENE_ASSOCIATION: (BU417_eno)PROTEIN_ASSOCIATION: (Enolase (2-phosphoglycerate dehydratase) (2-phospho-D- glycerate hydro-lyase)//2PGADEHYDRAT-RXN)SUBSYSTEM: glycolysis ISUBSYSTEM: respiration (anaerobic)SUBSYSTEM: formaldehyde assimilation I (serine pathway)SUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 4.2.1.11SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

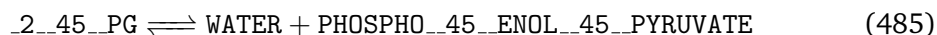


Table 247: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
_2_45_	2-phosphoglycerate	WATER	H2O
_PG		PHOSPHO- _45_ _ENOL- _45_ _PYRUVATE	phosphoenolpyruvate

Kinetic Law

$$v_{243} = \text{not specified} \quad (486)$$

5.244. Reaction RXNO__45__2161

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU313_serS)PROTEIN_ASSOCIATION: (Seryl-tRNA synthetase (Seryl-tRNA(Ser/Sec) synthetase) (Serine-tRNA ligase) (SerRS)//RXN0-2161//SERINE-TRNA-LIGASE-RXN//Serine-tRNA ligase)SUBSYSTEM: selenocysteine biosynthesisPROTEIN_CLASS: 6.1.1.11COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

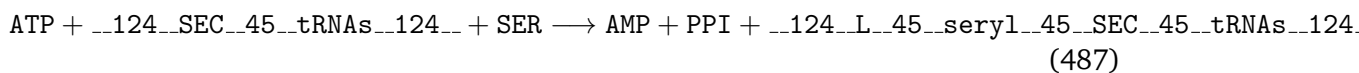


Table 248: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	AMP	AMP
__124-	tRNAsec	PPI	diphosphate
__SEC-			
__45-			
tRNAs-			
_124__			
SER	L-serine	__124_-	L-seryl-tRNAsec
		L__45_-	
		_seryl-	
		__45_-	
		_SEC-	
		__45_-	
		tRNAs-	
		_124__	

Kinetic Law

$$v_{244} = \text{not specified} \quad (488)$$

5.245. Reaction _6PGLUCONDEHYDROG__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Phosphogluconate dehydrogenase (decarboxylating)

Notes GENE_ASSOCIATION: (BU107_gnd)PROTEIN_ASSOCIATION: (6-phosphogluconate dehydrogenase, decarboxylating//6PGLUCONDEHYDROG-RXN)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (oxidative branch)PROTEIN_CLASS: 1.1.1.44COFACTOR: NAD__45__P__45__OR__45__NOPCOFACTOR: NADH__45__P__45__OR__45__NOPSIDE: NAD__45__P__45__OR__45__NOPSIDE: NADH__45__P__45__OR__45__NOPSIDE: CARBON__45__DIOXIDEGENERIC: trueTYPE: smallHOLE: false

Reaction equation

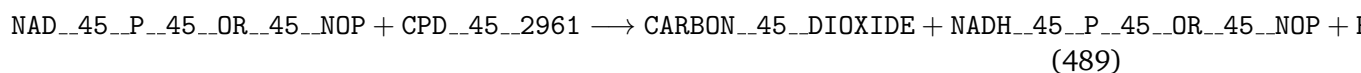


Table 249: Overview of participating species.

Id	Reactants Name	Id	Products Name
NAD_45_P_45_OR_45_NOP	NAD(P) +	CARBON_45_DIOXIDE	CO2
CPD_45_2961	6-phospho-D-gluconate	NADH_45_P_45_OR_45_NOP	NAD(P)H
		RIBULOSE_45_5P	D-ribulose-5-phosphate

Kinetic Law

$$v_{245} = \text{not specified} \quad (490)$$

5.246. Reaction GMKALT_45_RXN

This is a reversible reaction of two reactants forming two products.

Name T2-induced deoxynucleotide kinase

Notes GENE_ASSOCIATION: (BU434.gmk)PROTEIN_ASSOCIATION: (Guanylate kinase (GMP kinase)//GUANYL-KIN-RXN//Guanylate kinase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.4.12COFACTOR: ADPCOFACTOR: ATPGENERIC: falseTYPE: small-HOLE: false

Reaction equation

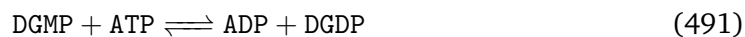


Table 250: Overview of participating species.

Id	Reactants Name	Id	Products Name
DGMP	dGMP	ADP	ADP
ATP	ATP	DGDP	dGDP

Kinetic Law

$$v_{246} = \text{not specified} \quad (492)$$

5.247. Reaction CTPSYN__45__RXN

This is an irreversible reaction of four reactants forming four products.

Name CTP synthetase

Notes GENE_ASSOCIATION: (BU416_pyrG)PROTEIN_ASSOCIATION: (CTP synthase (UTP-ammonia ligase) (CTP synthetase)//CTPSYN-RXN//CTP synthase)SUBSYSTEM: pyrimidine ribonucleotides interconversionSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 6.3.4.2COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: GLNSIDE: WATERSIDE: ADPSIDE: __124__Pi__124__SIDE: GLTSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

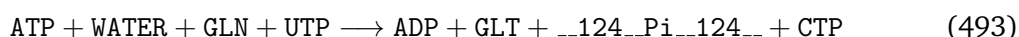


Table 251: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
WATER	H2O	GLT	L-glutamate
GLN	L-glutamine	__124__Pi__124__	phosphate
UTP	UTP	CTP	CTP

Kinetic Law

$$v_{247} = \text{not specified} \quad (494)$$

5.248. Reaction AMINOCYL__45__TRNA__45__HYDROLASE__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Aminoacyl-tRNA hydrolase

Notes GENE ASSOCIATION: (BU190_pth)PROTEIN ASSOCIATION: (Peptidyl-tRNA hydrolase (PTH)//AMINOCYL-TRNA-HYDROLASE-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 3.1.1.29GENERIC: trueTYPE: macroHOLE: false

Reaction equation

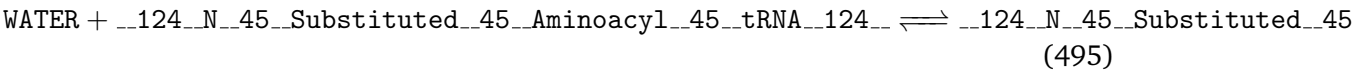


Table 252: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	__124_- N_45_- Substituted- _45_- Amino- _45_- Acids_- _124__	an N-substituted amino acid
__124_- N_45_- Substituted- _45_- Aminoacyl- _45_- tRNA_- _124__	N-substituted aminoacyl-tRNA	__124_- Some- _45_- tRNA_- _124__	a tRNA

Kinetic Law

v_{248} = not specified (496)

5.249. Reaction RXN__45__6401

This is an irreversible reaction of two reactants forming one product.

Name NA

Notes GENE ASSOCIATION: (BU196_panC)PROTEIN ASSOCIATION: (Pantothenate synthetase (PS) (Pantoate-beta-alanine ligase) (Pantoate-activating enzyme)//PANTOATE-BETA-ALANINE-LIG-RXN//Pantoate-beta-alanine ligase)SUBSYSTEM: NAPROTEIN_CLASS: 6.3.2.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 253: Overview of participating species.

Id	Reactants Name	Id	Products Name
PANTOYL- _45_- _LACTONE	pantoyl lactone	PANTOTHENATE	pantothenate
B_45_- _ALANINE	β-alanine		

Kinetic Law

$$v_{249} = \text{not specified} \quad (498)$$

5.250. Reaction RXN_45_7933

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE ASSOCIATION: (BU047_argE)PROTEIN ASSOCIATION: (Acetylornithine deacetylase (Acetylornithinase) (AO) (N- acetylornithinase) (NAO)//ACETYLORNDEACET-RXN//Acetylornithine deacetylase)SUBSYSTEM: arginine biosynthesis IIIPROTEIN_CLASS: 3.5.1.16SIDE: ACETSIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

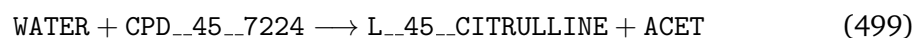


Table 254: Overview of participating species.

Id	Reactants Name	Id	Products Name
WATER	H2O	L_45_- _CITRULLINE	citrulline
CPD_- _45_- _7224	N-acetyl-L-citrulline	ACET	acetate

Kinetic Law

$$v_{250} = \text{not specified} \quad (500)$$

5.251. Reaction ACETYLORNDEACET__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Acetylornithine deacetylase

Notes GENE_ASSOCIATION: (BU047_argE)PROTEIN_ASSOCIATION: (Acetylornithine deacetylase (Acetylornithinase) (AO) (N- acetylornithinase) (NAO)//ACETYLORNDEACET-RXN//Acetylornithine deacetylase)SUBSYSTEM: ornithine biosynthesisSUBSYSTEM: arginine biosynthesis IPROTEIN_CLASS: 3.5.1.16SIDE: ACETSIDE: WATER-GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 255: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	ACET	acetate
N__45_- _ALPHA- __45_- _ACETYLORNITHINE	N-acetyl-L- ornithine	L__45_- _ORNITHINE	L-ornithine

Kinetic Law

$$v_{251} = \text{not specified} \quad (502)$$

5.252. Reaction UROPORIIIMETHYLTRANSA__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU425_cysG)PROTEIN_ASSOCIATION: (Siroheme synthase [Includes: Uroporphyrinogen-III C-methyltransferase (Urogen III methylase) (SUMT) (Uroporphyrinogen III methylase) (UROM); Precorrin-2 dehydrogenase ;

Sirohydrochlorin ferrochelatase]//DIMETHUROPORDEHYDROG-RXN//RXN-8675//SIROHEME-FERROCHELAT-RXN//UROPORIIIMETHYLTRANSA-RXN//Uroporphyrinogen-III C-methyltransferase//Precorrin-2 dehydrogenase//Sirohydrochlorin ferrochelatase)SUBSYSTEM: adenosylcobalamin biosynthesis II (late cobalt incorporation)SUBSYSTEM: siroheme biosynthesisSUBSYSTEM: adenosylcobalamin biosynthesis I (early cobalt insertion)PROTEIN_CLASS: 2.1.1.107COFACTOR: ADENOSYL_45_HOMO_45_CYS COFACTOR: S_45_ADENOSYLMETHIONINESIDE: ADENOSYL_45_HOMO_45_CYS SIDE: S_45_ADENOSYLMETHIONINEfalseTYPE: smallHOLE: false

Reaction equation

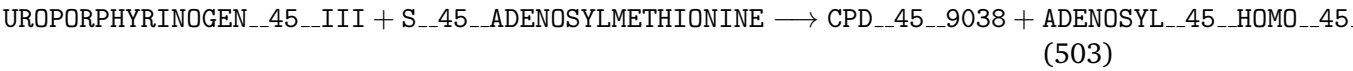


Table 256: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UROPORPHYRINOGEN_45_III	Uroporphyrinogen-III	CPD_45_9038	precorrin-1
S_45_ADENOSYLMETHIONINE	S-adenosyl-L-homocysteine	ADENOSYL_45_HOMO_45_CYS	S-adenosyl-L-homocysteine

Kinetic Law

$v_{252} = \text{not specified}$ (504)

5.253. Reaction NAD_45_SYNTH_45_GLN_45_RXN

This is an irreversible reaction of four reactants forming four products.

Name NAD(+) synthetase (glutamine-hydrolysing)

Notes GENE_ASSOCIATION: (BU174_nadE)PROTEIN_ASSOCIATION: (NH(3)-dependent NAD(+) synthetase//NAD-SYNTH-NH3-RXN)SUBSYSTEM: NAD biosynthesis I (from aspartate)SUBSYSTEM: NAD salvage pathway IPROTEIN_CLASS: 6.3.5.1COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: GLNSIDE: WATERSIDE: PPI-SIDE: GLTSIDE: ATPSIDE: AMPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

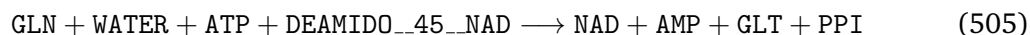


Table 257: Overview of participating species.

Id	Reactants Name	Id	Products Name
GLN	L-glutamine	NAD	NAD+
WATER	H2O	AMP	AMP
ATP	ATP	GLT	L-glutamate
DEAMIDO- _45_- _NAD	deamido-NAD	PPI	diphosphate

Kinetic Law

$$v_{253} = \text{not specified} \quad (506)$$

5.254. Reaction HISTIDPHOS_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Histidinol-phosphatase

Notes GENE_ASSOCIATION: (BU102_hisB)PROTEIN_ASSOCIATION: (Histidine biosynthesis bifunctional protein hisB [Includes: Histidinol-phosphatase ; Imidazoleglycerol-phosphate dehydratase (IGPD)]//HISTIDPHOS-RXN//IMIDPHOSDEHYD-RXN//Histidinol-phosphatase//Imidazoleglycerol-phosphate dehydratase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 3.1.3.15SIDE: WATERSIDE: _124_Pi_124_GENERIC: falseTYPE: smallHOLE: false

Reaction equation

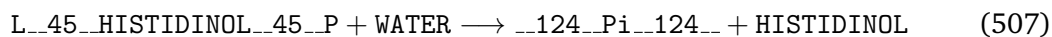


Table 258: Overview of participating species.

Id	Reactants Name	Id	Products Name
L__45_- _HISTIDINO __45__P WATER	L-histidinol- phosphate H2O	__124- __Pi_- _124__ HISTIDINO	phosphate histidinol

Kinetic Law

$$v_{254} = \text{not specified} \quad (508)$$

5.255. Reaction _1TRANSKETO__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Transketolase

Notes GENE_ASSOCIATION: (BU094_tkt)PROTEIN_ASSOCIATION: (Transketolase (TK)//Transketolase)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (partial)SUBSYSTEM: pentose phosphate pathway (non-oxidative branch)SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 2.2.1.1GENERIC: false-TYPE: smallHOLE: false

Reaction equation

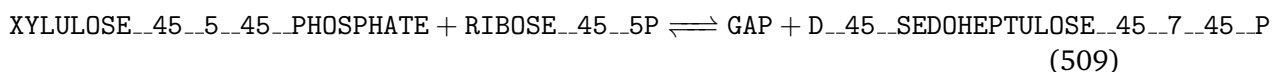


Table 259: Overview of participating species.

Id	Reactants Name	Id	Products Name
XYLULOSE- __45__5- __45_- _PHOSPHATE	D-xylulose-5- phosphate	GAP	D- glyceraldehyde-3- phosphate
RIBOSE- __45__5P	D-ribose-5- phosphate	D__45_- _SEDOHEPTULOSE __45__7- __45__P	D-sedoheptulose- 5-phosphate

Kinetic Law

$$v_{255} = \text{not specified} \quad (510)$$

5.256. Reaction FORMYLTHFGLUSYNTH__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU167_folC)PROTEIN_ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolylpolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: folate polyglutamylation IPROTEIN_CLASS: 6.3.2.17COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: GLTSIDE: ATPGENERIC: trueTYPE: small-HOLE: false

Reaction equation

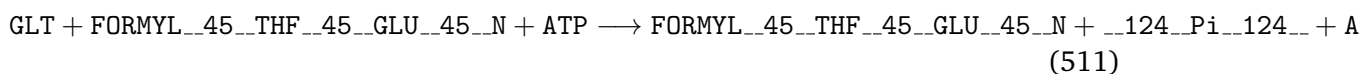


Table 260: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GLT	L-glutamate	FORMYL- __45_- _THF- __45_- _GLU_- _45__N	an N10-formyl- tetrahydrofolate
FORMYL- __45_- _THF- __45_- _GLU_- _45__N	an N10-formyl- tetrahydrofolate	__124- _Pi_- _124__	phosphate
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{256} = \text{not specified} \quad (512)$$

5.257. Reaction NAD__45__KIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NAD(+) kinase

Notes GENE_ASSOCIATION: (BU305_pfkA) or (BU185_ppnK)PROTEIN_ASSOCIATION: (6-phosphofructokinase (Phosphofructokinase) (Phosphohexokinase)//6PFRUCTPHOS-RXN//6-phosphofructokinase) or (Probable inorganic polyphosphate/ATP-NAD kinase (Poly(P)/ATP NAD kinase))SUBSYSTEM: NAD phosphorylation and de-phosphorylationPROTEIN_CLASS: 2.7.1.23COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 261: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	ADP	ADP
NAD	NAD+	NADP	NADP+

Kinetic Law

$$v_{257} = \text{not specified} \quad (514)$$

5.258. Reaction RXN__45__7001

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU541_deoD)PROTEIN_ASSOCIATION: (Purine nucleoside phosphorylase deoD-type (PNP)//ADENPHOSPHOR-RXN//INOPHOSPHOR-RXN//PNP-RXN//RXN0-5199)SUBSYSTEM: NAPROTEIN_CLASS: 2.4.2.1GENERIC: trueTYPE: smallHOLE: false

Reaction equation

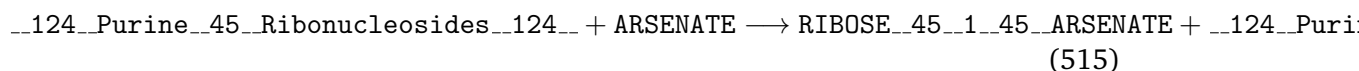


Table 262: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
__124_- _Purine- __45_- _Ribonucleosides- __124__ ARSENATE	a purine ribonucleoside arsenate	RIBOSE- __45__1- __45_- _ARSENATE __124_- _Purine- __45_- _Bases_- _124__	ribose-1-arsenate a purine base

Kinetic Law

$$v_{258} = \text{not specified} \quad (516)$$

5.259. Reaction RXN_45_8972

This is an irreversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanyl-D-glutamate-2,6-diaminopimelate ligase

Notes GENE_ASSOCIATION: (BU221_murE)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoylalanyl-D-glutamate-2,6-diaminopimelate ligase (UDP-N-acetylmuramyl-tripeptide synthetase) (Meso- diaminopimelate-adding enzyme) (UDP-MurNAc-tripeptide synthetase)//UDP-NACMURALGLDAPLIG-RXN)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 6.3.2.13COFACTOR: ADPCOFACTOR: __124_Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124_Pi__124__SIDE: ATPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

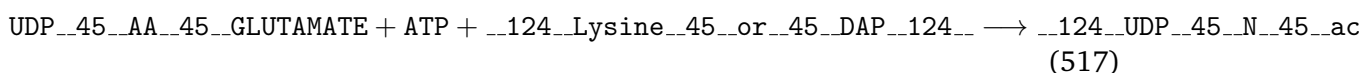


Table 263: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UDP_45_AA_45_	UDP-N-acetylmuramoyl-L-alanyl-D-glutamate	_124_UDP_45_N_45_	a UDP-N-acetylmuramoyl-tripeptide
ATP	ATP	_124_Pi_124_	phosphate
_124_Lysine_45_	an L-lysine or meso-2,6-diaminoheptanedioate	ADP	ADP
_or_45_DAP_124_			

Kinetic Law

$$v_{259} = \text{not specified} \quad (518)$$

5.260. Reaction UDP_45_NACMURALGLDAPAALIG_45_RXN

This is a reversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanyl-D-glutamyl-2,6-diaminopimelate-D-alanyl- D-alanine ligase

Notes GENE_ASSOCIATION: (BU220_murF)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase (UDP-MurNAc-pentapeptide synthetase) (D-alanyl-D- alanine-adding enzyme)//UDP-NACMURALGLDAPAAALIG-RXN//UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase)SUBSYSTEM: NAPROTEIN_CLASS: 6.3.2.10COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

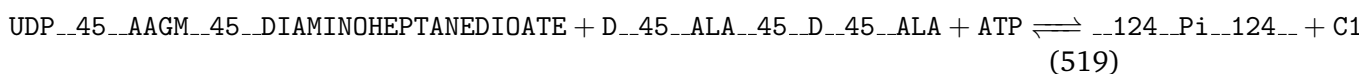


Table 264: Overview of participating species.

Id	Reactants Name	Id	Products Name
UDP_- _45_- _AAGM- _45_- _DIAMINOHEPTANOATE	UDP-N- acetylmuramoyl- L-alanyl-D- glutamyl- meso-2,6- diaminoheptanedioate	_124_- _Pi_- _124_-	phosphate
D_-45_- _ALA_- _45_-D_- _45_-ALA	D-alanyl-D- alanine	C1	UDP-N- acetylmuramoyl- L-alanyl-D- glutamyl- meso-2,6- diaminoheptanedioate- D-alanyl-D- alanine ADP
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{260} = \text{not specified} \quad (520)$$

5.261. Reaction RXN0_45_5234

This is a reversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU289_glyA)PROTEIN_ASSOCIATION: (Serine hydroxymethyltransferase (Serine methylase) (SHMT)//GLYOHMETRANS-RXN)SUBSYSTEM: NAPROTEIN_CLASS: NAGENERIC: trueTYPE: smallHOLE: false

Reaction equation

Table 265: Overview of participating species.

Id	Reactants Name	Id	Products Name
ALLO- _45__THR	allothreonine	GLY	glycine
		ACETALD	acetaldehyde

Kinetic Law

$$v_{261} = \text{not specified} \quad (522)$$

5.262. Reaction GUANYL__45__KIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Guanylate kinase

Notes GENE_ASSOCIATION: (BU434_gmk)PROTEIN_ASSOCIATION: (Guanylate kinase (GMP kinase)//GUANYL-KIN-RXN//Guanylate kinase)SUBSYSTEM: super-pathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesisISUBSYSTEM: salvage pathways of purine and pyrimidine nucleotidesPROTEIN_CLASS: 2.7.4.8COFACTOR: ADPCOFACTOR: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

Table 266: Overview of participating species.

Id	Reactants Name	Id	Products Name
GMP	GMP	ADP	ADP
ATP	ATP	GDP	GDP

Kinetic Law

$$v_{262} = \text{not specified} \quad (524)$$

5.263. Reaction RXN__45__8973

This is an irreversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramoylalanyl-D-glutamyl-2,6-diaminopimelate-D-alanyl- D-alanine ligase

Notes GENE_ASSOCIATION: (BU220_murF)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase (UDP-MurNAc-pentapeptide synthetase) (D-alanyl-D- alanine-adding enzyme)//UDP-NACMURALGLDAPAALIG-RXN//UDP-N-acetylmuramoyl-tripeptide-D-alanyl-D-alanine ligase)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 6.3.2.10COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: ATPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

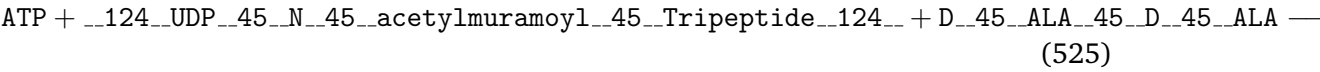


Table 267: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124__a	UDP-N-acetylmuramoyl-pentapeptide
__124__UDP__45__N__45__acetylmuramoyl__45__Tripeptide__124__	UDP-N-acetylmuramoyl-tripeptide	__124__Pi__124__	phosphate
D__45__ALA__45__D__45__ALA	D-alanyl-D-alanine	ADP	ADP

Kinetic Law

$$v_{263} = \text{not specified} \quad (526)$$

5.264. Reaction RXN__45__8976

This is an irreversible reaction of two reactants forming two products.

Name Undecaprenyldiphospho-muramoylpentapeptide β-N- acetylglucosaminyltransferase

Notes GENE_ASSOCIATION: (BU216_murG)PROTEIN_ASSOCIATION: (UDP-N-acetylglucosamine–N-acetylmuramyl-(pentapeptide) pyrophosphoryl-undecaprenol N-acetylglucosamine transferase (Undecaprenyl-PP-MurNAc-pentapeptide-UDPGlcNAc GlcNAc transferase)//NACGLCTRA RXN)SUBSYSTEM: NAPROTEIN_CLASS: 2.4.1.227COFACTOR: UDPCOFACTOR: UDP__45__N__45__ACETYL__45__D__45__GLUCOSAMINEGENERIC: falseTYPE: small-HOLE: false

Reaction equation

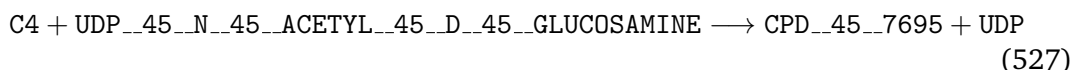


Table 268: Overview of participating species.

Id	Reactants Name	Id	Products Name
C4	N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine-diphosphoundecaprenol	CPD_45_7695	N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine
UDP_45_N_45_ACETYL_45_D_45_GLUCOSAMINE	UDP-N-acetyl-D-glucosamine	UDP	UDP

Kinetic Law

$$v_{264} = \text{not specified} \quad (528)$$

5.265. Reaction RXN__45__8975

This is an irreversible reaction of two reactants forming two products.

Name Phospho-N-acetylmuramoyl-pentapeptide-transferase

Notes GENE_ASSOCIATION: (BU219_mraY)PROTEIN_ASSOCIATION: (Phospho-N-acetylmuramoyl-pentapeptide-transferase (UDP- MurNAc-pentapeptide phosphotransferase)//PHOSMURNAc-pentapeptide-phosphotransferase)RXN//Phospho-N-acetylmuramoyl-pentapeptide-transferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.8.13GENERIC: falseTYPE: smallHOLE: false

Reaction equation

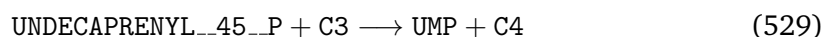


Table 269: Overview of participating species.

Id	Reactants Name	Id	Products Name
UNDECAPRENYL__45__P	undecaprenyl phosphate	UMP	UMP
C3	UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine	C4	N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl- D-alanyl-D-alanine-diphosphoundecaprenol

Kinetic Law

$$v_{265} = \text{not specified} \quad (530)$$

5.266. Reaction _2_46_7_46_7_46_8_45_RXN

This is a reversible reaction of three reactants forming three products.

Name Polyribonucleotide nucleotidyltransferase

Notes GENE ASSOCIATION: (BU373_pnp)PROTEIN ASSOCIATION: (Polyribonucleotide nucleotidyltransferase (Polynucleotide phosphorylase) (PNPase)//2.7.7.8-RXN//Polyribonucleotide nucleotidyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.7.7.8GENERIC: true-
TYPE: macroHOLE: false

Reaction equation

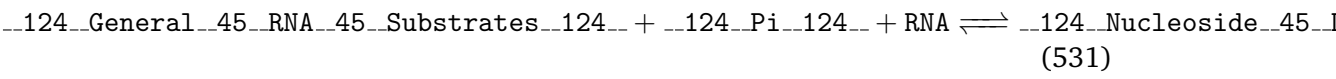


Table 270: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
--124-- _General-- _45-- _RNA-- _45-- _Substrates-- _124--	an RNA	--124-- _Nucleoside-- _45-- _Diphosphates-- _124--	a nucleoside diphosphate
--124-- _Pi-- _124--	phosphate	RNA	RNA
RNA	RNA	--124-- _General-- _45-- _RNA-- _45-- _Substrates-- _124--	an RNA

Kinetic Law

v_{266} = not specified

(532)

5.267. Reaction _3_46_5_46_1_46_88_45_RXN

This is a reversible reaction of two reactants forming two products.

Name Peptide deformylase

Notes GENE ASSOCIATION: (BU496_def)PROTEIN ASSOCIATION: (Peptide deformylase (PDF) (Polypeptide deformylase)//3.5.1.88-RXN//Peptide deformylase)SUBSYSTEM: NAPROTEIN_CLASS: 3.5.1.88GENERIC: falseTYPE: smallHOLE: false

Reaction equation

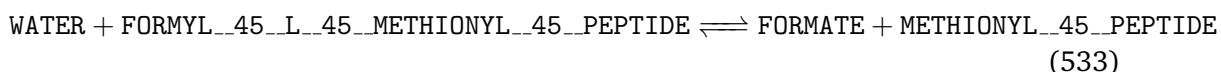


Table 271: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	FORMATE	formate
FORMYL- _45_L- _45- _METHIONYL- _45- _PEPTIDE	formyl-L- methionyl pep- tide	METHIONYL- methionyl pep- tide _PEPTIDE	

Kinetic Law

$$v_{267} = \text{not specified} \quad (534)$$

5.268. Reaction SPERMIDINESYN_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Spermidine synthase

Notes GENE ASSOCIATION: (BU209_speE)PROTEIN ASSOCIATION: (Spermidine synthase (Putrescine aminopropyltransferase) (PAPT) (SPDSY)//SPERMIDINESYN-RXN//Spermidine synthase)SUBSYSTEM: spermidine biosynthesisPROTEIN_CLASS: 2.5.1.16GENERIC: falseTYPE: smallHOLE: false

Reaction equation

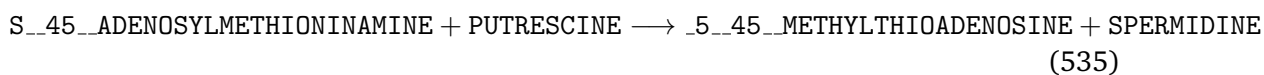


Table 272: Overview of participating species.

Id	Reactants Name	Id	Products Name
S__45_- _ADENOSYL PUTRESCINE	S-adenosyl-L- methionine Putrescine	_5__45_- _METHYLTHIO SPERMIDINE	S-methyl-5'- adenosine Spermidine

Kinetic Law

$$v_{268} = \text{not specified} \quad (536)$$

5.269. Reaction UNDECAPRENYL__45__DIPHOSPHATASE__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Undecaprenyl-diphosphatase

Notes GENE_ASSOCIATION: (BU062_uppP)PROTEIN_ASSOCIATION: (Undecaprenyl-diphosphatase (Undecaprenyl pyrophosphate phosphatase) (Bacitracin resistance protein)//Undecaprenyl-diphosphatase)SUBSYSTEM: NAPROTEIN_CLASS: 3.6.1.27GENERIC: falseTYPE: smallHOLE: false

Reaction equation

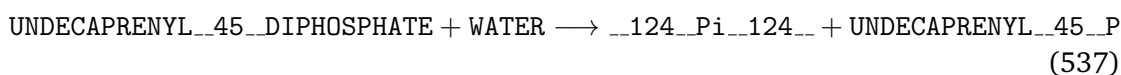


Table 273: Overview of participating species.

Id	Reactants Name	Id	Products Name
UNDECAPRENYL__45_- _DIPHOSPHATE	Undecaprenyl diphosphate	__124_- _Pi_- _124__	phosphate
WATER	H2O	UNDECAPRENYL__45__P	undecaprenyl phosphate

Kinetic Law

$$v_{269} = \text{not specified} \quad (538)$$

5.270. Reaction [ASPARAGINE__45__45__TRNA__45__LIGASE__45__RXN](#)

This is an irreversible reaction of three reactants forming three products.

Name Asparagine–tRNA ligase

Notes GENE_ASSOCIATION: (BU360_asnS)PROTEIN_ASSOCIATION: (Asparaginyl-tRNA synthetase (Asparagine–tRNA ligase) (AsnRS)//ASPARAGINE–TRNA-LIGASE-RXN//Asparagine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.22COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

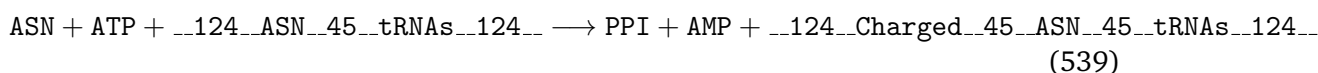


Table 274: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ASN	L-asparagine	PPI	diphosphate
ATP	ATP	AMP	AMP
__124__- __ASN__- __45__- __tRNAs__- __124__	tRNAasn	__124__- __Charged__- __45__- __ASN__- __45__- __tRNAs__- __124__	L-asparaginyl-tRNAasn

Kinetic Law

$$v_{270} = \text{not specified} \quad (540)$$

5.271. Reaction [RXN0__45__5240](#)

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU289_glyA)PROTEIN_ASSOCIATION: (Serine hydroxymethyltransferase (Serine methylase) (SHMT)//GLYOHMETRANS-RXN)SUBSYSTEM: NAPROTEIN_CLASS: NAGENERIC: falseTYPE: smallHOLE: false

Reaction equation

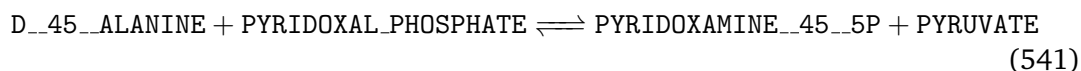


Table 275: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
D_45_-ALANINE	D-alanine	PYRIDOXAMINE_45_5P	pyridoxamine 5'-phosphate
PYRIDOXAL-PHOSPHATE	pyridoxal phosphate	PYRUVATE	pyruvate

Kinetic Law

$$v_{271} = \text{not specified} \quad (542)$$

5.272. Reaction SUCCINYLDIAMINOPIMTRANS_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Succinyldiaminopimelate aminotransferase

Notes GENE_ASSOCIATION: (BU534_argD)PROTEIN_ASSOCIATION: (Acetylornithine/succinyldiaminopimelate aminotransferase (ACOAT) (Succinyldiaminopimelate transferase) (DapATase)//ACETYLORNTRANS_RXN//SUCCINYLDIAMINOPIMTRANS-RXN)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 2.6.1.17COFACTOR: _2_45_KETOGLUTARATECOFACTOR: GLTSIDE: _2_45_KETOGLUTARATESIDE: GLTGENERIC: falseTYPE: smallHOLE: false

Reaction equation

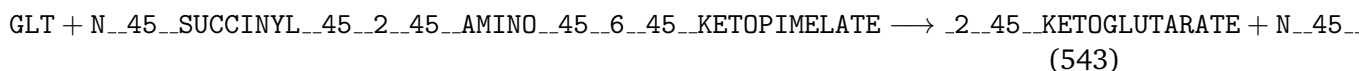


Table 276: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GLT	L-glutamate	_2_45_-KETOGLUTARATE	2-ketoglutarate

Reactants		Products	
Id	Name	Id	Name
N__45_- _SUCCINYL- _45_2- _45_- _AMINO- _45_6- _45_- _KETOPIMELATE	N-succinyl- 2-amino-6- ketopimelate	N__45_- _SUCCINYLLL- _45_2- _45_6- _45_- _DIAMINOPIMELATE	N-succinyl- L-2,6- diaminopimelate

Kinetic Law

$$v_{272} = \text{not specified} \quad (544)$$

5.273. Reaction ACETOLACTSYN__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Acetolactate synthase

Notes GENE_ASSOCIATION: (BU225_ilvH) or (BU226_ilvI) PROTEIN_ASSOCIATION: (Acetolactate synthase small subunit (AHAS) (Acetohydroxy- acid synthase small subunit) (ALS)//ACETOLACTSYN-RXN//ACETOHBUTSYN-RXN//Acetolactate synthase) or (Acetolactate synthase large subunit (AHAS) (Acetohydroxy- acid synthase large subunit) (ALS)//ACETOLACTSYN-RXN//ACETOHBUTSYN-RXN//Acetolactate synthase) SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesis SUBSYSTEM: valine biosynthesis PROTEIN_CLASS: 2.2.1.6 SIDE: CARBON__45__DIOXIDE GENERIC: false TYPE: small HOLE: false

Reaction equation

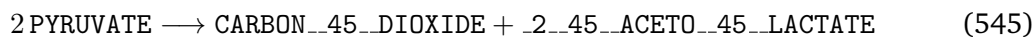


Table 277: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PYRUVATE	pyruvate	CARBON- __45_- DIOXIDE	CO2

Id	Reactants Name	Id	Products Name
		_2_45_- _ACETO- _45_- _LACTATE	2-acetolactate

Kinetic Law

$$v_{273} = \text{not specified} \quad (546)$$

5.274. Reaction DIOHBUTANONEPSYN__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU059_ribB)PROTEIN_ASSOCIATION: (3,4-dihydroxy-2-butanone 4-phosphate synthase (DHBP synthase))SUBSYSTEM: flavin biosynthesisPROTEIN_CLASS: NASIDE: FORMATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 278: Overview of participating species.

Id	Reactants Name	Id	Products Name
RIBULOSE- _45_5P	D-ribulose-5- phosphate	FORMATE	formate
		DIHYDROXY-3,4-dihydroxy-2- _45_- BUTANONE- _45_P	butanone-4-P

Kinetic Law

$$v_{274} = \text{not specified} \quad (548)$$

5.275. Reaction HOMOSERKIN__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Homoserine kinase

Notes GENE_ASSOCIATION: (BU193_thrB)PROTEIN_ASSOCIATION: (Homoserine kinase (HSK) (HK)//HOMOSERKIN-RXN//Homoserine kinase)SUBSYSTEM: threonine biosynthesis from homoserinePROTEIN_CLASS: 2.7.1.39COFACTOR: ADP-COFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 279: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
HOMO_- _45__SER	homoserine	O_45_- _PHOSPHO- _45__L- _45_- _HOMOSERINE	O-phospho-L- homoserine
ATP	ATP	ADP	ADP

Kinetic Law

$$v_{275} = \text{not specified} \quad (550)$$

5.276. Reaction ACETOHBUTREDUCTOISOM__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Ketol-acid reductoisomerase

Notes GENE_ASSOCIATION: (BU599_ilvC)PROTEIN_ASSOCIATION: (Ketol-acid reductoisomerase (Acetohydroxy-acid isomeroreductase) (Alpha-keto-beta-hydroxylacil reductoisomerase)//ACETOLACTREDUCTOISOM-RXN//ACETOHBUTREDUCTOISOM-RXN//Ketol-acid reductoisomerase)SUBSYSTEM: isoleucine biosynthesis IIISUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: isoleucine biosynthesis from threoninePROTEIN_CLASS: 1.1.1.86COFACTOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

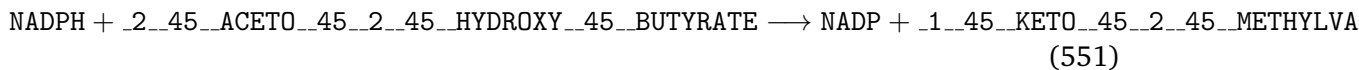


Table 280: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	NADP	NADP+
_2__45_-	2-aceto-2-	_1__45_-	2,3-dihydroxy-3-
_ACETO-	hydroxy-butyrate	_KETO_-	methylvalerate
_45__2-		_45__2-	
45-		_45_-	
_HYDROXY-		_METHYLVALERATE	
45-			
_BUTYRATE			

Kinetic Law

$$v_{276} = \text{not specified} \quad (552)$$

5.277. Reaction _3PGAREARR_45_RXN

This is a reversible reaction of one reactant forming one product.

Name Phosphoglycerate mutase

Notes GENE_ASSOCIATION: (BU304_gpmA)PROTEIN_ASSOCIATION: (2,3-bisphosphoglycerate-dependent phosphoglycerate mutase (Phosphoglyceromutase) (PGAM) (BPG-dependent PGAM) (dPGM)//3PGAREARR-RXN)SUBSYSTEM: glycolysis ISUBSYSTEM: formaldehyde assimilation I (serine pathway)SUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 5.4.2.1GENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 281: Overview of participating species.

Id	Reactants Name	Id	Products Name
G3P	3-phosphoglycerate	_2_45_ _PG	2-phosphoglycerate

Kinetic Law

$$v_{277} = \text{not specified} \quad (554)$$

5.278. Reaction RXN_45_7719

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-SYSTEM: branched-chain α-keto acid dehydrogenase complexPROTEIN_CLASS: 1.8.1.4COFACTOR: NADCOFACTOR: NADHSIDE: PROTONSIDE: NADSIDE: NAD-HGENERIC: trueTYPE: macroHOLE: false

Reaction equation

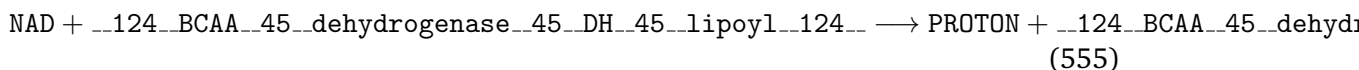


Table 282: Overview of participating species.

Id	Reactants Name	Id	Products Name
NAD	NAD+	PROTON	H+
124 _BCAA_45_ dehydrogenase_45_ DH_45_ lipoyl_124_	lipoamide acyl-transferase N6-(dihydrolipoyl)lysine	_124_ _BCAA_45_ dehydrogenase_45_ DH_45_ lipoyl_124_	lipoamide acyl-transferase N6-(lipoyl)lysine

Reactants		Products	
Id	Name	Id	Name
		NADH	NADH

Kinetic Law

$$v_{278} = \text{not specified} \quad (556)$$

5.279. Reaction N__45__ACETYLGLUTPREDUCT__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name N-acetyl-γ-glutamyl-phosphate reductase

Notes GENE_ASSOCIATION: (BU048_argC)PROTEIN_ASSOCIATION: (N-acetyl-gamma-glutamyl-phosphate reductase (AGPR) (N- acetyl-glutamate semialdehyde dehydrogenase) (NAGSA dehydrogenase)//N-ACETYLGLUTPREDUCT-RXN//N-acetyl-gamma-glutamyl-phosphate reductase)SUBSYSTEM: ornithine biosynthesisSUBSYSTEM: arginine biosynthesis IIISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 1.2.1.38COFACTOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: __124__Pi__124__SIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

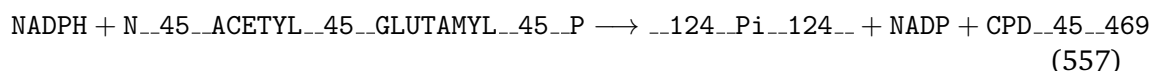


Table 283: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	__124__ __Pi__ __124__	phosphate
N__45__ _ACETYL_ __45__ _GLUTAMYL_ __45__P	N-acetylglutamyl-phosphate	NADP	NADP+
		CPD__ _45__469	N-acetyl-L-glutamate 5-semialdehyde

Kinetic Law

v_{279}

= not specified

(558)

5.280. Reaction RXN_45_7716

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-SYSTEM: 2-ketoglutarate dehydrogenase complexPROTEIN_CLASS: 1.8.1.4COFACTOR: NADCOFACTOR: NADHSIDE: PROTONSIDE: NADSIDE: NADHGENERIC: true-TYPE: macroHOLE: false

Reaction equation

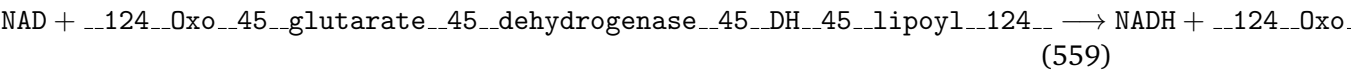


Table 284: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	NADH	NADH
_124_Oxo_45_glutarate_45_dehydrogenase_45_DH_45_lipoyl_124_	dihydrolipoyltranssuccinylase N6-(dihydrolipoyl)lysine	_124_Oxo_45_glutarate_45_dehydrogenase_45_DH_45_lipoyl_124_	dihydrolipoyltranssuccinylase N6-(lipoyl)lysine
		PROTON	H+

Kinetic Law

v_{280}

= not specified

(560)

5.281. Reaction

TRNA_45_GUANINE_45_N7_45_45_METHYLTRANSFERASE_45_RXN

This is a reversible reaction of two reactants forming two products.

Name tRNA (guanine-N7-)-methyltransferase

Notes GENE_ASSOCIATION: (BU551_trmB)PROTEIN_ASSOCIATION: (tRNA (guanine-N(7)-)-methyltransferase (tRNA(m7G46)- methyltransferase)//tRNA (guanine-N(7)-)-methyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: 2.1.1.33COFACTOR: ADENOSYL_45_HOMO_45_CYSCOFACTOR: S_45_ADENOSYLMETHIONINEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

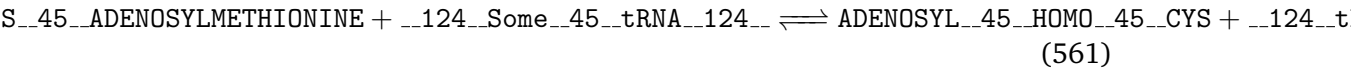


Table 285: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S_45_- _ADENOSYLMETHIONINE	S-adenosyl-L-homocysteine	ADENOSYL_45_- _HOMO_45_- _CYS	S-adenosyl-L-homocysteine
124- _Some_45_- _tRNA_124_	a tRNA	_124_- _tRNAs_45_- _with_45_- _N7_45_- _methyl_45_- _guanine_124_	a tRNA containing N7-methylguanine

Kinetic Law

v_{281} = not specified (562)

5.282. Reaction RXN0_45_2381

This is an irreversible reaction of one reactant forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU277_trpA)PROTEIN_ASSOCIATION: (Tryptophan synthase alpha chain//TRYPSYN-RXN//Tryptophan synthase)SUBSYSTEM: tryptophan biosynthesisPROTEIN_CLASS: NASIDE: GAPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

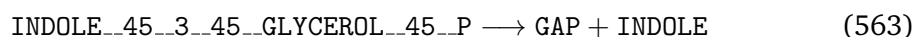


Table 286: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
INDOLE-3-GLYCEROL-P	indole-3-glycerol-phosphate	GAP	D-glyceraldehyde-3-phosphate
		INDOLE	indole

Kinetic Law

$$v_{282} = \text{not specified} \quad (564)$$

5.283. Reaction SHIKIMATE-5-DEHYDROGENASE-RXN

This is an irreversible reaction of two reactants forming two products.

Name Shikimate 5-dehydrogenase

Notes GENE_ASSOCIATION: (BU493_aroE)PROTEIN_ASSOCIATION: (Shikimate dehydrogenase//SHIKIMATE-5-DEHYDROGENASE-RXN//Shikimate dehydrogenase)SUBSYSTEM: chorismate biosynthesisPROTEIN_CLASS: 1.1.1.25COFACTOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 287: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
_3_45_- _DEHYDRO- _45_- _SHIKIMATE	3-dehydro-shikimate	SHIKIMATE	shikimate
NADPH	NADPH	NADP	NADP+

Kinetic Law

$$v_{283} = \text{not specified} \quad (566)$$

5.284. Reaction R343_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Cob(II)yrinic acid a,c-diamide reductase

Notes GENE_ASSOCIATION: (BU299_fldA)PROTEIN_ASSOCIATION: (Flavodoxin)SUBSYSTEM: adenosylcobalamin biosynthesis II (late cobalt incorporation)SUBSYSTEM: adenosylcobalamin biosynthesis I (early cobalt insertion)SUBSYSTEM: adenosylcobalamin biosynthesis from cobyrinate a,c-diamide IISUBSYSTEM: adenosylcobalamin biosynthesis from cobyrinate a,c-diamide IPROTEIN_CLASS: 1.16.8.1COFACTOR: FMNCOFACTOR: FMNH2SIDE: FMNGENERIC: falseTYPE: smallHOLE: false

Reaction equation

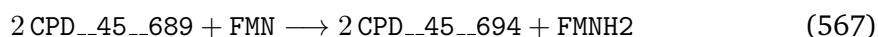


Table 288: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CPD_- _45_689	cob(II)yrinate a,c-diamide	CPD_- _45_694	cob(I)yrinate a,c-diamide
FMN	FMN	FMNH2	FMNH2

Kinetic Law

$$v_{284} = \text{not specified} \quad (568)$$

5.285. Reaction N__45__ACETYLTRANSFER__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Amino-acid N-acetyltransferase

Notes GENE_ASSOCIATION: (BU456_argA)PROTEIN_ASSOCIATION: (Amino-acid acetyltransferase (N-acetylglutamate synthase) (AGS) (NAGS)//N-ACETYLTRANSFER-RXN)SUBSYSTEM: ornithine biosynthesisSUBSYSTEM: arginine biosynthesis II-ISUBSYSTEM: arginine biosynthesis ISUBSYSTEM: arginine biosynthesis II (acetyl cycle)PROTEIN_CLASS: 2.3.1.1COFACTOR: CO__45__ACOFACITOR: ACETYL__45__COASIDE: CO__45__ASIDE: ACETYL__45__COAGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 289: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ACETYL- __45_- _COA	acetyl-CoA	CO__45_- _A	coenzyme A
GLT	L-glutamate	ACETYL- __45_- _GLU	N-acetyl-L-glutamate

Kinetic Law

$$v_{285} = \text{not specified} \quad (570)$$

5.286. Reaction _2__45__ISOPROPYLMALATESYN__45__RXN

This is an irreversible reaction of three reactants forming two products.

Name 2-isopropylmalate synthase

Notes GENE ASSOCIATION: (BUpL04_leuA)PROTEIN ASSOCIATION: (2-isopropylmalate synthase (Alpha-isopropylmalate synthase) (Alpha-IPM synthetase)//2-ISOPROPYLMALATESYN-RXN//2-isopropylmalate synthase)SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: leucine biosynthesisPROTEIN_CLASS: 2.3.3.13CO-FACTOR: CO_45_ACOFACTOR: ACETYL_45_COASIDE: WATERSIDE: CO_45_ASIDE: ACETYL_45_COAGENERIC: falseTYPE: smallHOLE: false

Reaction equation

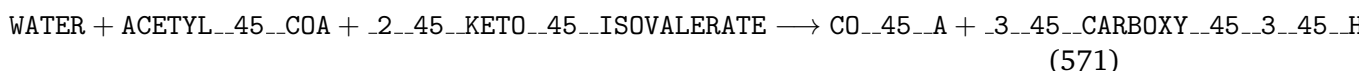


Table 290: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	CO_45_-A	coenzyme A
ACETYL_45_-COA	acetyl-CoA	3_45_-CARBOXY_45_3_45_-HYDROXY_45_-ISOCAPROATE	2-isopropylmalate
2_45_-KETO_45_-ISOVALERATE	2-keto-isovalerate		

Kinetic Law

$$v_{286} = \text{not specified} \quad (572)$$

5.287. Reaction NICONUCADENYLYLTRAN_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Nicotinate-nucleotide adenylyltransferase

Notes GENE ASSOCIATION: (BU446_nadD)PROTEIN ASSOCIATION: (Probable nicotinate-nucleotide adenylyltransferase (Deamido-NAD(+) pyrophosphorylase) (Deamido-NAD(+) diphosphorylase) (Nicotinate mononucleotide adenylyltransferase) (NaMN

adenylyltransferase)//NICONUCADENYLYLTRAN-RXN)SUBSYSTEM: NAD biosynthesis I (from aspartate)SUBSYSTEM: NAD salvage pathway IPROTEIN_CLASS: 2.7.7.18SIDE: PPISIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

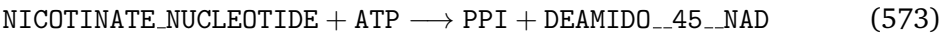


Table 291: Overview of participating species.

Reactants			Products		
Id	Name		Id	Name	
NICOTINATE_NUCLEOTIDE	Nicotinate Nucleotide	nu-	PPI	diphosphate	
ATP	ATP		DEAMIDO__45__NAD	deamido-NAD	

Kinetic Law

v₂₈₇ = not specified (574)

5.288. Reaction RXN__45__8991

This is an irreversible reaction of two reactants forming one product.

Name 3-isopropylmalate dehydratase

Notes GENE_ASSOCIATION: (BUPL07_leuD) or (BUPL06_leuC)PROTEIN_ASSOCIATION: (3-isopropylmalate dehydratase small subunit (Isopropylmalate isomerase) (Alpha-IPM isomerase) (IPMI)//3-ISOPROPYLMALISOM-RXN//3-isopropylmalate dehydratase) or (3-isopropylmalate dehydratase large subunit (Isopropylmalate isomerase) (Alpha-IPM isomerase) (IPMI)//3-ISOPROPYLMALISOM-RXN//3-isopropylmalate dehydratase)SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: leucine biosynthesisPROTEIN_CLASS: 4.2.1.33SIDE: WATER-GENERIC: falseTYPE: smallHOLE: false

Reaction equation

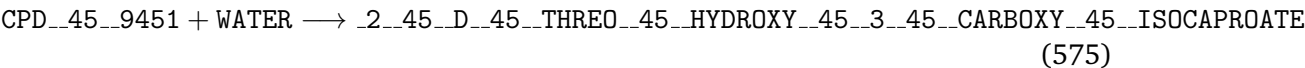


Table 292: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_45_9451	isopropylmaleate	_2_45_3-D_45_THREO_45_HYDROXY_45_3_45_CARBOXY_45_ISOCAPROATE	
WATER	H2O		

Kinetic Law

$$v_{288} = \text{not specified} \quad (576)$$

5.289. Reaction SUPEROX_45_DISMUT_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Superoxide dismutase

Notes GENE_ASSOCIATION: (BU189_sodA)PROTEIN_ASSOCIATION: (Superoxide dismutase [Mn]//SUPEROX-DISMUT-RXN//Superoxide dismutase)SUBSYSTEM: removal of superoxide radicalsPROTEIN_CLASS: 1.15.1.1GENERIC: falseTYPE: small-HOLE: false

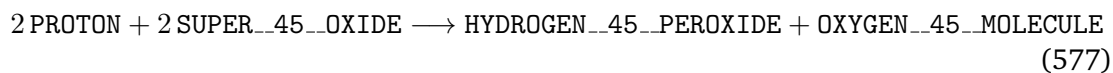
Reaction equation

Table 293: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROTON	H+	HYDROGEN- __45_- PEROXIDE	H2O2
SUPER- __45_- OXIDE	O2-	OXYGEN- __45_- MOLECULE	oxygen

Kinetic Law

$$v_{289} = \text{not specified} \quad (578)$$

5.290. Reaction DIAMINOPIMEPIM__45__RXN

This is an irreversible reaction of one reactant forming one product.

Name Diaminopimelate epimerase

Notes GENE_ASSOCIATION: (BU589_dapF)PROTEIN_ASSOCIATION: (Diaminopimelate epimerase (DAP epimerase)//DIAMINOPIMEPIM-RXN//Diaminopimelate epimerase)SUBSYSTEM: lysine biosynthesis ISUBSYSTEM: superpathway of lysine, threonine and methionine biosynthesis IPROTEIN_CLASS: 5.1.1.7GENERIC: falseTYPE: smallHOLE: false

Reaction equation

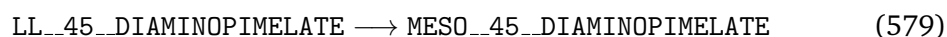


Table 294: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
LL__45_- DIAMINOPIMELATE	L,L- diaminopimelate	MESO- __45_- DIAMINOPIMELATE	meso- diaminopimelate

Kinetic Law

$$v_{290} = \text{not specified} \quad (580)$$

5.291. Reaction PTAALT__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU176_pta)PROTEIN_ASSOCIATION: (Phosphate acetyl-transferase (Phosphotransacetylase)//PHOSACETYLTRANS-RXN//Phosphate acetyl-transferase)SUBSYSTEM: threonine degradation IPROTEIN_CLASS: 2.3.1.-COFACTOR: CO__45__ACOFACOR: PROPIONYL__45__COASIDE: CO__45__ASIDE: __124__Pi__124__GENERIC: falseTYPE: smallHOLE: false

Reaction equation

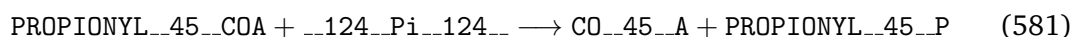


Table 295: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROPIONYL__45__COA	propionyl-CoA	CO__45__A	coenzyme A
__124__Pi__124__	phosphate	PROPIONYL__45__P	propionyl-P

Kinetic Law

$$v_{291} = \text{not specified} \quad (582)$$

5.292. Reaction _1__46__8__46__1__46__4__45__RXN

This is a reversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases

complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-
SYSTEM: NAPROTEIN_CLASS: 1.8.1.4COFACTOR: NADCOFACTOR: NADHGENERIC:
trueTYPE: macroHOLE: false

Reaction equation

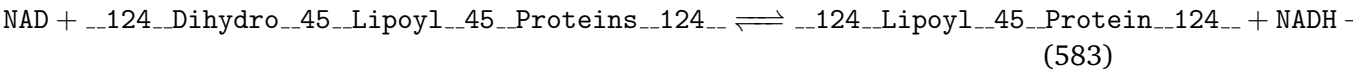


Table 296: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	_124_protein N6-	
		Lipoyl- (lipoyl)lysine	
		_45_Protein-	
		_124_NADH	
_124_protein N6-		NADH	NADH
_Dihydro- (dihydrolipoyl)lysine			
_45_Lipoyl-			
_45_Proteins-			
_124_PROTON		H+	

Kinetic Law

$$v_{292} = \text{not specified}$$

(584)

5.293. Reaction RXN_45_7919

This is a reversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU246_gloB)PROTEIN_ASSOCIATION: (Hydroxyacyl-
glutathione hydrolase (Glyoxalase II) (Glx II)//GLYOXII-RXN//Hydroxyacylglutathione
hydrolase)SUBSYSTEM: NAPROTEIN_CLASS: 3.1.2.6GENERIC: trueTYPE: small-
HOLE: false

Reaction equation

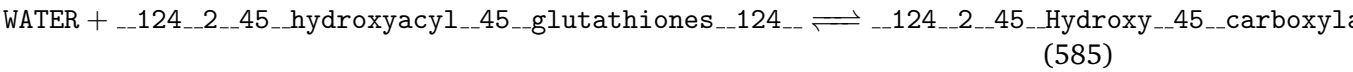


Table 297: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	<code>_124_2_45_</code>	a 2-hydroxy carboxylate
<code>_124_2_45_</code>	S-(2-hydroxyacyl)glutathione	<code>_124_2_45_</code>	Hydroxy-carboxylates
<code>_124_2_45_</code>	hydroxyacyl-glutathiones	<code>_124_2_45_</code>	GLUTATHIONE
<code>_124_2_45_</code>		<code>_124_2_45_</code>	Glutathione

Kinetic Law

v_{293} = not specified

(586)

5.294. Reaction `SULFATE_45_ADENYLYLTRANS_45_RXN`

This is a reversible reaction of two reactants forming two products.

Name Sulfate adenylyltransferase

Notes GENE_ASSOCIATION: (BU424_cysD) or (BU423_cysN)PROTEIN_ASSOCIATION: (Sulfate adenylyltransferase subunit 2 (Sulfate adenylyltransferase) (SAT) (ATP-sulfurylase small subunit)//SULFATE-ADENYLYLTRANS-RXN//Sulfate adenylyltransferase) or (Sulfate adenylyltransferase subunit 1 (Sulfate adenylyltransferase) (SAT) (ATP-sulfurylase large subunit)//SULFATE-ADENYLYLTRANS-RXN//Sulfate adenylyltransferase)SUBSYSTEM: sulfate reduction I (assimilatory)SUBSYSTEM: superpathway of cysteine biosynthesisSUBSYSTEM: sulfite oxidation IIISUBSYSTEM: sulfate activation for sulfonationPROTEIN_CLASS: 2.7.7.4SIDE: PPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

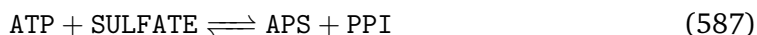


Table 298: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	APS	adenosine 5'-phosphosulfate
SULFATE	sulfate	PPI	diphosphate

Kinetic Law

$$v_{294} = \text{not specified} \quad (588)$$

5.295. Reaction _3_45__ISOPROPYLMALISOM_45__RXN

This is an irreversible reaction of two reactants forming two products.

Name 3-isopropylmalate dehydratase

Notes GENE_ASSOCIATION: (BUPL07.leuD) or (BUPL06.leuC) PROTEIN_ASSOCIATION: (3-isopropylmalate dehydratase small subunit (Isopropylmalate isomerase) (Alpha-IPM isomerase) (IPMI)//3-ISOPROPYLMALISOM-RXN//3-isopropylmalate dehydratase) or (3-isopropylmalate dehydratase large subunit (Isopropylmalate isomerase) (Alpha-IPM isomerase) (IPMI)//3-ISOPROPYLMALISOM-RXN//3-isopropylmalate dehydratase) SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesis SUBSYSTEM: leucine biosynthesis PROTEIN_CLASS: 4.2.1.33 SIDE: WATER-GENERIC: false TYPE: small HOLE: false

Reaction equation

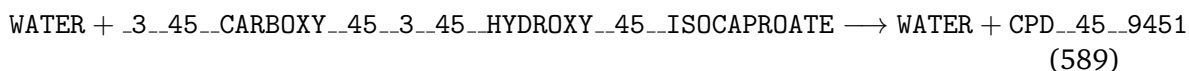


Table 299: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
WATER	H2O	WATER	H2O

Id	Reactants Name	Id	Products Name
3_45_	2-	CPD_	isopropylmaleate
CARBOXY-	isopropylmalate	45_	
45_3-		9451	
45_			
HYDROXY-			
45_			
ISOCAPROATE			

Kinetic Law

$$v_{295} = \text{not specified}$$

(590)

5.296. Reaction DNA_45_LIGASE_45_NAD_43_45_RXN

This is a reversible reaction of three reactants forming three products.

Name DNA ligase (NAD+)

Notes GENE_ASSOCIATION: (BU067_ligA)PROTEIN_ASSOCIATION: (DNA ligase (Poly-deoxyribonucleotide synthase [NAD+])//DNA-LIGASE-(NAD(+))-RXN)SUBSYSTEM: NAPROTEIN_CLASS: 6.5.1.2GENERIC: trueTYPE: smallHOLE: false

Reaction equation

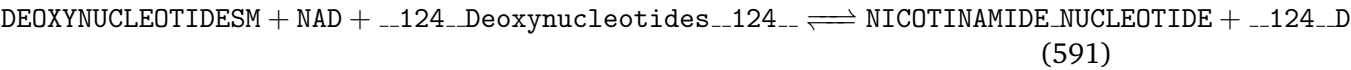


Table 300: Overview of participating species.

Id	Reactants Name	Id	Products Name
DEOXYNUCLEOTIDESM	(deoxy)nucleotides	(n)NICOTINAMIDE_NUCLEOTIDE	Nicotinamide mononucleotide
NAD	NAD+	_124_ a deoxynu- Deoxynucleotides-	
124 a deoxynu- Deoxynucleotides- _124_		AMP	AMP

Kinetic Law

$$v_{296} = \text{not specified} \quad (592)$$

5.297. Reaction DIHYDROXYISOVALDEHYDRAT__45__RXN

This is an irreversible reaction of one reactant forming two products.

Name Dihydroxy-acid dehydratase

Notes GENE_ASSOCIATION: (BU600_ilvD)PROTEIN_ASSOCIATION: (Dihydroxy-acid dehydratase (DAD)//DIHYDROXYISOVALDEHYDRAT-RXN//DIHYDROXYMETVALDEHYDRAT-RXN//Dihydroxy-acid dehydratase)SUBSYSTEM: superpathway of leucine, valine, and isoleucine biosynthesisSUBSYSTEM: valine biosynthesisPROTEIN_CLASS: 4.2.1.9SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

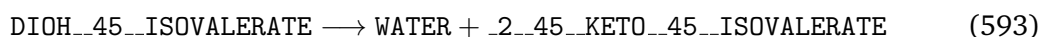


Table 301: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DIOH- __45_- _ISOVALERATE	2,3-dihydroxy- isovalerate	WATER	H2O
		_2__45- _KETO- _45_- _ISOVALERATE	2-keto-isovalerate

Kinetic Law

$$v_{297} = \text{not specified} \quad (594)$$

5.298. Reaction UDPNACETYLMURAMATEDEHYDROG__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name UDP-N-acetylmuramate dehydrogenase

Notes GENE_ASSOCIATION: (BU045_murB)PROTEIN_ASSOCIATION: (UDP-N-acetylenolpyruvoylglucosa
reductase (UDP-N- acetylmuramate dehydrogenase)//UDPNACETYLMURAMATEDEHYDROG-
RXN)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 1.1.1.158CO-
FACTOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: NADPGENERIC: falseTYPE:
smallHOLE: false

Reaction equation

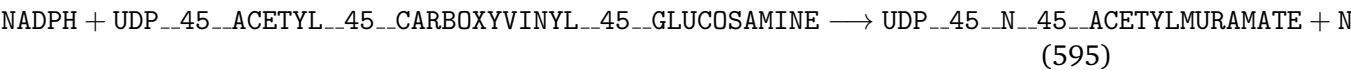


Table 302: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	UDP_- _45_-N- _45_- _ACETYLMURAMATE	UDP-N- acetylmuramate
UDP_- _45_- _ACETYL- _45_- _CARBOXYVINYL- _45_- _GLUCOSAMINE	UDP-GlcNAc- enolpyruvate	NADP	NADP+

Kinetic Law

$$v_{298} = \text{not specified}$$

(596)

5.299. Reaction OHMETHYLBILANESYN_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Hydroxymethylbilane synthase

Notes GENE_ASSOCIATION: (BU591_hemC)PROTEIN_ASSOCIATION: (Porphobilino-
gen deaminase (PBG) (Hydroxymethylbilane synthase) (HMBS) (Pre-uroporphyrinogen
synthase)//OHMETHYLBILANESYN-RXN//Hydroxymethylbilane synthase)SUB-
SYSTEM: tetrapyrrole biosynthesis IPROTEIN_CLASS: 2.5.1.61SIDE: AMMONIA-
SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

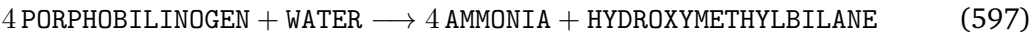


Table 303: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PORPHOBILINOGEN	porphobilinogen	AMMONIA	ammonia
WATER	H2O	HYDROXYMETHYLBILANE	hydroxymethylbilane

Kinetic Law

v₂₉₉ = not specified (598)

5.300. Reaction ADPREDUCT__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA)PROTEIN_ASSOCIATION:
(Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase
small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-
DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)
or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-
RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-
RXN//Ribonucleoside-diphosphate reductase)SUBSYSTEM: superpathway of his-
tidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo
biosynthesis IPROTEIN_CLASS: 1.17.4.1COFACTOR: __124__Red__45__Thioredoxin__124__COFACTOR:
__124__Ox__45__Thioredoxin__124__SIDE: WATERSIDE: __124__Red__45__Thioredoxin__124__SIDE:
__124__Ox__45__Thioredoxin__124__GENERIC: trueTYPE: macroHOLE: false

Reaction equation

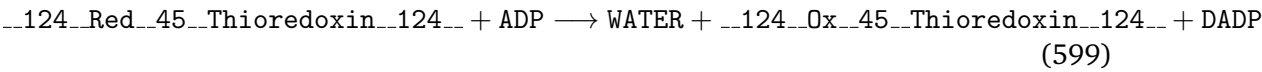


Table 304: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- __Red- __45_- _Thioredoxin- __124__	a reduced thiore- doxin	WATER	H2O
ADP	ADP	__124- __0x- __45_- _Thioredoxin- __124__	an oxidized thioredoxin
		DADP	dADP

Kinetic Law

$$v_{300} = \text{not specified} \quad (600)$$

5.301. Reaction PRIBFAICARPISOM__45__RXN

This is an irreversible reaction of one reactant forming one product.

Name N-(5'-phospho-D-ribosylformimino)-5-amino-1-(5"-phosphoribosyl)-4- imidazole carboxamide isomerase

Notes GENE ASSOCIATION: (BU104_hisA)PROTEIN ASSOCIATION: (1-(5-phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino] imidazole-4-carboxamide isomerase (Phosphoribosylformimino-5-aminoimidazole carboxamide ribotide isomerase)//PRIBFAICARPISOM__45__RXN)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 5.3.1.16GENERIC: false-TYPE: smallHOLE: false

Reaction equation

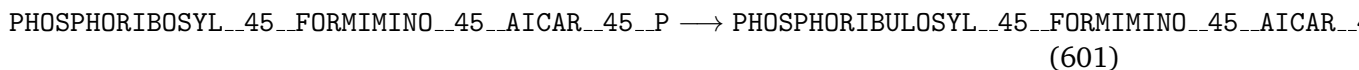


Table 305: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PHOSPHORIBOSYL-P	phosphoribosylphosphate	PHOSPHORIBOSYL-P	phosphoribosylphosphate
FORMIMINO-P	formimino-phosphate	FORMIMINO-P	formimino-phosphate
AICAR-P	AICAR-P	AICAR-P	AICAR-P

Kinetic Law

$$v_{301} = \text{not specified} \quad (602)$$

5.302. Reaction ANTHRANSYN__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Anthranilate synthase

Notes GENE_ASSOCIATION: (BUPT01_trpE) or (BUPT04_trpG2) or (BU280_trpD) or (BUPT02_trpG) PROTEIN_ASSOCIATION: (Anthranilate synthase component 1 (Anthranilate synthase component I)//ANTHRANSYN-RXN//Anthranilate synthase) or (anthranilate synthase small subunit) or (Anthranilate phosphoribosyltransferase//PRTRA RXN//Anthranilate phosphoribosyltransferase) or (anthranilate synthase small subunit) SUBSYSTEM: tryptophan biosynthesis PROTEIN_CLASS: 4.1.3.27 SIDE: GLN- SIDE: PYRUVATE SIDE: GLT GENERIC: false TYPE: small HOLE: false

Reaction equation



Table 306: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CHORISMATE	chorismate	ANTHRANILATE	anthranilate
GLN	L-glutamine	GLT	L-glutamate
		PYRUVATE	pyruvate

Kinetic Law

$$v_{302} = \text{not specified} \quad (604)$$

5.303. Reaction _6PFRUCTPHOS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name 6-phosphofructokinase

Notes GENE_ASSOCIATION: (BU305_pfkA)PROTEIN_ASSOCIATION: (6-phosphofructokinase (Phosphofructokinase) (Phosphohexokinase)//6PFRUCTPHOS-RXN//6-phosphofructokinase)SUBSYSTEM: glycolysis ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassSUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 2.7.1.11COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

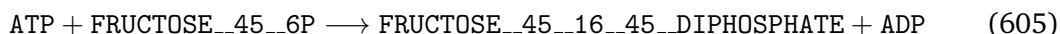


Table 307: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	FRUCTOSE- _45_- _16_- _45_- DIPHOSPHATE	fructose-1,6- biphosphate
FRUCTOSE- _45_6P	fructose-6- phosphate	ADP	ADP

Kinetic Law

$$v_{303} = \text{not specified} \quad (606)$$

5.304. Reaction RXN0__45__2382

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU278_trpB) or (BU277_trpA)PROTEIN_ASSOCIATION: (Tryptophan synthase beta chain//RXN0-2382//TRYPSYN-RXN//Tryptophan synthase) or (Tryptophan synthase alpha chain//TRYPSYN-RXN//Tryptophan synthase)SUBSYSTEM: tryptophan biosynthesisPROTEIN_CLASS: 4.2.1.20SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 308: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
INDOLE	indole	TRP	L-tryptophan
SER	L-serine	WATER	H2O

Kinetic Law

$$v_{304} = \text{not specified} \quad (608)$$

5.305. Reaction 2_46_3_46_1_46_157_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Glucosamine-1-phosphate N-acetyltransferase

Notes GENE_ASSOCIATION: (BU027_glmU)PROTEIN_ASSOCIATION: (Bifunctional protein glmU [Includes: UDP-N-acetylglucosamine pyrophosphorylase (N-acetylglucosamine-1-phosphate uridyltransferase); Glucosamine-1-phosphate N-acetyltransferase]//2.3.1.157-RXN//NAG1P-URIDYLTRANS-RXN//Glucosamine-1-phosphate N-acetyltransferase)SUBSYSTEM: UDP-N-acetyl-D-glucosamine biosynthesis IPROTEIN_CLASS: 2.3.1.157CO-FACTOR: CO_45_ACOFACTOR: ACETYL_45_COASIDE: CO_45_ASIDE: ACETYL_45_COAGENERIC: falseTYPE: smallHOLE: false

Reaction equation

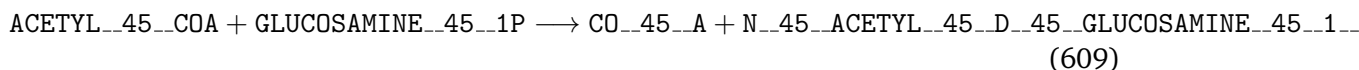


Table 309: Overview of participating species.

Id	Reactants Name	Id	Products Name
ACETYL- __45_- _COA	acetyl-CoA	CO__45_- _A	coenzyme A
GLUCOSAMINE- __45__1P	N-glucosamine 1-phosphate	N__45_- _ACETYL- __45__D- __45_- _GLUCOSAMINE- __45__1- __45__P	N-acetyl-glucosamine-1-phosphate

Kinetic Law

$$v_{305} = \text{not specified} \quad (610)$$

5.306. Reaction 2_46_4_46_1_46_129_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name Peptidoglycan glycosyltransferase

Notes GENE_ASSOCIATION: (BU222_ftsI) or (BU200_mrcB) PROTEIN_ASSOCIATION: (Peptidoglycan synthetase ftsI (Peptidoglycan glycosyltransferase 3) (Penicillin-binding protein 3) (PBP-3)//Peptidoglycan glycosyltransferase) or (Penicillin-binding protein 1B (PBP-1b) (PBP1b) (Murein polymerase) [Includes: Penicillin-insensitive transglycosylase (Peptidoglycan glycosyltransferase) (Peptidoglycan TGase); Penicillin-sensitive transpeptidase (DD-transpeptidase)]//2.4.1.129-RXN//Peptidoglycan glycosyltransferase) SUBSYSTEM: NAPROTEIN_CLASS: 2.4.1.129 GENERIC: true- TYPE: small HOLE: false

Reaction equation

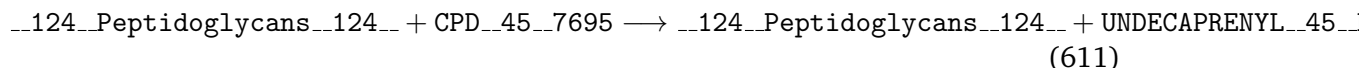


Table 310: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- Peptidoglycans- __124__	a peptidoglycan	__124_- Peptidoglycans- __124__	a peptidoglycan
CPD_- _45_- _7695	N- acetylmuramoyl- L-alanyl-D- glutamyl-L- lysyl-D-alanyl- D-alanine- diphosphoundecaprenyl- N- acetylglucosamine	UNDECAPRENYL- _45_- DIPHOSPHATE	trans,poly-cis- undecaprenyl diphosphate

Kinetic Law

$$v_{306} = \text{not specified} \quad (612)$$

5.307. Reaction ISPH2__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE ASSOCIATION: (BU147_ispH)PROTEIN ASSOCIATION: (4-hydroxy-3-methylbut-2-enyl diphosphate reductase//ISPH2-RXN//RXN0-884//4-hydroxy-3-methylbut-2-enyl diphosphate reductase)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 1.17.1.2COFACTOR: NAD__45__P__45__OR__45__NOPCOFACTOR: NADH__45__P__45__OR__45__NOPSIDE: PROTONSIDE: NAD__45__P__45__OR__45__NOPSIDE: WATERSIDE: NADH__45__P__45__OR__45__NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

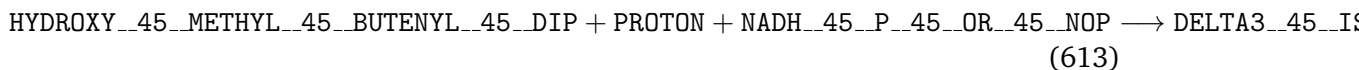


Table 311: Overview of participating species.

Id	Reactants Name	Id	Products Name
HYDROXY- __45_- _METHYL- __45_- _BUTENYL- __45_- _DIP	1-hydroxy- 2-methyl-2- (E)-butenyl 4-diphosphate	DELTA3- __45_- _ISOPENTENYL- __45__PP	isopentenyl diphosphate
PROTON	H+	NAD_- __45__P_- __45__OR- __45_- _NOP	NAD(P)+
NADH_- __45__P_- __45__OR- __45_- _NOP	NAD(P)H	WATER	H2O

Kinetic Law

$$v_{307} = \text{not specified} \quad (614)$$

5.308. Reaction PEPTIDYLPROLYL__45__ISOMERASE__45__RXN

This is a reversible reaction of one reactant forming one product.

Name Peptidylprolyl isomerase

Notes GENE ASSOCIATION: (BU474_tig) or (BU533_fkpA) or (BU478_ppiD) or (BU140_surA) PROTEIN ASSOCIATION: (Trigger factor (TF)) or (FKBP-type peptidyl-prolyl cis-trans isomerase fkpA (PPIase) (Rotamase)//PEPTIDYLPROLYL-ISOMERASE-RXN) or (Peptidyl-prolyl cis-trans isomerase D (PPIase D) (Rotamase D)//PEPTIDYLPROLYL-ISOMERASE-RXN) or (Chaperone surA homolog precursor) SUBSYSTEM: NAPROTEIN.CLASS: 5.2.1.8 GENERIC: false TYPE: small HOLE: false

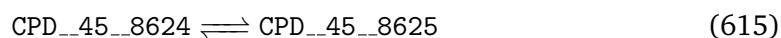
Reaction equation

Table 312: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_- _45_- _8624	peptidylproline (- ω = 180)	CPD_- _45_- _8625	peptidylproline (- ω = 0)

Kinetic Law

$$v_{308} = \text{not specified} \quad (616)$$

5.309. Reaction OROPTRIBTRANS__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Orotate phosphoribosyltransferase

Notes GENE_ASSOCIATION: (BU559_pyrE)PROTEIN_ASSOCIATION: (Orotate phosphoribosyltransferase (OPRT) (OPRTase)//OROPTRIBTRANS-RXN//Orotate phosphoribosyltransferase)SUBSYSTEM: de novo biosynthesis of uridine-5'-monophosphateSUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: de novo biosynthesis of pyrimidine ribonucleotidesPROTEIN_CLASS: 2.4.2.10SIDE: PPIGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 313: Overview of participating species.

Id	Reactants Name	Id	Products Name
PRPP	5-phosphoribosyl 1-pyrophosphate	PPI	diphosphate
OROTATE	orotate	OROTIDINE- _45_5- _45_- _PHOSPHATE	orotidine-5'- phosphate

Kinetic Law

$$v_{309} = \text{not specified} \quad (618)$$

5.310. Reaction SULFITE__45__REDUCT__45__RXN

This is an irreversible reaction of two reactants forming three products.

Name Sulfite reductase (NADPH)

Notes GENE_ASSOCIATION: (BU427_cysI) or (BU428_cysJ)PROTEIN_ASSOCIATION: (Sulfite reductase [NADPH] hemoprotein beta-component (SIR-HP) (SIRHP)//SULFITE-REDUCT-RXN) or (Sulfite reductase [NADPH] flavoprotein alpha-component (SIR-FP)//SULFITE-REDUCT-RXN)SUBSYSTEM: sulfate reduction I (assimilatory)SUBSYSTEM: superpathway of cysteine biosynthesisPROTEIN_CLASS: 1.8.1.2COFACTOR: NAD-PHCOFACTOR: NADPSIDE: WATERSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 314: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NADPH	NADPH	NADP	NADP+
SO3	sulfite	WATER	H2O
		HS	hydrogen sulfide

Kinetic Law

$$v_{310} = \text{not specified} \quad (620)$$

5.311. Reaction _2__46__5__46__1__46__19__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name 3-phosphoshikimate 1-carboxyvinyltransferase

Notes GENE_ASSOCIATION: (BU311_aroA)PROTEIN_ASSOCIATION: (3-phosphoshikimate 1-carboxyvinyltransferase (5- enolpyruvylshikimate-3-phosphate synthase) (EPSP synthase) (EPSPS)//2.5.1.19-RXN//3-phosphoshikimate 1-carboxyvinyltransferase

)SUBSYSTEM: chorismate biosynthesisPROTEIN_CLASS: 2.5.1.19SIDE: _124_Pi_124_SIDE:
PHOSPHO_45_ENOL_45_PYRUVATEGENERIC: falseTYPE: smallHOLE: false

Reaction equation

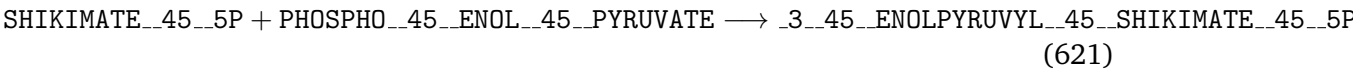


Table 315: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
SHIKIMATE_45_5P	shikimate-3-phosphate	_3_45_ENOLPYRUVYL_45_SHIKIMATE_45_5P	5-enolpyruvyl-shikimate-3-phosphate
PHOSPHO_45_ENOL_45_PYRUVATE	phosphoenolpyruvate	_124_Pi_124_	phosphate

Kinetic Law

v311 = not specified (622)

5.312. Reaction PYRUVDEH_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU206_aceF) or (BU205_aceE)PROTEIN_ASSOCIATION:
(Dihydrolipoyllysine-residue acetyltransferase component of pyruvate dehydrogenase complex (E2) (Dihydrolipoamide acetyltransferase component of pyruvate dehydrogenase complex)//RXN0-1133//Dihydrolipoyllysine-residue acetyltransferase) or (Pyruvate dehydrogenase E1 component//RXN0-1134)SUBSYSTEM: respiration (anaerobic)SUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassSUBSYSTEM: pyruvate fermentation to acetate IIPROTEIN_CLASS: 1.2.1.-COFACTOR: CO_45_ACOFACTOR: NADCOFACTOR: NADHCOFACTOR: ACETYL_45_COASIDE: CO_45_ASIDE: NADSIDE: NAD-HGENERIC: falseTYPE: smallHOLE: false

Reaction equation

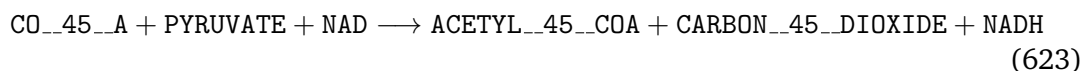


Table 316: Overview of participating species.

Id	Reactants Name	Id	Products Name
CO_45-_A	coenzyme A	ACETYL-_45-_COA	acetyl-CoA
PYRUVATE	pyruvate	CARBON-_45-_DIOXIDE	CO2
NAD	NAD+	NADH	NADH

Kinetic Law

$$v_{312} = \text{not specified} \quad (624)$$

5.313. Reaction FOLYLPOLYGLUTAMATESYNTH_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name folypolyglutamate synthetase

Notes GENE_ASSOCIATION: (BU167_folC)PROTEIN_ASSOCIATION: (Bifunctional protein folC [Includes: Folylpolyglutamate synthase (Folylpoly-gamma-glutamate synthetase) (FPGS) (Tetrahydrofolate synthase) (Tetrahydrofolypolyglutamate synthase); Dihydrofolate synthase]//DIHYDROFOLATESYNTH-RXN//FOLYLPOLYGLUTAMATESYNTH-RXN//FORMYLTHFGLUSYNTH-RXN//RXN0-2921//Tetrahydrofolate synthase//Dihydrofolate synthase)SUBSYSTEM: tetrahydrofolate biosynthesis IISUBSYSTEM: formylTHF biosynthesis IISUBSYSTEM: folate polyglutamylatation IPROTEIN_CLASS: 6.3.2.17CO-FACTOR: ADPCOFACTOR: _124_Pi_124_COFACTOR: ATPSIDE: ADPSIDE: _124_Pi_124_SIDE: GLTSIDE: ATPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

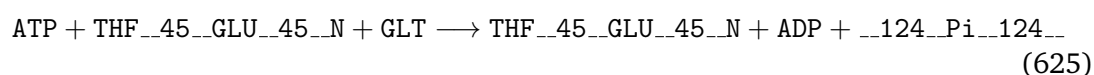


Table 317: Overview of participating species.

Id	Reactants Name	Id	Products Name
ATP	ATP	THF_45_GLU_45_N	a tetrahydrofolate polyglutamate
THF_45_GLU_45_N	a tetrahydrofolate polyglutamate	ADP	ADP
GLT	L-glutamate	_124_Pi_124_	phosphate

Kinetic Law

$$v_{313} = \text{not specified} \quad (626)$$

5.314. Reaction LEUCINE_45_45_TRNA_45_LIGASE_45_RXN

This is an irreversible reaction of three reactants forming three products.

Name Leucine-tRNA ligase

Notes GENE_ASSOCIATION: (BU444_leuS)PROTEIN_ASSOCIATION: (Leucyl-tRNA synthetase (Leucine-tRNA ligase) (LeuRS)//LEUCINE-TRNA-LIGASE-RXN//Leucine-tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.4CO-FACTOR: PPICOFACITOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: trueTYPE: macroHOLE: false

Reaction equation

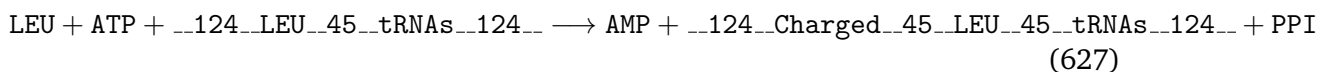


Table 318: Overview of participating species.

Id	Reactants Name	Id	Products Name
LEU	L-leucine	AMP	AMP

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	__124_- _Charged- _45_- _LEU- _45_- _tRNAs_- _124__	L-leucyl-tRNAleu
__124_- _LEU- _45_- _tRNAs_- _124__	tRNAleu	PPI	diphosphate

Kinetic Law

$$v_{314} = \text{not specified} \quad (628)$$

5.315. Reaction DIHYDLIPOXN__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Dihydrolipoamide dehydrogenase

Notes GENE_ASSOCIATION: (BU207_lpdA)PROTEIN_ASSOCIATION: (Dihydrolipoyl dehydrogenase (E3 component of pyruvate and 2-oxoglutarate dehydrogenases complexes) (Dihydrolipoamide dehydrogenase)//Dihydrolipoyl dehydrogenase)SUB-SYSTEM: NAPROTEIN_CLASS: 1.8.1.4COFACTOR: NADCOFACTOR: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation



Table 319: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
NAD	NAD+	LIPOAMIDE	lipoamide
DIHYDROLIPOAMIDE	dihydrolipoamide	NADH	NADH

Kinetic Law

$$v_{315} = \text{not specified}$$

(630)

5.316. Reaction RXN0_45_5268

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU469_cyoD) or (BU472_cyoA) or (BU471_cyoB) or (BU470_cyoC)PROTEIN_ASSOCIATION: (Cytochrome o ubiquinol oxidase protein cyoD) or (Ubiquinol oxidase subunit 2 precursor (Ubiquinol oxidase polypeptide II) (Cytochrome o subunit 2) (Oxidase BO(3) subunit 2) (Cytochrome o ubiquinol oxidase subunit 2)) or (Ubiquinol oxidase subunit 1 (Ubiquinol oxidase polypeptide I) (Cytochrome o subunit 1) (Oxidase BO(3) subunit 1) (Cytochrome o ubiquinol oxidase subunit 1)) or (Cytochrome o ubiquinol oxidase subunit 3 (Cytochrome o ubiquinol oxidase subunit III))SUBSYSTEM: NAPROTEIN_CLASS: 1.10.2.-COFACTOR: _124_Ubiquinols_124_COFACTOR: _124_Ubiquinones_124_GtrueTYPE: smallHOLE: false

Reaction equation

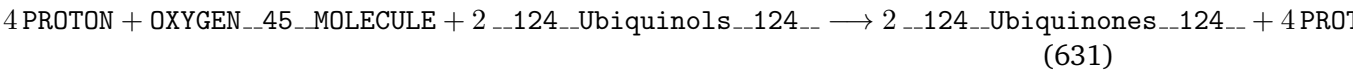


Table 320: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PROTON	H+	_124_- _Ubiquinones- _124_	a ubiquinone
OXYGEN- _45_- _MOLECULE	oxygen	PROTON	H+
124- _Ubiquinols- _124_	a ubiquinol	WATER	H2O

Kinetic Law

$$v_{316} = \text{not specified}$$

(632)

5.317. Reaction [_2OXOGLUTARATEDEH__45__RXN](#)

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU302_sucA) or (BU303_sucB)PROTEIN_ASSOCIATION: (2-oxoglutarate dehydrogenase E1 component (Alpha- ketoglutarate dehydrogenase)) or (Dihydrolipoyllysine-residue succinyltransferase component of 2- oxoglutarate dehydrogenase complex (E2) (Dihydrolipoamide succinyltransferase component of 2-oxoglutarate dehydrogenase complex)//RXN0-1147//Dihydrolipoyllysine-residue succinyltransferase)SUBSYSTEM: NAPROTEIN_CLASS: NACOFACOR: CO__45__ACOFACOR: NADCOFACTOR: NADHCOFACTOR: SUC__45__COAGENERIC: falseTYPE: smallHOLE: false

Reaction equation

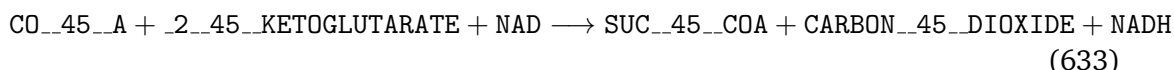


Table 321: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
CO__45__A	coenzyme A	SUC__45__COA	succinyl-CoA
_2_45_KETOGLUTARATE	2-ketoglutarate	CARBON_45_DIOXIDE	CO ₂
NAD	NAD ⁺	NADH	NADH

Kinetic Law

$$v_{317} = \text{not specified} \quad (634)$$

5.318. Reaction [AICARTRANSFORM__45__RXN](#)

This is an irreversible reaction of two reactants forming two products.

Name Phosphoribosylaminoimidazolecarboxamide formyltransferase

Notes GENE_ASSOCIATION: (BU031_purH)PROTEIN_ASSOCIATION: (Bifunctional purine biosynthesis protein purH [Includes: Phosphoribosylaminoimidazolecarboxamide formyltransferase (AICAR transformylase); IMP cyclohydrolase (Inosini-

case) (IMP synthetase) (ATIC)]//AICARTRANSFORM-RXN//IMPCYCLOHYDROLASE-RXN//Phosphoribosylaminoimidazolecarboxamide formyltransferase//IMP cyclohydrolase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo biosynthesis IPROTEIN_CLASS: 2.1.2.3COFACTOR: THFCOFACTOR: _10_45_FORMYL_45_THFSIDE: THFSIDE: _10_45_FORMYL_45_THFCfalseTYPE: smallHOLE: false

Reaction equation

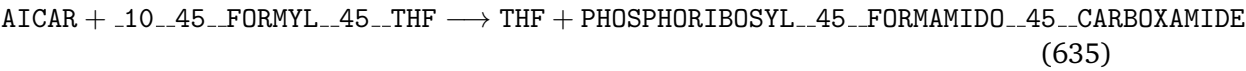


Table 322: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
AICAR	aminoimidazole carboxamide ribonucleotide	THF	tetrahydrofolate
_10- _45- _FORMYL- _45- _THF	10-formyl-tetrahydrofolate	PHOSPHORIBOSYL_45_FORMAMIDO_45_CARBOXAMIDE	phosphoribosyl-formamido-carboxamide

Kinetic Law

v_{318} = not specified (636)

5.319. Reaction GDPREDUCT_45_RXN

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU178_nrdB) or (BU179_nrdA)PROTEIN_ASSOCIATION: (Ribonucleoside-diphosphate reductase subunit beta (Ribonucleotide reductase small subunit)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase) or (Ribonucleoside-diphosphate reductase subunit alpha (Ribonucleotide reductase)//ADPREDUCT-RXN//CDPREDUCT-RXN//GDPREDUCT-RXN//RIBONUCLEOSIDE-DIP-REDUCTI-RXN//UDPREDUCT-RXN//Ribonucleoside-diphosphate reductase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: purine nucleotides de novo

biosynthesis IPROTEIN_CLASS: 1.17.4.1COFACTOR: __124__Red__45__Thioredoxin__124__COFACTOR:
__124__Ox__45__Thioredoxin__124__SIDE: WATERSIDE: __124__Red__45__Thioredoxin__124__SIDE:
__124__Ox__45__Thioredoxin__124__GENERIC: trueTYPE: macroHOLE: false

Reaction equation

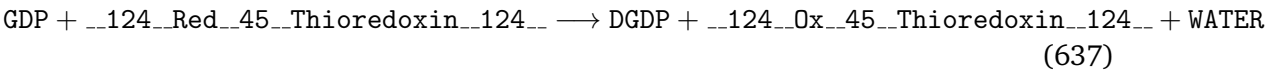


Table 323: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
GDP	GDP	DGDP	dGDP
__124__Red__45__Thioredoxin__124__	a reduced thioredoxin	__124__Ox__45__Thioredoxin__124__	an oxidized thioredoxin
		WATER	H2O

Kinetic Law

v_{319} = not specified (638)

5.320. Reaction _2OXOGLUTDECARB__45__RXN

This is an irreversible reaction of two reactants forming two products.

Name Oxoglutarate dehydrogenase (lipoamide)

Notes GENE_ASSOCIATION: (BU302_sucA)PROTEIN_ASSOCIATION: (2-oxoglutarate dehydrogenase E1 component (Alpha- ketoglutarate dehydrogenase))SUBSYSTEM: 2-ketoglutarate dehydrogenase complexPROTEIN_CLASS: 1.2.4.2SIDE: _2__45__KETOGLUTARATECARBON__45__DIOXIDEGENERIC: trueTYPE: macroHOLE: false

Reaction equation

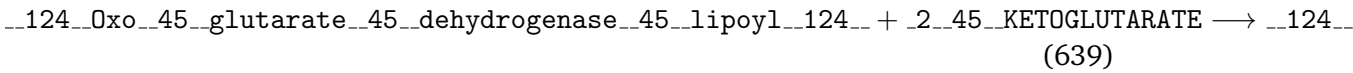


Table 324: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124- __0xo- __45_- glutarate- __45_- dehydrogenase- __45_- lipoyl- __124__	dihydrolipoyltranssuccinylase N6-(lipoyl)lysine	__124- __0xo- __45_- glutarate- __45_- dehydro- __45_- suc- 45__DH- __45_- lipoyl- __124__	dihydrolipoyltranssuccinylase N6-(S- succinyldihydrolipoyl)lysine
__2__45_- KETOGLUTARATE	2-ketoglutarate	CARBON- __45_- DIOXIDE	CO2

Kinetic Law

$$v_{320} = \text{not specified} \quad (640)$$

5.321. Reaction RXN0__45__884

This is an irreversible reaction of three reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU147_ispH)PROTEIN_ASSOCIATION: (4-hydroxy-3-methylbut-2-enyl diphosphate reductase//ISPH2-RXN//RXN0-884//4-hydroxy-3-methylbut-2-enyl diphosphate reductase)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 1.17.1.2COFACTOR: NAD__45__P__45__OR__45__NOPCOFACTOR: NADH__45__P__45__OR__45__NOPSIDE: PROTONSIDE: NAD__45__P__45__OR__45__NOPSIDE: WATERSIDE: NADH__45__P__45__OR__45__NOPGENERIC: trueTYPE: smallHOLE: false

Reaction equation

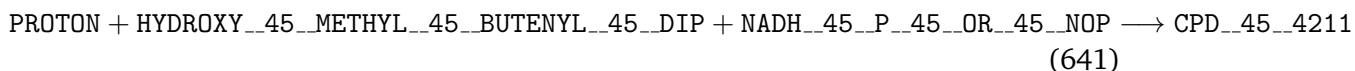


Table 325: Overview of participating species.

Id	Reactants Name	Id	Products Name
PROTON	H+	CPD_ _45_ _4211	dimethylallyl- diphosphate
HYDROXY- _45_ _METHYL- _45_ _BUTENYL- _45_ _DIP	1-hydroxy- 2-methyl-2- (E)-butenyl 4-diphosphate	NAD_ _45_P_ _45_OR- _45_ _NOP	NAD(P)+
NADH_ _45_P_ _45_OR- _45_ _NOP	NAD(P)H	WATER	H2O

Kinetic Law

$$v_{321} = \text{not specified} \quad (642)$$

5.322. Reaction DXPREDISOM_45_RXN

This is an irreversible reaction of two reactants forming two products.

Name NA

Notes GENE_ASSOCIATION: (BU235_dxr)PROTEIN_ASSOCIATION: (1-deoxy-D-xylulose 5-phosphate reductoisomerase (DXP reductoisomerase) (1-deoxyxylulose-5-phosphate reductoisomerase) (2-C- methyl-D-erythritol 4-phosphate synthase)//DXPREDISOM-RXN)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 1.1.1.267CO-FACTOR: NADPHCOFACTOR: NADPSIDE: NADPHSIDE: NADPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

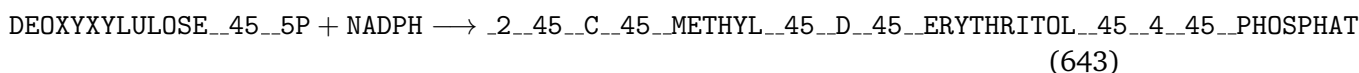


Table 326: Overview of participating species.

Id	Reactants Name	Id	Products Name
DEOXYXYLULOSE- 45-5P	Deoxy-D- xylulose phosphate	5- 2-45- C-45- METHYL- 45-D- 45- ERYTHRITOL- 45-4- 45- PHOSPHATE	2-C-methyl-D- erythritol-4- phosphate
NADPH	NADPH	NADP	NADP+

Kinetic Law

$$v_{322} = \text{not specified} \quad (644)$$

5.323. Reaction RXN0_45_882

This is an irreversible reaction of two reactants forming three products.

Name NA

Notes GENE_ASSOCIATION: (BU287_ispG)PROTEIN_ASSOCIATION: (4-hydroxy-3-methylbut-2-en-1-yl diphosphate synthase (1- hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate synthase)//RXN0-882//4-hydroxy-3-methylbut-2-en-1-yl diphosphate synthase)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 1.17.4.3SIDE: WATERSIDE: _124_Protein_45_Disulfides_124_SIDE: _124_Protein_45_Dithiols_124_GENERIC: trueTYPE: smallHOLE: false

Reaction equation

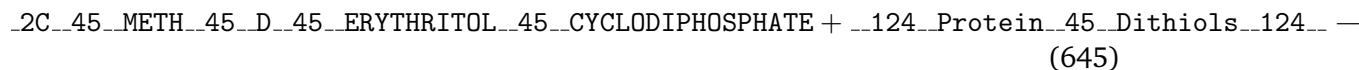


Table 327: Overview of participating species.

Id	Reactants Name	Id	Products Name
_2C__45- _METH_- _45__D- _45_- _ERYTHRITOL- _45_- _CYCLODIPHOSPHATE	2-C-methyl-D- erythritol-2,4- cyclodiphosphate	_124_- _Protein- _45_- _Disulfides- _124__	a protein disul- fide
124- _Protein- _45_- _Dithiols- _124__	a protein dithiol	_HYDROXY- _45_- _METHYL- _45_- _BUTENYL- _45_- _DIP _WATER	1-hydroxy- 2-methyl-2- (E)-butenyl 4-diphosphate
			H2O

Kinetic Law

$$v_{323} = \text{not specified} \quad (646)$$

5.324. Reaction _2TRANSKETO__45__RXN

This is a reversible reaction of two reactants forming two products.

Name Transketolase

Notes GENE_ASSOCIATION: (BU094_tkt)PROTEIN_ASSOCIATION: (Transketolase (TK)//Transketolase)SUBSYSTEM: pentose phosphate pathwaySUBSYSTEM: pentose phosphate pathway (partial)SUBSYSTEM: pentose phosphate pathway (non-oxidative branch)SUBSYSTEM: formaldehyde assimilation II (RuMP Cycle)PROTEIN_CLASS: 2.2.1.1GENERIC: false-TYPE: smallHOLE: false

Reaction equation

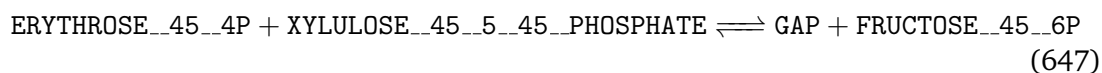


Table 328: Overview of participating species.

Id	Reactants Name	Id	Products Name
ERYTHROSE- _45_4P	D-erythrose-4- phosphate	GAP	D- glyceraldehyde-3- phosphate
XYLULOSE- _45_5- _45_- _PHOSPHATE	D-xylulose-5- phosphate	FRUCTOSE- _45_6P	fructose-6- phosphate

Kinetic Law

$$v_{324} = \text{not specified} \quad (648)$$

5.325. Reaction _3_46_1_46_13_46_1_45_RXN

This is a reversible reaction of two reactants forming three products.

Name Exoribonuclease II

Notes GENE_ASSOCIATION: (BU565_rnr) or (BU266_rnb)PROTEIN_ASSOCIATION: (Ribonuclease R (RNase R) (VacB protein homolog)) or (Exoribonuclease 2 (Exoribonuclease II) (Ribonuclease II) (RNase II)//3.1.13.1-RXN//Exoribonuclease II)SUBSYSTEM: NAPROTEIN_CLASS: 3.1.13.1GENERIC: trueTYPE: smallHOLE: false

Reaction equation

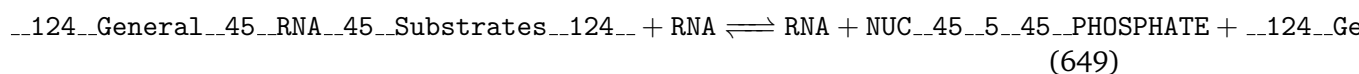


Table 329: Overview of participating species.

Id	Reactants Name	Id	Products Name
__124_- _General- __45_- _RNA- __45_- _Substrates- __124__	an RNA RNA	RNA	RNA
		NUC_- _45__5- __45_- _PHOSPHATE __124_- _General- __45_- _RNA- __45_- _Substrates- __124__	a nucleoside-5'- phosphate an RNA

Kinetic Law

$$v_{325} = \text{not specified} \quad (650)$$

5.326. Reaction FRUCTOSEPHOSPHO__45__RXN

This is a reversible reaction of two reactants forming three products.

Name transport of fructose by PTS

Notes GENE_ASSOCIATION: (BU572_mtlA) or (BU356_ptsG) PROTEIN_ASSOCIATION: (PTS system mannitol-specific EIICBA component (EIICBA-Mtl) (EII-Mtl) [Includes: Mannitol permease IIC component (PTS system mannitol- specific EIIC component); Mannitol-specific phosphotransferase enzyme IIB component (PTS system mannitol-specific EIIB component); Mannitol-specific phosphotransferase enzyme IIA component (PTS system mannitol-specific EIIA component)]) or (PTS system glucose-specific EIICB component (EIICB-Glc) (EII-Glc) [Includes: Glucose permease IIC component (PTS system glucose-specific EIIC component); Glucose-specific

phosphotransferase enzyme IIB component (PTS system glucose-specific EIIB component)])SUBSYSTEM: NAPROTEIN_CLASS: 2.7.1.69GENERIC: trueTYPE: macroHOLE: false

Reaction equation

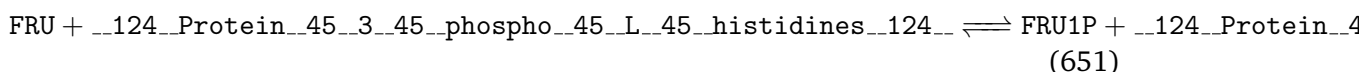


Table 330: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
FRU	D-fructose	FRU1P	fructose-1-phosphate
__124_- _Protein- __45__3- __45_- _phospho- __45__L- __45_- _histidines- __124__	a protein-N- π-phospho-L- histidine	__124_- _Protein- __45_- _Histidines- __124__	a protein histi- dine
		WATER	H2O

Kinetic Law

$$v_{326} = \text{not specified} \quad (652)$$

5.327. Reaction 24674614614845RXN

This is an irreversible reaction of two reactants forming two products.

Name 4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol kinase

Notes GENE_ASSOCIATION: (BU170_ispE)PROTEIN_ASSOCIATION: (4-diphosphocytidyl-2-C-methyl-D-erythritol kinase (CMK) (4-(cytidine-5'-diphospho)-2-C-methyl-D-erythritol kinase)//2.7.1.148-RXN)SUBSYSTEM: methylerythritol phosphate pathwayPROTEIN_CLASS: 2.7.1.148COFACTOR: ADPCOFACTOR: ATPSIDE: ADPSIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

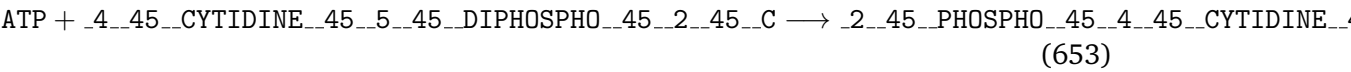


Table 331: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
ATP	ATP	_2_45_ _PHOSPHO_45_4_45_ _CYTIDINE_4_45_ _MET	2-phospho-4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol
_4_45_ _CYTIDINE_45_5_45_ _DIPHOSPHO_45_2_45_ _C	4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol	ADP	ADP

Kinetic Law

v_{327} = not specified

(654)

5.328. Reaction SAMDECARB_45_RXN

This is an irreversible reaction of one reactant forming two products.

Name Adenosylmethionine decarboxylase

Notes GENE_ASSOCIATION: (BU208_speD)PROTEIN_ASSOCIATION: (S-adenosylmethionine decarboxylase proenzyme (AdoMetDC) (SamDC) [Contains: S-adenosylmethionine decarboxylase beta chain; S- adenosylmethionine decarboxylase alpha chain]//SAMDECARB-RXN)SUBSYSTEM: spermine biosynthesisSUBSYSTEM: spermidine biosynthesis-

PROTEIN_CLASS: 4.1.1.50SIDE: CARBON__45__DIOXIDEGENERIC: falseTYPE: small-HOLE: false

Reaction equation

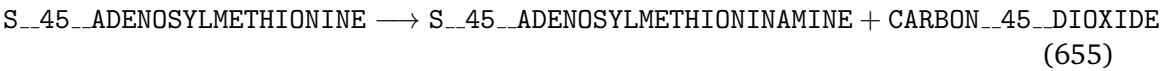


Table 332: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
S__45__- _ADENOSYLMETHIONINE	S-adenosyl-L- _METHIONINE	S__45__- _ADENOSYLMETHIONINAMINE	S-adenosyl-L- _METHIONINAMINE
		CARBON- __45__- _DIOXIDE	CO2

Kinetic Law

v_{328} = not specified (656)

5.329. Reaction LYSINE__45____45__TRNA__45__LIGASE__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name Lysine–tRNA ligase

Notes GENE_ASSOCIATION: (BU437_lysS) or (BU582_poxA)PROTEIN_ASSOCIATION: (Lysyl-tRNA synthetase (Lysine–tRNA ligase) (LysRS)//Lysine–tRNA ligase) or (Putative lysyl-tRNA synthetase (Lysine–tRNA ligase) (LysRS) (GX)//Lysine–tRNA ligase)SUBSYSTEM: tRNA charging pathwayPROTEIN_CLASS: 6.1.1.6COFACTOR: PPICOFACOR: ATPCOFACTOR: AMPSIDE: PPISIDE: ATPSIDE: AMPGENERIC: true-TYPE: macroHOLE: false

Reaction equation

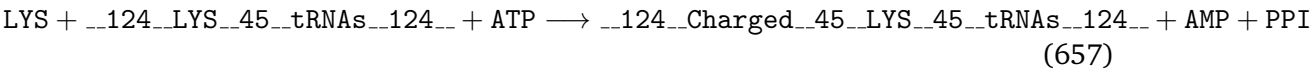


Table 333: Overview of participating species.

Id	Reactants Name	Id	Products Name
LYS	L-lysine	__124_- _Charged- __45_- _LYS- __45_- _tRNAs_- _124__	L-lysyl-tRNAlys
__124_- _LYS- __45_- _tRNAs_- _124__	tRNAlys	AMP	AMP
ATP	ATP	PPI	diphosphate

Kinetic Law

$$v_{329} = \text{not specified} \quad (658)$$

5.330. Reaction 3_45_CH3_45_2_45_OXOBUTANOATE_45_OH_45_CH3_45_- _XFER_45_RXN

This is an irreversible reaction of three reactants forming two products.

Name 3-methyl-2-oxobutanoate hydroxymethyltransferase

Notes GENE_ASSOCIATION: (BU197_panB)PROTEIN_ASSOCIATION: (3-methyl-2-oxobutanoate hydroxymethyltransferase (Ketopantoate hydroxymethyltransferase) (KPHMT)//3-CH3-2-OXOBUTANOATE-OH-CH3-XFER-RXN//3-methyl-2-oxobutanoate hydroxymethyltransferase)SUBSYSTEM: pantothenate biosynthesis IPROTEIN_CLASS: 2.1.2.11CO-FACTOR: METHYLENE_45_THFCOFACTOR: THFSIDE: WATERSIDE: METHYLENE_45_THFSIDE: THFGENERIC: falseTYPE: smallHOLE: false

Reaction equation

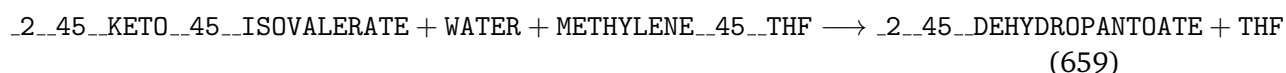


Table 334: Overview of participating species.

Id	Reactants Name	Id	Products Name
2_45_-- _KETO-- _45_-- _ISOVALERATE	2-keto-isovalerate	2_45_-- _DEHYDRO-PANTOATE	2- dehydro-pantoate
WATER H2O	H2O	THF	tetrahydrofolate
METHYLENE-5,10-methylene- _45_-- _THF	THF		

Kinetic Law

$$v_{330} = \text{not specified} \quad (660)$$

5.331. Reaction RXN0_45_2582

This is a reversible reaction of one reactant forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU137_nfo)PROTEIN_ASSOCIATION: (Probable endonuclease 4 (Endonuclease IV) (Endodeoxyribonuclease IV)//RXN0-2581)SUBSYSTEM: NAPROTEIN_CLASS: 3.1.21.2GENERIC: falseTYPE: macroHOLE: false

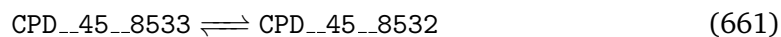
Reaction equation

Table 335: Overview of participating species.

Id	Reactants Name	Id	Products Name
CPD_-- _45_-- _8533	AP site on DNA created by glyco- sylase in repair process	CPD_-- _45_-- _8532	AP site removed from DNA

Kinetic Law

$$v_{331} = \text{not specified} \quad (662)$$

5.332. Reaction GAPOXNPBOSPHN__45__RXN

This is a reversible reaction of three reactants forming two products.

Name Glyceraldehyde 3-phosphate dehydrogenase (phosphorylating)

Notes GENE_ASSOCIATION: (BU298_gapA)PROTEIN_ASSOCIATION: (Glyceraldehyde-3-phosphate dehydrogenase (GAPDH)//GAPOXNPBOSPHN-RXN)SUBSYSTEM: glycolysis ISUBSYSTEM: superpathway of glycolysis, pyruvate dehydrogenase, TCA, and glyoxylate bypassPROTEIN_CLASS: 1.2.1.12COFACTOR: NADCOFACTOR: NADHSIDE: __124__Pi__124__SIDE: NADSIDE: NADHGENERIC: falseTYPE: smallHOLE: false

Reaction equation

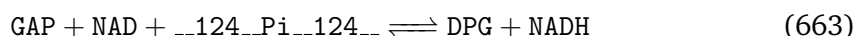


Table 336: Overview of participating species.

Id	Reactants Name	Id	Products Name
GAP	D- glyceraldehyde-3- phosphate	DPG	1,3- diphosphateglycerate
NAD __124__ __Pi__ __124__	NAD+ phosphate	NADH	NADH

Kinetic Law

$$v_{332} = \text{not specified} \quad (664)$$

5.333. Reaction RXN0__45__2581

This is a reversible reaction of one reactant forming one product.

Name NA

Notes GENE ASSOCIATION: (BU137_nfo)PROTEIN ASSOCIATION: (Probable endonuclease 4 (Endonuclease IV) (Endodeoxyribonuclease IV)//RXN0-2581)SUBSYSTEM: NAPROTEIN_CLASS: 3.1.21.2GENERIC: trueTYPE: macroHOLE: false

Reaction equation

DNA_32_apurinic_32_or_32_apyrimidinic_32_40_AP_41_32_site_32_following_32_glycosidic_bond_32_cleavage_32_during_32_repair_32_process (665)

Table 337: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DNA_32_apurinic_32_or_32_apyrimidinic_32_40_AP_41_32_site_32_following_32_glycosidic_bond_32_cleavage_32_during_32_repair_32_process	NA	CPD_45_8532	AP site removed from DNA

Kinetic Law

$$v_{333} = \text{not specified}$$

(666)

5.334. Reaction HISTCYCLOHYD__45__RXN

This is an irreversible reaction of two reactants forming one product.

Name Phosphoribosyl-AMP cyclohydrolase

Notes GENE_ASSOCIATION: (BU106_hisI)PROTEIN_ASSOCIATION: (Histidine biosynthesis bifunctional protein hisIE [Includes: Phosphoribosyl-AMP cyclohydrolase (PRA-CH); Phosphoribosyl-ATP pyrophosphatase (PRA-PH)]//HISTCYCLOHYD-RXN//HISTPRATPHY RXN//Phosphoribosyl-AMP cyclohydrolase)SUBSYSTEM: superpathway of histidine, purine and pyrimidine biosynthesisSUBSYSTEM: histidine biosynthesis IPROTEIN_CLASS: 3.5.4.19SIDE: WATERGENERIC: falseTYPE: smallHOLE: false

Reaction equation

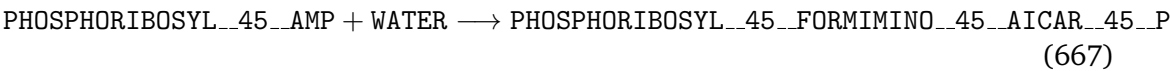


Table 338: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
PHOSPHORIBOSYL__45__AMP	Phosphoribosyl-AMP	PHOSPHORIBOSYL__45__FORMIMINO__45__AICAR__45__P	PhosphoribosylformiminoAICAR-phosphate
WATER	H2O		

Kinetic Law

$$v_{334} = \text{not specified}$$

(668)

5.335. Reaction RXN0__45__2584

This is a reversible reaction of two reactants forming one product.

Name NA

Notes GENE_ASSOCIATION: (BU183.ung)PROTEIN_ASSOCIATION: (Uracil-DNA glycosylase (UDG))SUBSYSTEM: NAPROTEIN_CLASS: 3.2.2.-GENERIC: trueTYPE: macroHOLE: false

Reaction equation

DNA_32_with_32_uracil_32_due_32_to_32_misincorporation_32_or_32_deamination_32_of_32_cytosine_32_46_124_DNA_45_with_45_Uracils_124_ (669)

Table 339: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
DNA_32_with_32_uracil_32_due_32_to_32_misincorporation_32_or_32_deamination_32_of_32_cytosine_32_46_124_DNA_45_with_45_Uracils_124_	a DNA with uracil	DNA_32_with_32_uracil_32_cleaved_32_out_32_leaving_32_an_32_AP_32_site	NA

Kinetic Law

$$v_{335} = \text{not specified}$$

(670)

5.336. Reaction UDP__45__NACMUR__45__ALA__45__LIG__45__RXN

This is an irreversible reaction of three reactants forming three products.

Name UDP-N-acetylmuramate–alanine ligase

Notes GENE_ASSOCIATION: (BU215_murC)PROTEIN_ASSOCIATION: (UDP-N-acetylmuramate–L-alanine ligase (UDP-N- acetylmuramoyl-L-alanine synthetase)//UDP-NACMUR-ALA-LIG-RXN//UDP-N-acetylmuramate–L-alanine ligase)SUBSYSTEM: peptidoglycan biosynthesis IPROTEIN_CLASS: 6.3.2.8COFACTOR: ADPCOFACTOR: __124__Pi__124__COFACTOR: ATPSIDE: ADPSIDE: __124__Pi__124__SIDE: ATPGENERIC: falseTYPE: smallHOLE: false

Reaction equation

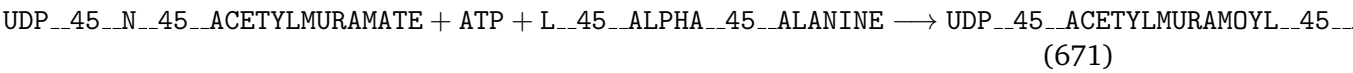


Table 340: Overview of participating species.

Reactants		Products	
Id	Name	Id	Name
UDP_- _45_-N- _45_- _ACETYLMURAMATE	UDP-N-acetylmuramate	UDP- _45_- _ACETYLMURAMOYL- _45_- _ALA _124_- _Pi_- _124_- ADP	UDP-N-acetylmuramoyl-L-alanine phosphate ADP
ATP	ATP		
L_45_- _ALPHA- _45_- _ALANINE	L-alanine		

Kinetic Law

$$v_{336} = \text{not specified}$$

(672)

6. Derived Rate Equations

When interpreted as an ordinary differential equation framework, this model implies the following set of equations for the rates of change of each species.

The identifiers for reactions, which are not defined properly or which are lacking a kinetic equation, are highlighted in red.

6.1. Species B_45_ALANINE

Name β-alanine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in PANTOATE_45_BETA_45-_ALANINE_45_LIG_45_RXN, RXN_45_6401).

$$\frac{d}{dt}B_45_ALANINE = -v_{222} - v_{249} \quad (673)$$

6.2. Species _124_0xo_45_glutarate_45_dehydrogenase_45_DH_45-_lipoyl_124_

Name dihydrolipoyltranssuccinylase N6-(dihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN_45_7716 and as a product in RXN0_45_1147).

$$\begin{aligned} \frac{d}{dt} _124_0xo_45_glutarate_45_dehydrogenase_45_DH_45_lipoyl_124_ \\ = v_{192} - v_{280} \end{aligned} \quad (674)$$

6.3. Species _124_Reduced_45_ferredoxins_124_

Name a reduced ferredoxin

Initial amount 0 mol

This species takes part in one reaction (as a reactant in _1_46_18_46_1_46_2_45-_RXN).

$$\frac{d}{dt} _124_Reduced_45_ferredoxins_124_ = -v_{206} \quad (675)$$

6.4. Species NADPH

Name NADPH

Initial amount 0 mol

This species takes part in 20 reactions (as a reactant in ACETOLACTREDUCTOISOM__45__RXN, _3__45__OXOACYL__45__ACP__45__REDUCT__45__RXN, DIHYDROFOLATEREDUCT__45__RXN, RXN0__45__2142, RXN0__45__2145, ENOYL__45__ACP__45__REDUCT__45__NADPH__45__RXN, ASPARTATE__45__SEMIALDEHYDE__45__DEHYDROGENASE__45__RXN, RIBOFLAVINSYNREDUC__45__RXN, ACETOHBUTREDUCTOI__45__RXN, N__45__ACETYLGLUTPREDUCT__45__RXN, SHIKIMATE__45__5__45__DEHYDROGENASE__45__RXN, UDPNACETYLMURAMATEDEHYDROG__45__RXN, SULFITE__45__REDUCT__45__RXN, DXPREDISOM__45__RXN and as a product in METHYLENETHFDEHYDROG__45__NADP__45__RXN, GLU6PDEHYDROG__45__RXN, GMP__45__REDUCT__45__RXN, FLAVONADPREDUCT__45__RXN, _1__46__18__46__1__46__2__45__RXN, THIOREDoxIN__45__REDUCT__45__NADPH__45__RXN).

$$\frac{d}{dt}\text{NADPH} = v_{19} + v_{78} + v_{107} + v_{182} + v_{206} + v_{227} - v_6 - v_{184} - v_{185} - v_{207} - v_{208} - v_{210} - v_{214} - v_{232} - v_{276} - v_{279} - v_{283} - v_{298} - 3v_{310} - v_{322} \quad (676)$$

6.5. Species PROPIONATE

Name propionate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN__45__7958 and as a product in PROPkin__45__RXN).

$$\frac{d}{dt}\text{PROPIONATE} = v_{37} - v_{195} \quad (677)$$

6.6. Species HEME_O

Name heme o

Initial amount 0 mol

This species takes part in one reaction (as a product in HEMEosyn__45__RXN).

$$\frac{d}{dt}\text{HEME_O} = v_{163} \quad (678)$$

6.7. Species PYRIDOXAMINE__45__5P

Name pyridoxamine 5'-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__5240](#)).

$$\frac{d}{dt}\text{PYRIDOXAMINE__45__5P} = v_{271} \quad (679)$$

6.8. Species CPD0__45__1080

Name GlcNAc-1,6-anhMurNAc-L-Ala-γ-D-Glu-DAP-D-Ala

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__5225](#)).

$$\frac{d}{dt}\text{CPD0__45__1080} = -v_{55} \quad (680)$$

6.9. Species CPD__45__7224

Name N-acetyl-L-citrulline

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__7933](#)).

$$\frac{d}{dt}\text{CPD__45__7224} = -v_{250} \quad (681)$$

6.10. Species FAD

Name FAD

Initial amount 0 mol

This species takes part in one reaction (as a product in [FADSYN__45__RXN](#)).

$$\frac{d}{dt}\text{FAD} = v_{61} \quad (682)$$

6.11. Species CPD0__45__1082

Name L-Ala-γ-D-Glu-DAP-D-Ala

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__5225](#)).

$$\frac{d}{dt}\text{CPD0__45__1082} = v_{55} \quad (683)$$

6.12. Species CPD0_45_1081

Name GlcNAc-1,6-anhMurNAc

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN0_45_5225).

$$\frac{d}{dt} \text{CPD0_45_1081} = v_{55} \quad (684)$$

6.13. Species _124_Cis_45_Delta5_45_dodecenoyl_45_ACPs_124_

Name a cis-Δ5-dodecenoyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN0_45_2145).

$$\frac{d}{dt} \text{_124_Cis_45_Delta5_45_dodecenoyl_45_ACPs_124_} = v_{208} \quad (685)$$

6.14. Species

TRANS_45_DELTA3_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP

Name trans-Δ3-cis-Δ5-dodecenoyl-ACP

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN0_45_2145).

$$\frac{d}{dt} \text{TRANS_45_DELTA3_45_CIS_45_DELTA5_45_DODECENOYL_45_ACP} = -v_{208} \quad (686)$$

6.15. Species CPD_45_209

Name UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in _6_46_3_46_2_46_10_45_-RXN).

$$\frac{d}{dt} \text{CPD_45_209} = -v_{128} \quad (687)$$

6.16. Species DIAMINO__45__OH__45__PHOSPHORIBOSYLAMINO__45__PYR

Name 2,5-diamino-6-(ribosylamino)-4-(3H)-pyrimidinone 5'-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RIBOFLAVINSYNDEAM__45__RXN and as a product in GTP__45__CYCLOHYDRO__45__II__45__RXN).

$$\frac{d}{dt}\text{DIAMINO__45__OH__45__PHOSPHORIBOSYLAMINO__45__PYR} = v_{91} - v_{191} \quad (688)$$

6.17. Species L__45__GAMMA__45__GLUTAMYLCYSTEINE

Name L-γ-glutamylcysteine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in GLUTATHIONE__45__SYN__45__RXN and as a product in GLUTCYSLIG__45__RXN).

$$\frac{d}{dt}\text{L__45__GAMMA__45__GLUTAMYLCYSTEINE} = v_{164} - v_{90} \quad (689)$$

6.18. Species GDP

Name GDP

Initial amount 0 mol

This species takes part in three reactions (as a reactant in GDPREDUCT__45__RXN and as a product in ADENYLOSUCCINATE__45__SYNTHASE__45__RXN, GUANYL__45__KIN__45__RXN).

$$\frac{d}{dt}\text{GDP} = v_{201} + v_{262} - v_{319} \quad (690)$$

6.19. Species CPD__45__1086

Name 5-amino-6-(5'-phosphoribitylamino)uracil

Initial amount 0 mol

This species takes part in one reaction (as a product in RIBOFLAVINSYNREDUC__45__RXN).

$$\frac{d}{dt}\text{CPD__45__1086} = v_{232} \quad (691)$$

6.20. Species APS

Name adenosine 5'-phosphosulfate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ADENYLYLSULFKIN__45__RXN](#) and as a product in [SULFATE__45__ADENYLYLTRANS__45__RXN](#)).

$$\frac{d}{dt}\text{APS} = v_{294} - v_{92} \quad (692)$$

6.21. Species __124__Damaged__45__DNA__45__Pyrimidine__124__

Name a damaged DNA pyrimidine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__2601](#)).

$$\frac{d}{dt}\text{__124__Damaged__45__DNA__45__Pyrimidine__124__} = -v_{81} \quad (693)$$

6.22. Species D__45__SEDOHEPTULOSE__45__7__45__P

Name D-sedoheptulose-7-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [TRANSALDOL__45__RXN](#) and as a product in [_1TRANSKETO__45__RXN](#)).

$$\frac{d}{dt}\text{D__45__SEDOHEPTULOSE__45__7__45__P} = v_{255} - v_{49} \quad (694)$$

6.23. Species DIHYDROFOLATE

Name 7,8-dihydrofolate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [DIHYDROFOLATEREDUCT__45__RXN](#) and as a product in [DIHYDROFOLATESYNTH__45__RXN](#), [THYMIDYLATESYN__45__RXN](#)).

$$\frac{d}{dt}\text{DIHYDROFOLATE} = v_{14} + v_{99} - v_{185} \quad (695)$$

6.24. Species `_124_PRO_45_tRNAs_124_`

Name tRNA_{Pro}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `PROLINE_45_45_TRNA_45_-LIGASE_45_RXN`).

$$\frac{d}{dt} _124_PRO_45_tRNAs_124_ = -v_{241} \quad (696)$$

6.25. Species `_124_Acceptor_124_`

Name an oxidized electron acceptor

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `_1_46_6_46_99_46_5_45_-RXN`, `RXN0_45_1`).

$$\frac{d}{dt} _124_Acceptor_124_ = -v_{29} - v_{111} \quad (697)$$

6.26. Species `_124_Charged_45_LYS_45_tRNAs_124_`

Name L-lysyl-tRNA_{Lys}

Initial amount 0 mol

This species takes part in one reaction (as a product in `LYSINE_45_45_TRNA_45_-LIGASE_45_RXN`).

$$\frac{d}{dt} _124_Charged_45_LYS_45_tRNAs_124_ = v_{329} \quad (698)$$

6.27. Species `ILE`

Name L-isoleucine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `ISOLEUCINE_45_45_TRNA_45_-LIGASE_45_RXN`).

$$\frac{d}{dt} ILE = -v_{125} \quad (699)$$

6.28. Species `_2_45_PG`

Name 2-phosphoglycerate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `_2PGADEHYDRAT_45_RXN` and as a product in `_3PGAREARR_45_RXN`).

$$\frac{d}{dt} _2_45_PG = v_{277} - v_{243} \quad (700)$$

6.29. Species

`_124_tRNAs_45_with_45_N7_45_methyl_45_guanine_124_`

Name a tRNA containing N7-methylguanine

Initial amount 0 mol

This species takes part in one reaction (as a product in `TRNA_45_GUANINE_45_N7_45_45_METHYLTRANSFERASE_45_RXN`).

$$\frac{d}{dt} _124_tRNAs_45_with_45_N7_45_methyl_45_guanine_124_ = v_{281} \quad (701)$$

6.30. Species `_124_General_45_rRNA_45_Substrates_124_`

Name an rRNA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RRNA_45_ADENINE_45_N6_45_45_METHYLTRANSFERASE_45_RXN`).

$$\frac{d}{dt} _124_General_45_rRNA_45_Substrates_124_ = -v_{24} \quad (702)$$

6.31. Species `S_45_ADENOSYLMETHIONINAMINE`

Name S-adenosyl-L-methioninamine

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `RXN0_45_5217`, `SPERMIDINESYN_45_RXN` and as a product in `SAMDECARB_45_RXN`).

$$\frac{d}{dt} S_45_ADENOSYLMETHIONINAMINE = v_{328} - v_{70} - v_{268} \quad (703)$$

6.32. Species `__124__Protein__45__6__45__N__45__lipoyl__45__lysine__124__`

Name a protein 6-N-(lipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a product in `__2__46__8__46__1__46__8__45__-__RXN__`).

$$\frac{d}{dt} \text{__124__Protein__45__6__45__N__45__lipoyl__45__lysine__124__} = v_{42} \quad (704)$$

6.33. Species ARG

Name L-arginine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `ARGININE__45__45__TRNA__45__-__LIGASE__45__RXN` and as a product in `ARGSUCCINLYA__45__RXN`).

$$\frac{d}{dt} \text{ARG} = v_{148} - v_{101} \quad (705)$$

6.34. Species `__124__DNA__45__containing__45__abasic__45__Sites__124__`

Name a DNA containing abasic site

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `__4__46__2__46__99__46__18__45__-__RXN__`).

$$\frac{d}{dt} \text{__124__DNA__45__containing__45__abasic__45__Sites__124__} = -v_{170} \quad (706)$$

6.35. Species PROTOHEME

Name protoheme IX

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `HEMEOSYN__45__RXN`).

$$\frac{d}{dt} \text{PROTOHEME} = -v_{163} \quad (707)$$

6.36. Species FORMALDEHYDE

Name formaldehyde

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__2881](#)).

$$\frac{d}{dt}\text{FORMALDEHYDE} = -v_{198} \quad (708)$$

6.37. Species N__45__SUCCINYL__45__2__45__AMINO__45__6__45__KETOPIMELATE

Name N-succinyl-2-amino-6-ketopimelate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [SUCCINYLDIAMINOPIMTRANS__45__RXN](#) and as a product in [TETHYDPICSUCC__45__RXN](#)).

$$\frac{d}{dt}\text{N__45__SUCCINYL__45__2__45__AMINO__45__6__45__KETOPIMELATE} = v_{183} - v_{272} \quad (709)$$

6.38. Species

[BETA__45__HYDROXY__45__CIS__45__DELTA5__45__DODECENOYL__45__ACP](#)

Name β-hydroxy-cis-Δ5-dodecenoyl-ACP

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__2142](#)).

$$\frac{d}{dt}\text{BETA__45__HYDROXY__45__CIS__45__DELTA5__45__DODECENOYL__45__ACP} = v_{207} \quad (710)$$

6.39. Species IMP

Name inosine-5'-phosphate

Initial amount 0 mol

This species takes part in five reactions (as a reactant in [GMP__45__REDUCT__45__RXN](#), [ADENYLOSUCCINATE__45__SYNTHASE__45__RXN](#) and as a product in [IMPCYCLOHYDROLASE__45__RXN](#), [HYPXPRIOSYLTRAN__45__RXN](#), [HYPOXANPRIOSYLTRAN__45__RXN](#)).

$$\frac{d}{dt}\text{IMP} = v_{80} + v_{82} + v_{239} - v_{107} - v_{201} \quad (711)$$

6.40. Species

`_124__tRNA__45__Containing__45__5MeAminoMe__45__2__45__ThioU__124__`

Name tRNA containing 5-methylaminomethyl-2-thiouridylate

Initial amount 0 mol

This species takes part in one reaction (as a product in `_2__46__1__46__1__46__61__45__-__RXN__`).

$$\frac{d}{dt} \text{_124_tRNA_45_Containing_45_5MeAminoMe_45_2_45_ThioU_124_} = v_{131} \quad (712)$$

6.41. Species

`C__45__O__45__P__32__bond__32__3__38__apos__59__32__to__32__-__AP__32__site__32__in__32__DNA__32__is__32__broken__46__32__3__38__-__apos__59__45__terminal__32__unsaturated__32__sugar__32__and__32__-__a__32__product__32__with__32__a__32__terminal__32__5__38__apos__59__-__45__phosphate`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in `_4__46__2__46__99__46__18__45__-__RXN__`).

$$\frac{d}{dt} \text{_C_45_O_45_P_32_bond_32_3_38_apos_59_32_to_32_AP_32_site_32_in_32_DNA_32_is_32_broken_46_32_3_38_-_apos_59_45_terminal_32_unsaturated_32_sugar_32_and_32_-_a_32_product_32_with_32_a_32_terminal_32_5_38_apos_59_-_45_phosphate_} = v_{170} \quad (713)$$

6.42. Species DIAMINONONANOATE

Name 7,8-diaminopelargonate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `DETHIOBIOTIN__45__SYN__45__-__RXN__` and as a product in `DAPASYN__45__RXN__`).

$$\frac{d}{dt} \text{DIAMINONONANOATE} = v_{223} - v_{209} \quad (714)$$

6.43. Species RNA

Name RNA

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [_2_46_7_46_7_46_8_45_--RXN](#), [_3_46_1_46_13_46_1_45_RXN](#) and as a product in [_2_46_7_46_7_46_8_--45_RXN](#), [_3_46_1_46_13_46_1_45_RXN](#)).

$$\frac{d}{dt}\text{RNA} = v_{266} + v_{325} - v_{266} - v_{325} \quad (715)$$

6.44. Species ACETYL_45__COA

Name acetyl-CoA

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in [PHOSACETYLTRANS_45_RXN](#), [SERINE_45_0_45_ACETTRAN_45_RXN](#), [N_45_ACETYLTRANSFER_45_RXN](#), [_2_45_ISOPROPYLMALATESYN_45_RXN](#), [_2_46_3_46_1_46_157_45_RXN](#) and as a product in [RXN0_45_1133](#), [PYRUVDEH_45_RXN](#)).

$$\frac{d}{dt}\text{ACETYL_45__COA} = v_{178} + v_{312} - v_{36} - v_{230} - v_{285} - v_{286} - v_{305} \quad (716)$$

6.45. Species _124_Charged_45__TRP_45__tRNAs_124__

Name L-tryptophanyl-tRNA^{trp}

Initial amount 0 mol

This species takes part in one reaction (as a product in [TRYPTOPHAN_45____45__TRNA_45_LIGASE_45_RXN](#)).

$$\frac{d}{dt}\text{_124_Charged_45__TRP_45__tRNAs_124__} = v_{100} \quad (717)$$

6.46. Species HIS

Name L-histidine

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [HISTIDINE_45____45__TRNA_45_LIGASE_45_RXN](#) and as a product in [HISTALDEHYD_45_RXN](#), [RXN_45_8001](#)).

$$\frac{d}{dt}\text{HIS} = v_{88} + v_{221} - v_{79} \quad (718)$$

6.47. Species MANNITOL__45__1P

Name mannitol-1-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [MANNPDEHYDROG__45__RXN](#)).

$$\frac{d}{dt}\text{MANNITOL__45__1P} = -v_{211} \quad (719)$$

6.48. Species NUC__45__5__45__PHOSPHATE

Name a nucleoside-5'-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [_3__46__1__46__13__46__1__45__-__RXN](#)).

$$\frac{d}{dt}\text{NUC__45__5__45__PHOSPHATE} = v_{325} \quad (720)$$

6.49. Species LIPOAMIDE

Name lipoamide

Initial amount 0 mol

This species takes part in one reaction (as a product in [DIHYDLIPOXN__45__RXN](#)).

$$\frac{d}{dt}\text{LIPOAMIDE} = v_{315} \quad (721)$$

6.50. Species COPROPORPHYRINOGEN_III

Name coproporphyrinogen III

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [HEMN__45__RXN](#)).

$$\frac{d}{dt}\text{COPROPORPHYRINOGEN_III} = -v_{115} \quad (722)$$

6.51. Species `--124_Lipoylated_45_domains_124--`

Name lipoylated domain

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_949](#)).

$$\frac{d}{dt} \text{--124_Lipoylated_45_domains_124--} = v_1 \quad (723)$$

6.52. Species `--124_Charged_45_ASN_45_tRNAs_124--`

Name L-asparaginyI-tRNAasn

Initial amount 0 mol

This species takes part in one reaction (as a product in [ASPARAGINE_45_45_TRNA-_45_LIGASE_45_RXN](#)).

$$\frac{d}{dt} \text{--124_Charged_45_ASN_45_tRNAs_124--} = v_{270} \quad (724)$$

6.53. Species `DNA_32_with_32_uracil_32_cleaved_32_out_32_-leaving_32_an_32_AP_32_site`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_2584](#)).

$$\frac{d}{dt} \text{DNA_32_with_32_uracil_32_cleaved_32_out_32_leaving_32_an_32_AP_32_site} = v_{335} \quad (725)$$

6.54. Species

`--124_N2_45_Methylguanine_45_containing_45_rRNAs_124--`

Name rRNA containing N2-methylguanine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RRNA_45_GUANINE_45_N2_45-_45_METHYLTRANSFERASE_45_RXN](#)).

$$\frac{d}{dt} \text{--124_N2_45_Methylguanine_45_containing_45_rRNAs_124--} = v_{97} \quad (726)$$

6.55. Species FORMYL__45__L__45__METHIONYL__45__PEPTIDE

Name formyl-L-methionyl peptide

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [_3__46__5__46__1__46__88__45__RXN](#)).

$$\frac{d}{dt}\text{FORMYL_45_L_45_METHIONYL_45_PEPTIDE} = -v_{267} \quad (727)$$

6.56. Species L__45__ASPARTATE

Name L-aspartate

Initial amount 0 mol

This species takes part in six reactions (as a reactant in [RXN__45__10](#), [ARGSUCCINSYN__45__RXN](#), [ASPARTATEKIN__45__RXN](#), [ASPCARBTRANS__45__RXN](#), [ADENYLOSUCCINATE__45__SYNTHASE__45__RXN](#), [ASPARTATE__45____45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{L_45_ASPARTATE} = -v_{31} - v_{47} - v_{85} - v_{142} - v_{201} - v_{242} \quad (728)$$

6.57. Species ASN

Name L-asparagine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ASPARAGINE__45____45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{ASN} = -v_{270} \quad (729)$$

6.58. Species UBIQUINONE__45__8

Name ubiquinone-8

Initial amount 0 mol

This species takes part in one reaction (as a product in [CYT__45__UBIQUINOL__45__OXID__45__RXN](#)).

$$\frac{d}{dt}\text{UBIQUINONE_45_8} = 2v_{212} \quad (730)$$

6.59. Species `_124_Donor_45_H2_124_`

Name a reduced electron acceptor

Initial amount 0 mol

This species takes part in two reactions (as a product in `_1_46_6_46_99_46_5_45_-RXN`, `RXN0_45_1`).

$$\frac{d}{dt} \text{_124_Donor_45_H2_124_} = v_{29} + v_{111} \quad (731)$$

6.60. Species `N_45_SUCCINYLLL_45_2_45_6_45_DIAMINOPIMELATE`

Name N-succinyl-L,L-2,6-diaminopimelate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `SUCCDIAMINOPIMDESUCC_45_-RXN` and as a product in `SUCCINYLDIAMINOPIMTRANS_45_-RXN`).

$$\frac{d}{dt} \text{N_45_SUCCINYLLL_45_2_45_6_45_DIAMINOPIMELATE} = v_{272} - v_{57} \quad (732)$$

6.61. Species `OXYGEN_45_MOLECULE`

Name oxygen

Initial amount 0 mol

This species takes part in four reactions (as a reactant in `DIHYDROOROTOX_45_-RXN`, `CYT_45_UBIQUINOL_45_OXID_45_-RXN`, `RXN0_45_5268` and as a product in `SUPEROX_45_-DISMUT_45_-RXN`).

$$\frac{d}{dt} \text{OXYGEN_45_MOLECULE} = v_{289} - v_{34} - v_{212} - v_{316} \quad (733)$$

6.62. Species `DIMETHYL_45_D_45_RIBITYL_45_LUMAZINE`

Name 6,7-dimethyl-8-(1-D-ribityl)lumazine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RIBOFLAVIN_45_-SYN_45_-RXN`).

$$\frac{d}{dt} \text{DIMETHYL_45_D_45_RIBITYL_45_LUMAZINE} = -2v_{120} \quad (734)$$

6.63. Species `--124--TRP--45--tRNAs--124--`

Name tRNA^{trp}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `TRYPTOPHAN--45--45--TRNA--45--LIGASE--45--RXN`).

$$\frac{d}{dt} \text{--124--TRP--45--tRNAs--124--} = -v_{100} \quad (735)$$

6.64. Species `--124--PHE--45--tRNAs--124--`

Name tRNA^{phe}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `PHENYLALANINE--45--45--TRNA--45--LIGASE--45--RXN`).

$$\frac{d}{dt} \text{--124--PHE--45--tRNAs--124--} = -v_{63} \quad (736)$$

6.65. Species `--1--45--L--45--MYO--45--INOSITOL--45--1--45--P`

Name D-myo-inositol (3)-monophosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `MYO--45--INOSITOL--45--10R--45--4--45--MONOPHOSPHATASE--45--RXN`).

$$\frac{d}{dt} \text{--1--45--L--45--MYO--45--INOSITOL--45--1--45--P} = -v_{130} \quad (737)$$

6.66. Species `--124--Ribonucleoside--45--Diphosphates--124--`

Name a ribonucleoside diphosphate

Initial amount 0 mol

This species takes part in two reactions (as a product in `RIBONUCLEOSIDE--45--DIP--45--REDUCTI--45--RXN`, `RXN0--45--1`).

$$\frac{d}{dt} \text{--124--Ribonucleoside--45--Diphosphates--124--} = v_{109} + v_{111} \quad (738)$$

6.67. Species

[_124_Protein_45_N_45_6_45_octanoyl_45_lysines_124_](#)

Name a protein-N-6-octanoyl-lysine

Initial amount 0 mol

This species takes part in one reaction (as a product in [_2_46_3_46_1_46_181_45_-RXN](#)).

$$\frac{d}{dt} \text{_124_Protein_45_N_45_6_45_octanoyl_45_lysines_124_} = v_{17} \quad (739)$$

6.68. Species DEOXYADENOSINE

Name deoxyadenosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DEOXYADENPHOSPHOR_45_RXN](#)).

$$\frac{d}{dt} \text{DEOXYADENOSINE} = -v_3 \quad (740)$$

6.69. Species FE_43_2

Name Fe2+

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [SIROHEME_45_FERROCHELAT_45_RXN](#)).

$$\frac{d}{dt} \text{FE_43_2} = -v_{32} \quad (741)$$

6.70. Species [_124_b_45_Hydroxy_45_cis_45_D5_45_dodecenoyl_45_-ACPs_124_](#)

Name a β-hydroxy cis Δ5-dodecenoyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_2142](#)).

$$\frac{d}{dt} \text{_124_b_45_Hydroxy_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_} = v_{207} \quad (742)$$

6.71. Species `--124--UDP--45--N--45--acetylmuramoyl--45--Tripeptide--124--`

Name a UDP-N-acetylmuramoyl-tripeptide

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN--45--8973](#) and as a product in [RXN--45--8972](#)).

$$\frac{d}{dt} \text{--124--UDP--45--N--45--acetylmuramoyl--45--Tripeptide--124--} = v_{259} - v_{263} \quad (743)$$

6.72. Species PHE

Name L-phenylalanine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [PHENYLALANINE--45----45--TRNA--45--LIGASE--45--RXN](#)).

$$\frac{d}{dt} \text{PHE} = -v_{63} \quad (744)$$

6.73. Species `--124--Leader--45--Sequences--124--`

Name a leader sequence

Initial amount 0 mol

This species takes part in one reaction (as a product in [_3--46--4--46--21--46--89--45--RXN](#)).

$$\frac{d}{dt} \text{--124--Leader--45--Sequences--124--} = v_{41} \quad (745)$$

6.74. Species `D--45--RIBULOSE--45--1--45--P`

Name D-ribulose-1-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN--45--8442](#)).

$$\frac{d}{dt} \text{D--45--RIBULOSE--45--1--45--P} = -v_{147} \quad (746)$$

6.75. Species DEHYDROQUINATE

Name 3-dehydroquininate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_3_45_DEHYDROQUINATE_45_DEHYDRATASE_45_RXN](#) and as a product in [_3_45_DEHYDROQUINATE_45_SYNTHASE_45_RXN](#)).

$$\frac{d}{dt}\text{DEHYDROQUINATE} = v_{113} - v_{30} \quad (747)$$

6.76. Species ATP

Name ATP

Initial amount 0 mol

This species takes part in 74 reactions (as a reactant in DEPHOSPHOCOAKIN_45_RXN, DIHYDROFOLATESYNTH_45_RXN, GLYCINE_45_45_TRNA_45_LIGASE_45_RXN, RIBOFLAVINKIN_45_RXN, RXN_45_10, PANTEPADENYLYLTRAN_45_RXN, THREONINE_45_45_TRNA_45_LIGASE_45_RXN, ARGSUCCINSYN_45_RXN, RXN_45_6102, ATPPHOSPHORIBOSYLTRANS_45_RXN, FADSYN_45_RXN, PHENYLALANINE_45_45_TRNA_45_LIGASE_45_RXN, VALINE_45_45_TRNA_45_LIGASE_45_RXN, GLUTAMINE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2023, HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN, UMPKI_45_RXN, ASPARTATEKIN_45_RXN, S_45_ADENMETSYN_45_RXN, NAD_45_SYNTH_45_NH3_45_RXN, GLUTATHIONE_45_SYN_45_RXN, ADENYLYLSULFKIN_45_RXN, UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN, TRYPTOPHAN_45_45_TRNA_45_LIGASE_45_RXN, ARGININE_45_45_TRNA_45_LIGASE_45_RXN, TRNA_45_ADENYLYLTRANSFERASE_45_RXN, GLURS_45_RXN, ISOLEUCINE_45_45_TRNA_45_LIGASE_45_RXN, METHIONINE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2921, _6_46_3_46_2_46_10_45_RXN, ACETATEKIN_45_RXN, DTMPKI_45_RXN, THI_45_P_45_KIN_45_RXN, UDP_45_NACMURALGLDAPLIG_45_RXN, ADENYL_45_KIN_45_RXN, CARBPSYN_45_RXN, SERINE_45_45_TRNA_45_LIGASE_45_RXN, GLUTCYSLIG_45_RXN, ACETYLGLUTKIN_45_RXN, CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN, ALANINE_45_45_TRNA_45_LIGASE_45_RXN, TYROSINE_45_45_TRNA_45_LIGASE_45_RXN, RXN_45_7958, DETHIOBIOTIN_45_SYN_45_RXN, PRPPSYN_45_RXN, PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN, RXN_45_3742, SHIKIMATE_45_KINASE_45_RXN, PHOSGLYPHOS_45_RXN, PROLINE_45_45_TRNA_45_LIGASE_45_RXN, ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2161, GMKALT_45_RXN, CTPSYN_45_RXN, NAD_45_SYNTH_45_GLN_45_RXN, FORMYLTHFGLUSYNTH_45_RXN, NAD_45_KIN_45_RXN, RXN_45_8972, UDP_45_NACMURALGLDAPAALIG_45_RXN, GUANYL_45_KIN_45_RXN, RXN_45_8973, ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN, HOMOSERKIN_45_RXN, NICONUCADENYLYLTRAN_45_RXN, SULFATE_45_ADENYLYLTRANS_45_RXN, _6PFRUCTPHOS_45_RXN, FOLYLPOLYGLUTAMATESYNTH_45_RXN, LEUCINE_45_45_TRNA_45_LIGASE_45_RXN, _2_46_7_46_1_46_148_45_RXN, LYSINE_45_45_45_RXN, RXNO_45_2023, HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN, UMPKI_45_RXN, ASPARTATEKIN_45_RXN, S_45_ADENMETSYN_45_RXN, NAD_45_SYNTH_45_NH3_45_RXN, GLUTATHIONE_45_SYN_45_RXN, ADENYLYLSULFKIN_45_RXN, UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN, TRYPTOPHAN_45_45_TRNA_45_LIGASE_45_RXN, ARGININE_45_45_TRNA_45_LIGASE_45_RXN, TRNA_45_ADENYLYLTRANSFERASE_45_RXN, GLURS_45_RXN, ISOLEUCINE_45_45_TRNA_45_LIGASE_45_RXN, METHIONINE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2921, _6_46_3_46_2_46_10_45_RXN, ACETATEKIN_45_RXN, DTMPKI_45_RXN, THI_45_P_45_KIN_45_RXN, UDP_45_NACMURALGLDAPLIG_45_RXN, ADENYL_45_KIN_45_RXN, CARBPSYN_45_RXN, SERINE_45_45_TRNA_45_LIGASE_45_RXN, GLUTCYSLIG_45_RXN, ACETYLGLUTKIN_45_RXN, CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN, ALANINE_45_45_TRNA_45_LIGASE_45_RXN, TYROSINE_45_45_TRNA_45_LIGASE_45_RXN, RXN_45_7958, DETHIOBIOTIN_45_SYN_45_RXN, PRPPSYN_45_RXN, PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN, RXN_45_3742, SHIKIMATE_45_KINASE_45_RXN, PHOSGLYPHOS_45_RXN, PROLINE_45_45_TRNA_45_LIGASE_45_RXN, ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2161, GMKALT_45_RXN, CTPSYN_45_RXN, NAD_45_SYNTH_45_GLN_45_RXN, FORMYLTHFGLUSYNTH_45_RXN, NAD_45_KIN_45_RXN, RXN_45_8972, UDP_45_NACMURALGLDAPAALIG_45_RXN, GUANYL_45_KIN_45_RXN, RXN_45_8973, ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN, HOMOSERKIN_45_RXN, NICONUCADENYLYLTRAN_45_RXN, SULFATE_45_ADENYLYLTRANS_45_RXN, _6PFRUCTPHOS_45_RXN, FOLYLPOLYGLUTAMATESYNTH_45_RXN, LEUCINE_45_45_TRNA_45_LIGASE_45_RXN, _2_46_7_46_1_46_148_45_RXN, LYSINE_45_45_45_RXN, RXNO_45_2023, HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN, UMPKI_45_RXN, ASPARTATEKIN_45_RXN, S_45_ADENMETSYN_45_RXN, NAD_45_SYNTH_45_NH3_45_RXN, GLUTATHIONE_45_SYN_45_RXN, ADENYLYLSULFKIN_45_RXN, UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN, TRYPTOPHAN_45_45_TRNA_45_LIGASE_45_RXN, ARGININE_45_45_TRNA_45_LIGASE_45_RXN, TRNA_45_ADENYLYLTRANSFERASE_45_RXN, GLURS_45_RXN, ISOLEUCINE_45_45_TRNA_45_LIGASE_45_RXN, METHIONINE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2921, _6_46_3_46_2_46_10_45_RXN, ACETATEKIN_45_RXN, DTMPKI_45_RXN, THI_45_P_45_KIN_45_RXN, UDP_45_NACMURALGLDAPLIG_45_RXN, ADENYL_45_KIN_45_RXN, CARBPSYN_45_RXN, SERINE_45_45_TRNA_45_LIGASE_45_RXN, GLUTCYSLIG_45_RXN, ACETYLGLUTKIN_45_RXN, CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN, ALANINE_45_45_TRNA_45_LIGASE_45_RXN, TYROSINE_45_45_TRNA_45_LIGASE_45_RXN, RXN_45_7958, DETHIOBIOTIN_45_SYN_45_RXN, PRPPSYN_45_RXN, PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN, RXN_45_3742, SHIKIMATE_45_KINASE_45_RXN, PHOSGLYPHOS_45_RXN, PROLINE_45_45_TRNA_45_LIGASE_45_RXN, ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2161, GMKALT_45_RXN, CTPSYN_45_RXN, NAD_45_SYNTH_45_GLN_45_RXN, FORMYLTHFGLUSYNTH_45_RXN, NAD_45_KIN_45_RXN, RXN_45_8972, UDP_45_NACMURALGLDAPAALIG_45_RXN, GUANYL_45_KIN_45_RXN, RXN_45_8973, ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN, HOMOSERKIN_45_RXN, NICONUCADENYLYLTRAN_45_RXN, SULFATE_45_ADENYLYLTRANS_45_RXN, _6PFRUCTPHOS_45_RXN, FOLYLPOLYGLUTAMATESYNTH_45_RXN, LEUCINE_45_45_TRNA_45_LIGASE_45_RXN, _2_46_7_46_1_46_148_45_RXN, LYSINE_45_45_45_RXN, RXNO_45_2023, HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN, UMPKI_45_RXN, ASPARTATEKIN_45_RXN, S_45_ADENMETSYN_45_RXN, NAD_45_SYNTH_45_NH3_45_RXN, GLUTATHIONE_45_SYN_45_RXN, ADENYLYLSULFKIN_45_RXN, UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN, TRYPTOPHAN_45_45_TRNA_45_LIGASE_45_RXN, ARGININE_45_45_TRNA_45_LIGASE_45_RXN, TRNA_45_ADENYLYLTRANSFERASE_45_RXN, GLURS_45_RXN, ISOLEUCINE_45_45_TRNA_45_LIGASE_45_RXN, METHIONINE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2921, _6_46_3_46_2_46_10_45_RXN, ACETATEKIN_45_RXN, DTMPKI_45_RXN, THI_45_P_45_KIN_45_RXN, UDP_45_NACMURALGLDAPLIG_45_RXN, ADENYL_45_KIN_45_RXN, CARBPSYN_45_RXN, SERINE_45_45_TRNA_45_LIGASE_45_RXN, GLUTCYSLIG_45_RXN, ACETYLGLUTKIN_45_RXN, CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN, ALANINE_45_45_TRNA_45_LIGASE_45_RXN, TYROSINE_45_45_TRNA_45_LIGASE_45_RXN, RXN_45_7958, DETHIOBIOTIN_45_SYN_45_RXN, PRPPSYN_45_RXN, PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN, RXN_45_3742, SHIKIMATE_45_KINASE_45_RXN, PHOSGLYPHOS_45_RXN, PROLINE_45_45_TRNA_45_LIGASE_45_RXN, ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN, RXNO_45_2161, GMKALT_45_RXN, CTPSYN_45_RXN, NAD_45_SYNTH_45_GLN_45_RXN, FORMYLTHFGLUSYNTH_45_RXN, NAD_45_KIN_45_RXN, RXN_45_8972, UDP_45_NACMURALGLDAPAALIG_45_RXN, GUANYL_45_KIN_45_RXN, RXN_45_8973, ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN, HOMOSERKIN_45_RXN, NICONUCADENYLYLTRAN_45_RXN, SULFATE_45_ADENYLYLTRANS_45_RXN, _6PFRUCTPHOS_45_RXN, FOLYLPOLYGLUTAMATESYNTH_45_RXN, LEUCINE_45_45_TRNA_45_LIGASE_45_RXN, _2_46_7_46_1_46_148_45_RXN, LYSINE_45_45_45_RXN, RXNO_45_2023, HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN, UMPKI_45_RXN, ASPARTATEKIN_45_RXN, S_45_ADENMETSYN_45_RXN, NAD_45_SYNTH_45_NH3_45_RXN, GLUTATHIONE_45_SYN_45_RXN, ADENYLYLSULFKIN_45_RXN, UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN

[_45__TRNA__45__LIGASE__45__RXN](#), [UDP__45__NACMUR__45__ALA__45__LIG__45__RXN](#) and as a product in [PROPKIN__45__RXN](#), [PEPDEPHOS__45__RXN](#)).

$$\begin{aligned} \frac{d}{dt}\text{ATP} = & v_{37} + v_{68} - v_{10} - v_{14} - v_{26} - v_{28} - v_{31} - v_{39} - v_{40} - v_{47} - v_{51} - v_{59} - v_{61} - v_{63} \\ & - v_{65} - v_{71} - v_{74} - v_{79} - v_{84} - v_{85} - v_{87} - v_{89} - v_{90} - v_{92} - v_{94} - v_{100} - v_{101} \\ & - v_{102} - v_{105} - v_{125} - v_{126} - v_{127} - v_{128} - v_{133} - v_{137} - v_{138} - v_{150} - v_{154} - 2v_{158} \\ & - v_{162} - v_{164} - v_{167} - v_{171} - v_{176} - v_{180} - v_{195} - v_{209} - v_{217} - v_{222} - v_{233} - v_{235} \\ & - v_{240} - v_{241} - v_{242} - v_{244} - v_{246} - v_{247} - v_{253} - v_{256} - v_{257} - v_{259} - v_{260} - v_{262} \\ & - v_{263} - v_{270} - v_{275} - v_{287} - v_{294} - v_{303} - v_{313} - v_{314} - v_{327} - v_{329} - v_{336} \end{aligned} \quad (748)$$

6.77. Species [LL__45__DIAMINOPIMELATE](#)

Name L,L-diaminopimelate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DIAMINOPIMEPIM__45__RXN](#) and as a product in [SUCCDIAMINOPIMDESUCC__45__RXN](#)).

$$\frac{d}{dt}\text{LL__45__DIAMINOPIMELATE} = v_{57} - v_{290} \quad (749)$$

6.78. Species [RIBOSE__45__5P](#)

Name D-ribose-5-phosphate

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [PRPPSYN__45__RXN](#), [RIB5PISOM__45__RXN](#), [_1TRANSKETO__45__RXN](#) and as a product in [PPENTOMUT__45__RXN](#)).

$$\frac{d}{dt}\text{RIBOSE__45__5P} = v_{156} - v_{217} - v_{226} - v_{255} \quad (750)$$

6.79. Species [S__32__rRNA__32__containing__32__N2__45__methyluridine](#)

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__3161](#)).

$$\frac{d}{dt}\text{S__32__rRNA__32__containing__32__N2__45__methyluridine} = v_{234} \quad (751)$$

6.80. Species `_124__tRNA__45__Containing__45__Queueine__124__`

Name tRNA containing queueine

Initial amount 0 mol

This species takes part in one reaction (as a product in `QUEUOSINE__45__TRNA__45__-__RIBOSYLTRANSFERASE__45__RXN`).

$$\frac{d}{dt} \text{_124_tRNA_45_Containing_45_Queueine_124_} = v_{54} \quad (752)$$

6.81. Species `D__45__ERYTHRO__45__IMIDAZOLE__45__GLYCEROL__45__P`

Name D-erythro-imidazole-glycerol-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `IMIDPHOSDEHYD__45__RXN` and as a product in `GLUTAMIDOTRANS__45__RXN`).

$$\frac{d}{dt} \text{D_45_ERYTHRO_45_IMIDAZOLE_45_GLYCEROL_45_P} = v_{112} - v_{213} \quad (753)$$

6.82. Species `PHOSPHORIBOSYL__45__FORMIMINO__45__AICAR__45__P`

Name phosphoribosylformiminoAICAR-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `PRIBFAICARPISOM__45__RXN` and as a product in `HISTCYCLOHYD__45__RXN`).

$$\frac{d}{dt} \text{PHOSPHORIBOSYL_45_FORMIMINO_45_AICAR_45_P} = v_{334} - v_{301} \quad (754)$$

6.83. Species `DI__45__H__45__OROTATE`

Name dihydroorotate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `DIHYDROOROTOX__45__RXN` and as a product in `DIHYDROOROT__45__RXN`).

$$\frac{d}{dt} \text{DI_45_H_45_OROTATE} = v_{76} - v_{34} \quad (755)$$

6.84. Species `--124--DNA--45--Cyclobuta--45--Dipyrimidines--124--`

Name a DNA cyclobutadipyrimidine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DEOXYRIBODIPYRIMIDINE--45--PHOTOLYASE--45--RXN](#)).

$$\frac{d}{dt} \text{--124--DNA--45--Cyclobuta--45--Dipyrimidines--124--} = -v_{218} \quad (756)$$

6.85. Species NAD

Name NAD+

Initial amount 0 mol

This species takes part in 24 reactions (as a reactant in [DIMETHUROPORDEHYDROG--45--RXN](#), [HISTALDEHYD--45--RXN](#), [RXN--45--8629](#), [3--45--ISOPROPYLMALDEHYDROG--45--RXN](#), [RXN0--45--1132](#), [MANNPDEHYDROG--45--RXN](#), [RXN--45--8001](#), [RXN--45--3341](#), [HISTOLDEHYD--45--RXN](#), [NAD--45--KIN--45--RXN](#), [RXN--45--7719](#), [RXN--45--7716](#), [1--46--8--46--1--46--4--45--RXN](#), [DNA--45--LIGASE--45--NAD--43--45--RXN](#), [PYRUVDEH--45--RXN](#), [DIHYDLIPOXN--45--RXN](#), [20XOGLUTARATEDEH--45--RXN](#), [GAPOXNPHOSPHN--45--RXN](#) and as a product in [1--46--6--46--99--46--5--45--RXN](#), [NADH--45--DEHYDROGENASE--45--QUINONE--45--RXN](#), [NAD--45--SYNTH--45--NH3--45--RXN](#), [NADH--45--DEHYDROG--45--A--45--RXN](#), [ENOYL--45--ACP--45--REDUCT--45--NADH--45--RXN](#), [NAD--45--SYNTH--45--GLN--45--RXN](#)).

$$\begin{aligned} \frac{d}{dt} \text{NAD} = & v_{29} + 2v_{73} + v_{89} + v_{95} + v_{103} + v_{253} - v_{69} - v_{88} - v_{119} - v_{161} - v_{179} - v_{211} \\ & - 2v_{221} - v_{229} - v_{231} - v_{257} - v_{278} - v_{280} - v_{292} - v_{296} - v_{312} - v_{315} - v_{317} - v_{332} \end{aligned} \quad (757)$$

6.86. Species `--124--LYS--45--tRNAs--124--`

Name tRNA_{lys}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [LYSINE--45--45--TRNA--45--LIGASE--45--RXN](#)).

$$\frac{d}{dt} \text{--124--LYS--45--tRNAs--124--} = -v_{329} \quad (758)$$

6.87. Species NADH_45_P_45_OR_45_NOP

Name NAD(P)H

Initial amount 0 mol

This species takes part in eight reactions (as a reactant in [_1_46_5_46_1_46_20_45_RXN](#), [HOMOSERDEHYDROG_45_RXN](#), [DIHYDROPICRED_45_RXN](#), [FMNREDUCT_45_RXN](#), [ISPH2_45_RXN](#), [RXN0_45_884](#) and as a product in [_1_46_17_46_1_46_2_45_RXN](#), [_6PGLUCONDEHYDROG_45_RXN](#)).

$$\frac{d}{dt}\text{NADH}_45_P_45_OR_45_NOP = v_{173} + v_{245} - v_{33} - v_{93} - v_{121} - v_{134} - v_{307} - v_{321} \quad (759)$$

6.88. Species _124_Oxidized_45_ferredoxins_124_

Name an oxidized ferredoxin

Initial amount 0 mol

This species takes part in one reaction (as a product in [_1_46_18_46_1_46_2_45_RXN](#)).

$$\frac{d}{dt}\text{_124_Oxidized_45_ferredoxins_124_} = v_{206} \quad (760)$$

6.89. Species D_45_LACTATE

Name D-lactate

Initial amount 0 mol

This species takes part in one reaction (as a product in [GLYOXII_45_RXN](#)).

$$\frac{d}{dt}\text{D}_45_LACTATE = v_{155} \quad (761)$$

6.90. Species PHOSPHORIBOSYL_45_ATP

Name phosphoribosyl-ATP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [HISTPRATPHYD_45_RXN](#) and as a product in [ATPPHOSPHORIBOSYLTRANS_45_RXN](#)).

$$\frac{d}{dt}\text{PHOSPHORIBOSYL}_45_ATP = v_{59} - v_{203} \quad (762)$$

6.91. Species CPD__45__8199

Name a mismatched DNA base pair

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN0__45__2625).

$$\frac{d}{dt} \text{CPD_45_8199} = -v_{110} \quad (763)$$

6.92. Species __124__ASP__45__tRNAs__124__

Name tRNAasp

Initial amount 0 mol

This species takes part in one reaction (as a reactant in ASPARTATE__45__45__TRNA__45__LIGASE__45__RXN).

$$\frac{d}{dt} \text{__124__ASP_45_tRNAs_124__} = -v_{242} \quad (764)$$

6.93. Species UDP__45__AA__45__GLUTAMATE

Name UDP-N-acetylmuramoyl-L-alanyl-D-glutamate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in UDP__45__NACMURALGLDAPLIG__45__RXN, RXN__45__8972 and as a product in UDP__45__NACMURALA__45__GLU__45__LIG__45__RXN).

$$\frac{d}{dt} \text{UDP_45_AA_45_GLUTAMATE} = v_{94} - v_{150} - v_{259} \quad (765)$$

6.94. Species RNA__45__N

Name RNA

Initial amount 0 mol

This species takes part in two reactions (as a reactant in DNA__45__DIRECTED__45__RNA__45__POLYMERASE__45__RXN and as a product in DNA__45__DIRECTED__45__RNA__45__POLYMERASE__45__RXN).

$$\frac{d}{dt} \text{RNA_45_N} = v_{98} - v_{98} \quad (766)$$

6.95. Species CANAVANINE

Name canavanine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN_45_22](#)).

$$\frac{d}{dt}\text{CANAVANINE} = v_4 \quad (767)$$

6.96. Species RIBOSE_45_1_45_ARSENATE

Name ribose-1-arsenate

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN_45_7001](#)).

$$\frac{d}{dt}\text{RIBOSE_45_1_45_ARSENATE} = v_{258} \quad (768)$$

6.97. Species _124_Charged_45_PHE_45_tRNAs_124_

Name L-phenylalanyl-tRNAphe

Initial amount 0 mol

This species takes part in one reaction (as a product in [PHENYLALANINE_45_45_TRNA-_45_LIGASE_45_RXN](#)).

$$\frac{d}{dt}\text{_124_Charged_45_PHE_45_tRNAs_124_} = v_{63} \quad (769)$$

6.98. Species _124_L_45_methionyl_45_tRNAfmet_124_

Name L-methionyl-tRNAfmet

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [METHIONYL_45_TRNA_45-_FORMYLTRANSFERASE_45_RXN](#)).

$$\frac{d}{dt}\text{_124_L_45_methionyl_45_tRNAfmet_124_} = -v_{199} \quad (770)$$

6.99. Species SUC

Name succinate

Initial amount 0 mol

This species takes part in one reaction (as a product in [SUCCDIAMINOPIMDESUCC__45__RXN](#)).

$$\frac{d}{dt}\text{SUC} = v_{57} \quad (771)$$

6.100. Species TYR

Name L-tyrosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [TYROSINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{TYR} = -v_{180} \quad (772)$$

6.101. Species ARSENATE

Name arsenate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__7001](#)).

$$\frac{d}{dt}\text{ARSENATE} = -v_{258} \quad (773)$$

6.102. Species HOMO__45__CYS

Name L-homocysteine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [HOMOCYSMET__45__RXN](#)).

$$\frac{d}{dt}\text{HOMO__45__CYS} = -v_{15} \quad (774)$$

6.103. Species CPD__45__249

Name a sulfur donor

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN__45__5984, _2__46__8__46__1__46__6__45__RXN).

$$\frac{d}{dt}\text{CPD__45__249} = -v_{197} - v_{228} \quad (775)$$

6.104. Species

_3__45__DEOXY__45__D__45__ARABINO__45__HEPTULOSONATE__45__7__45__P

Name 3-deoxy-D-arabino-heptulosonate-7-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in _3__45__DEHYDROQUINATE__45__SYNTHASE__45__RXN and as a product in DAHPSYN__45__RXN).

$$\frac{d}{dt}\text{_3__45__DEOXY__45__D__45__ARABINO__45__HEPTULOSONATE__45__7__45__P} = v_{200} - v_{113} \quad (776)$$

6.105. Species LYS

Name L-lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in LYSINE__45__45__TRNA__45__LIGASE__45__RXN and as a product in DIAMINOPIMDECARB__45__RXN).

$$\frac{d}{dt}\text{LYS} = v_{216} - v_{329} \quad (777)$$

6.106. Species __124__Reduced__45__flavodoxins__124__

Name a reduced flavodoxin

Initial amount 0 mol

This species takes part in one reaction (as a reactant in FLAVONADPREDUCT__45__RXN).

$$\frac{d}{dt}\text{__124__Reduced__45__flavodoxins__124__} = -v_{182} \quad (778)$$

6.107. Species ADENYLOSUCC

Name adenylo-succinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [AMPSYN__45__RXN](#) and as a product in [ADENYLOSUCCINATE__45__SYNTHASE__45__RXN](#)).

$$\frac{d}{dt}\text{ADENYLOSUCC} = v_{201} - v_{174} \quad (779)$$

6.108. Species DGMP

Name dGMP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [GMKALT__45__RXN](#) and as a product in [RXNO__45__385](#)).

$$\frac{d}{dt}\text{DGMP} = v_{219} - v_{246} \quad (780)$$

6.109. Species CPD__45__1301

Name tetrahydropteroyltri-L-glutamate

Initial amount 0 mol

This species takes part in one reaction (as a product in [HOMOCYSMET__45__RXN](#)).

$$\frac{d}{dt}\text{CPD__45__1301} = v_{15} \quad (781)$$

6.110. Species __124__Charged__45__ARG__45__tRNAs__124__

Name L-arginyl-tRNAarg

Initial amount 0 mol

This species takes part in one reaction (as a product in [ARGININE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Charged__45__ARG__45__tRNAs__124__} = v_{101} \quad (782)$$

6.111. Species CPD__45__1302

Name 5-methyltetrahydropteroyltri-L-glutamate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [HOMOCYSMET__45__RXN](#)).

$$\frac{d}{dt}\text{CPD_45_1302} = -v_{15} \quad (783)$$

6.112. Species PYRIDOXAL_PHOSPHATE

Name pyridoxal 5'-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__5240](#)).

$$\frac{d}{dt}\text{PYRIDOXAL_PHOSPHATE} = -v_{271} \quad (784)$$

6.113. Species DUMP

Name dUMP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [THYMIDYLATESYN__45__RXN](#) and as a product in [DUTP__45__PYROP__45__RXN](#)).

$$\frac{d}{dt}\text{DUMP} = v_{194} - v_{99} \quad (785)$$

6.114. Species __124__Protein__45__Histidines__124__

Name a protein histidine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [_2__46__7__46__3__46__9__45__-__RXN](#) and as a product in [LACTOSEPHOSPHO__45__RXN](#), [_2__46__7__46__1__46__69__45__RXN](#), [FRUCTOSEPHOSPHO__45__RXN](#)).

$$\frac{d}{dt}\text{_124_Protein_45_Histidines_124_} = v_{66} + v_{106} + v_{326} - v_{172} \quad (786)$$

6.115. Species NAD__45__P__45__OR__45__NOP

Name NAD(P)+

Initial amount 0 mol

This species takes part in eight reactions (as a reactant in [_1__46__17__46__1__46__2__45__RXN](#), [_6PGLUCONDEHYDROG__45__RXN](#) and as a product in [_1__46__5__46__1__46__20__45__RXN](#), [HOMOSERDEHYDROG__45__RXN](#), [DIHYDROPICREG__45__RXN](#), [FMNREDUCT__45__RXN](#), [ISPH2__45__RXN](#), [RXN0__45__884](#)).

$$\frac{d}{dt}\text{NAD__45__P__45__OR__45__NOP} = v_{33} + v_{93} + v_{121} + v_{134} + v_{307} + v_{321} - v_{173} - v_{245} \quad (787)$$

6.116. Species _4__45__CYTIDINE__45__5__45__DIPHOSPHO__45__2__45__C

Name 4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_2__46__7__46__1__46__148__45__RXN](#) and as a product in [_2__46__7__46__7__46__60__45__RXN](#)).

$$\frac{d}{dt}\text{_4__45__CYTIDINE__45__5__45__DIPHOSPHO__45__2__45__C} = v_{187} - v_{327} \quad (788)$$

6.117. Species E__45__4__45__HYDROXY__45__3__45__METHYLBUT__45__2__45__EN__45__1__45__YL__45__DIPH

Name (E)-4-hydroxy-3-methylbut 2-en-1-yl diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [_1__46__17__46__1__46__2__45__RXN](#)).

$$\frac{d}{dt}\text{E__45__4__45__HYDROXY__45__3__45__METHYLBUT__45__2__45__EN__45__1__45__YL__45__DIPH} = v_{173} \quad (789)$$

6.118. Species __124__Unsulfurated__45__Sulfur__45__Acceptors__124__

Name an unsulfurated sulfur acceptor

Initial amount 0 mol

This species takes part in two reactions (as a product in [RXN__45__5984](#), [_2__46__8__46__1__46__6__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Unsulfurated__45__Sulfur__45__Acceptors__124__} = v_{197} + v_{228} \quad (790)$$

6.119. Species HYDROXY_45_METHYL_45_BUTENYL_45_DIP

Name 1-hydroxy-2-methyl-2-(E)-butenyl 4-diphosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in ISPH2_45_RXN, RXN0_45_884 and as a product in RXN0_45_882).

$$\frac{d}{dt}\text{HYDROXY_45_METHYL_45_BUTENYL_45_DIP} = v_{323} - v_{307} - v_{321} \quad (791)$$

6.120. Species _124_Cis_45_delta_45_3_45_decenoyl_45_ACPs_124_

Name a cis-Δ3-decenoyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN0_45_2141).

$$\frac{d}{dt}\text{_124_Cis_45_delta_45_3_45_decenoyl_45_ACPs_124_} = -v_{205} \quad (792)$$

6.121. Species _124_Amino_45_Acids_45_20_124_

Name a standard α amino acid

Initial amount 0 mol

This species takes part in one reaction (as a product in _3_46_4_46_11_46_1_45_-RXN).

$$\frac{d}{dt}\text{_124_Amino_45_Acids_45_20_124_} = v_{117} \quad (793)$$

6.122. Species L_45_CITRULLINE

Name citrulline

Initial amount 0 mol

This species takes part in three reactions (as a reactant in ARGSUCCINSYN_45_RXN and as a product in ORNCARBAMTRANSFER_45_RXN, RXN_45_7933).

$$\frac{d}{dt}\text{L_45_CITRULLINE} = v_{45} + v_{250} - v_{47} \quad (794)$$

6.123. Species T__45__POLY__45__C__45__UNDECAPRENYL__45__DIPHOSPHATE

Name di-trans,poly-cis-undecaprenyl diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [DECAPCISTRANSFER__45__RXN](#)).

$$\frac{d}{dt}T_45_POLY_45_C_45_UNDECAPRENYL_45_DIPHOSPHATE = v_{43} \quad (795)$$

6.124. Species __124__Non__45__lipoylated__45__domains__124__

Name a non-lipoylated apo domain

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__947](#)).

$$\frac{d}{dt}_124_Non_45_lipoylated_45_domains_124_ = -v_{13} \quad (796)$$

6.125. Species UNDECAPRENYL__45__DIPHOSPHATE

Name di-trans,poly-cis-undecaprenyl diphosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [UNDECAPRENYL__45__DIPHOSPHATASE-__45__RXN](#) and as a product in [_2__46__4__46__1__46__129__45__RXN](#)).

$$\frac{d}{dt}UNDECAPRENYL_45_DIPHOSPHATE = v_{306} - v_{269} \quad (797)$$

6.126. Species CIS__45__DELTA5__45__DODECENOYL__45__ACP

Name cis-Δ5-dodecenoyl-ACP

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__2145](#)).

$$\frac{d}{dt}CIS_45_DELTA5_45_DODECENOYL_45_ACP = v_{208} \quad (798)$$

6.127. Species ALLO__45__THR

Name allothreonine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__5234](#)).

$$\frac{d}{dt}\text{ALLO__45__THR} = -v_{261} \quad (799)$$

6.128. Species __124__BCAA__45__dehydrogenase__45__DH__45__lipoyl__124__

Name lipoamide acyltransferase N6-(dihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__7719](#)).

$$\frac{d}{dt}\text{__124__BCAA__45__dehydrogenase__45__DH__45__lipoyl__124__} = -v_{278} \quad (800)$$

6.129. Species _2__45__DEHYDROPANTOATE

Name 2-dehydropantoate

Initial amount 0 mol

This species takes part in one reaction (as a product in [_3__45__CH3__45__2__45__OXOBUTANOATE-__45__OH__45__CH3__45__XFER__45__RXN](#)).

$$\frac{d}{dt}\text{_2__45__DEHYDROPANTOATE} = v_{330} \quad (801)$$

6.130. Species UROPORPHYRINOGEN__45__III

Name uroporphyrinogen-III

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [UROPORIIIMETHYLTRANSA__45__-RXN](#)).

$$\frac{d}{dt}\text{UROPORPHYRINOGEN__45__III} = -v_{252} \quad (802)$$

6.131. Species C4

Name N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine-diphosphoundecaprenol

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN__45__8976](#) and as a product in [RXN__45__8975](#)).

$$\frac{d}{dt}C4 = v_{265} - v_{264} \quad (803)$$

6.132. Species C3

Name UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN__45__8975](#) and as a product in [_6__46__3__46__2__46__10__45__RXN](#)).

$$\frac{d}{dt}C3 = v_{128} - v_{265} \quad (804)$$

6.133. Species C6

Name N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine

Initial amount 0 mol

This species takes part in one reaction (as a product in [NACGLCTrans__45__RXN](#)).

$$\frac{d}{dt}C6 = v_{157} \quad (805)$$

6.134. Species C5

Name N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptane-D-alanyl-D-alanine-diphosphoundecaprenol

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [NACGLCTrans__45__RXN](#) and as a product in [PHOSNACMURPENTATrans__45__RXN](#)).

$$\frac{d}{dt}C5 = v_{77} - v_{157} \quad (806)$$

6.135. Species `INDOLE`

Name indole

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN0_45_2382` and as a product in `RXN0_45_2381`).

$$\frac{d}{dt}\text{INDOLE} = v_{282} - v_{304} \quad (807)$$

6.136. Species `PROPIONYL_45_P`

Name propionyl-P

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `PROPKN_45_RXN` and as a product in `RXN_45_7958`, `PTAALT_45_RXN`).

$$\frac{d}{dt}\text{PROPIONYL_45_P} = v_{195} + v_{291} - v_{37} \quad (808)$$

6.137. Species `_3OH_45_4P_45_OH_45_ALPHA_45_KETOBUTYRATE`

Name 2-oxo-3-hydroxy-4-phosphobutanoate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `PSERTRANSAMPYR_45_RXN`).

$$\frac{d}{dt}\text{_3OH_45_4P_45_OH_45_ALPHA_45_KETOBUTYRATE} = -v_{60} \quad (809)$$

6.138. Species `OH_45_ACYL_45_ACP`

Name a (3R)-3-hydroxyacyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a product in `_3_45_OXOACYL_45_ACP_45_REDUCT_45_RXN`).

$$\frac{d}{dt}\text{OH_45_ACYL_45_ACP} = v_{184} \quad (810)$$

6.139. Species [_124_ARG_45_tRNAs_124_](#)

Name tRNAarg

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ARGININE_45_45_TRNA_45-_LIGASE_45_RXN](#)).

$$\frac{d}{dt} _124_ARG_45_tRNAs_124_ = -v_{101} \quad (811)$$

6.140. Species [XANTHINE](#)

Name xanthine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [XANPRIBOSYLTRAN_45_RXN](#)).

$$\frac{d}{dt} XANTHINE = -v_{225} \quad (812)$$

6.141. Species [_124_2_45_Hydroxy_45_carboxylates_124_](#)

Name a 2-hydroxy carboxylate

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN_45_7919](#)).

$$\frac{d}{dt} _124_2_45_Hydroxy_45_carboxylates_124_ = v_{293} \quad (813)$$

6.142. Species [METHYLENE_45_THF](#)

Name 5,10-methylene-THF

Initial amount 0 mol

This species takes part in six reactions (as a reactant in [METHYLENETHFDEHYDROG_45-_NADP_45_RXN](#), [_1_46_5_46_1_46_20_45_RXN](#), [THYMIDYLATESYN_45_RXN](#), [_3_45-_CH3_45_2_45_OXOBUTANOATE_45_OH_45_CH3_45_XFER_45_RXN](#) and as a product in [GLYOHMETRANS_45_RXN](#), [RXN_45_2881](#)).

$$\frac{d}{dt} METHYLENE_45_THF = v_{165} + v_{198} - v_{19} - v_{33} - v_{99} - v_{330} \quad (814)$$

6.143. Species N_45_ALPHA_45_ACETYLORNITHINE

Name N-acetyl-L-ornithine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in ACETYLORNDEACET_45_RXN and as a product in ACETYLORNTRANSAM_45_RXN).

$$\frac{d}{dt}N_45_ALPHA_45_ACETYLORNITHINE = v_{166} - v_{251} \quad (815)$$

6.144. Species C1

Name UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptanedioate- D-alanyl-D-alanine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in PHOSNACMURPENTATrans_45_RXN and as a product in UDP_45_NACMURALGLDAPAALIG_45_RXN).

$$\frac{d}{dt}C1 = v_{260} - v_{77} \quad (816)$$

6.145. Species PHOSPHORIBULOSYL_45_FORMIMINO_45_AICAR_45_P

Name phosphoribuloseylformimino-AICAR-P

Initial amount 0 mol

This species takes part in two reactions (as a reactant in GLUTAMIDOTrans_45_RXN and as a product in PRIBFAICARPISOM_45_RXN).

$$\frac{d}{dt}PHOSPHORIBULOSYL_45_FORMIMINO_45_AICAR_45_P = v_{301} - v_{112} \quad (817)$$

6.146. Species N_45_ACETYL_45_GLUTAMYL_45_P

Name N-acetylglutamyl-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in N_45_ACETYLGLUTPREDUCT_45_RXN and as a product in ACETYLGLUTKIN_45_RXN).

$$\frac{d}{dt}N_45_ACETYL_45_GLUTAMYL_45_P = v_{167} - v_{279} \quad (818)$$

6.147. Species RIBOSE__45__1P

Name ribose-1-phosphate

Initial amount 0 mol

This species takes part in six reactions (as a reactant in PPENTOMUT__45__RXN and as a product in GUANPHOSPHOR__45__RXN, INOPHOSPHOR__45__RXN, ADENPHOSPHOR__45__RXN, PNP__45__RXN, RXNO__45__5199).

$$\frac{d}{dt}\text{RIBOSE__45__1P} = v_{25} + v_{50} + v_{64} + v_{86} + v_{181} - v_{156} \quad (819)$$

6.148. Species TRANS__45__D2__45__ENOYL__45__ACP

Name a trans-Δ2-enoyl-acyl-[acp]

Initial amount 0 mol

This species takes part in two reactions (as a reactant in ENOYL__45__ACP__45__REDUCT__45__NADH__45__RXN, ENOYL__45__ACP__45__REDUCT__45__NADPH__45__RXN).

$$\frac{d}{dt}\text{TRANS__45__D2__45__ENOYL__45__ACP} = -v_{103} - v_{210} \quad (820)$$

6.149. Species NADH

Name NADH

Initial amount 0 mol

This species takes part in 20 reactions (as a reactant in 1__46__6__46__99__46__5__45__RXN, NADH__45__DEHYDROGENASE__45__QUINONE__45__RXN, NADH__45__DEHYDROG__45__A__45__RXN, ENOYL__45__ACP__45__REDUCT__45__NADH__45__RXN and as a product in DIMETHUROPORDEHYDROG__45__RXN, HISTALDEHYD__45__RXN, RXN__45__8629, 3__45__ISOPROPYLMALDEHYDROG__45__RXN, RXNO__45__1132, MANNPDEHYDROG__45__RXN, RXN__45__8001, RXN__45__3341, HISTOLDEHYD__45__RXN, RXN__45__7719, RXN__45__7716, 1__46__8__46__1__46__4__45__RXN, PYRUVDEH__45__RXN, DIHYDLIPOXN__45__RXN, 2OXOGLUTARATEDEH__45__RXN, GAPOXNPHOSPHN__45__RXN).

$$\begin{aligned} \frac{d}{dt}\text{NADH} = & v_{69} + v_{88} + v_{119} + v_{161} + v_{179} + v_{211} + 2v_{221} + v_{229} + v_{231} + v_{278} \\ & + v_{280} + v_{292} + v_{312} + v_{315} + v_{317} + v_{332} - v_{29} - 2v_{73} - v_{95} - v_{103} \end{aligned} \quad (821)$$

6.150. Species CYS

Name L-cysteine

Initial amount 0 mol

This species takes part in five reactions (as a reactant in [RXN0_45_308](#), [RXN0_45_2023](#), [GLUTCYSLIG_45_RXN](#), [CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN](#) and as a product in [ACSERLY_45_RXN](#)).

$$\frac{d}{dt}\text{CYS} = v_{224} - v_{52} - v_{74} - v_{164} - v_{171} \quad (822)$$

6.151. Species AICAR

Name aminoimidazole carboxamide ribonucleotide

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [AICARTRANSFORM_45_RXN](#) and as a product in [AICARSYN_45_RXN](#), [GLUTAMIDOTRANS_45_RXN](#)).

$$\frac{d}{dt}\text{AICAR} = v_{75} + v_{112} - v_{318} \quad (823)$$

6.152. Species CARBOXYPHENYLAMINO_45_DEOXYRIBULOSE_45_P

Name 1-(o-carboxyphenylamino)-1'-deoxyribulose-5'-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [IGPSYN_45_RXN](#) and as a product in [PRAISOM_45_RXN](#)).

$$\frac{d}{dt}\text{CARBOXYPHENYLAMINO_45_DEOXYRIBULOSE_45_P} = v_{20} - v_{129} \quad (824)$$

6.153. Species ADENOSINE

Name adenosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ADENPHOSPHOR_45_RXN](#)).

$$\frac{d}{dt}\text{ADENOSINE} = -v_{64} \quad (825)$$

6.154. Species CPD__45__7046

Name S2-

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN0__45__949).

$$\frac{d}{dt} \text{CPD__45__7046} = -2v_1 \quad (826)$$

6.155. Species NADP

Name NADP+

Initial amount 0 mol

This species takes part in 21 reactions (as a reactant in METHYLENETHFDEHYDROG__45__NADP__45__RXN, GLU6PDEHYDROG__45__RXN, GMP__45__REDUCT__45__RXN, FLAVONADPREDUCT__45__RXN, 1__46__18__46__1__46__2__45__RXN, THIOREDoxIN__45__REDUCT__45__NADPH__45__RXN and as a product in ACETOLACTREDUCTOISOM__45__RXN, 3__45__OXOACYL__45__ACP__45__REDUCT__45__RXN, DIHYDROFOLATEREDUCT__45__RXN, RXN0__45__2142, RXN0__45__2145, ENOYL__45__ACP__45__REDUCT__45__NADPH__45__RXN, ASPARTATE__45__SEMIALDEHYDE__45__DEHYDROGENASE__45__RXN, RIBOFLAVINSYNREDUC__45__RXN, NAD__45__KIN__45__RXN, ACETOHBUTREDUCTOISOM__45__RXN, N__45__ACETYLGLUTPREDUCT__45__RXN, SHIKIMATE__45__5__45__DEHYDROGENASE__45__RXN, UDPNACETYLMURAMATEDEHYDROG__45__RXN, SULFITE__45__REDUCT__45__RXN, DXPREDISOM__45__RXN).

$$\begin{aligned} \frac{d}{dt} \text{NADP} = & v_6 + v_{184} + v_{185} + v_{207} + v_{208} + v_{210} + v_{214} + v_{232} + v_{257} + v_{276} + v_{279} \\ & + v_{283} + v_{298} + 3v_{310} + v_{322} - v_{19} - v_{78} - v_{107} - v_{182} - v_{206} - v_{227} \end{aligned} \quad (827)$$

6.156. Species

__124__N6__45__Methyladenine__45__containing__45__rRNAs__124__

Name rRNA containing N6-methyladenine

Initial amount 0 mol

This species takes part in one reaction (as a product in RRNA__45__ADENINE__45__N6__45__METHYLTRANSFERASE__45__RXN).

$$\frac{d}{dt} \text{__124__N6__45__Methyladenine__45__containing__45__rRNAs__124__} = v_{24} \quad (828)$$

6.157. Species DIHYDROXY__45__ACETONE__45__PHOSPHATE

Name dihydroxy-acetone phosphate

Initial amount 0 mol

This species takes part in three reactions (as a product in F16ALDOLASE__45__RXN, TRIOSEPIISOMERIZATION__45__RXN, RXN__45__8631).

$$\frac{d}{dt}\text{DIHYDROXY__45__ACETONE__45__PHOSPHATE} = v_{16} + v_{53} + v_{96} \quad (829)$$

6.158. Species __124__Nucleoside__45__Triphosphates__124__

Name a nucleoside triphosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in DNA__45__DIRECTED__45__RNA__45__POLYMERASE__45__RXN).

$$\frac{d}{dt}\text{__124__Nucleoside__45__Triphosphates__124__} = -v_{98} \quad (830)$$

6.159. Species HYDROXYMETHYLBILANE

Name hydroxymethylbilane

Initial amount 0 mol

This species takes part in one reaction (as a product in OHMETHYLBILANESYN__45__RXN).

$$\frac{d}{dt}\text{HYDROXYMETHYLBILANE} = v_{299} \quad (831)$$

6.160. Species T__45__POLY__45__C__45__DECAPRENYL__45__DIPHOSPHATE

Name di-trans,poly-cis-decaprenyl diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in DECAPCISTRANSFER__45__RXN).

$$\frac{d}{dt}\text{T__45__POLY__45__C__45__DECAPRENYL__45__DIPHOSPHATE} = -v_{43} \quad (832)$$

6.161. Species ACETYL_45_ACP

Name an acetyl-[acp]

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_3_45_OXOACYL_45_ACP_45_-SYNTH_45_BASE_45_RXN](#) and as a product in [MALONYL_45_ACPDECARBOX_45_RXN](#)).

$$\frac{d}{dt}\text{ACETYL}_45\text{ACP} = v_{189} - v_{122} \quad (833)$$

6.162. Species FORMYL_45_THF_45_GLU_45_N

Name an N10-formyl-tetrahydrofolate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [FORMYLTHFGLUSYNTH_45_RXN](#) and as a product in [RXN_45_6282](#), [FORMYLTHFGLUSYNTH_45_RXN](#)).

$$\frac{d}{dt}\text{FORMYL}_45\text{THF}_45\text{GLU}_45\text{N} = v_{215} + v_{256} - v_{256} \quad (834)$$

6.163. Species HISTIDINAL

Name histidinal

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [HISTALDEHYD_45_RXN](#) and as a product in [HISTOLDEHYD_45_RXN](#)).

$$\frac{d}{dt}\text{HISTIDINAL} = v_{231} - v_{88} \quad (835)$$

6.164. Species _124_2_45_hydroxyacyl_45_glutathiones_124_

Name S-(2-hydroxyacyl)glutathione

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN_45_7919](#)).

$$\frac{d}{dt}_{124_2_45_hydroxyacyl_45_glutathiones_124_} = -v_{293} \quad (836)$$

6.165. Species `_124_Trans_45_D3_45_cis_45_D5_45_dodecenoyl_45-_ACPs_124_`

Name a trans- Δ^3 -cis- Δ^5 -dodecenoyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0_45_2145`).

$$\frac{d}{dt} \text{_124_Trans_45_D3_45_cis_45_D5_45_dodecenoyl_45_ACPs_124_} = -v_{208} \quad (837)$$

6.166. Species `_124_Peptides_124_`

Name a peptide

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `_3_46_4_46_11_46_1_45-_RXN` and as a product in `_3_46_5_46_1_46_28_45_RXN`, `_3_46_4_46_11_46_1-_45_RXN`).

$$\frac{d}{dt} \text{_124_Peptides_124_} = v_{62} + v_{117} - v_{117} \quad (838)$$

6.167. Species `DNA_32_with_32_AP_32_40_32_apyrimidinic_32_-site_41_32_as_32_part_32_of_32_base_32_excision_32_-repair_32_process`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in `RXN0_45_2601`).

$$\frac{d}{dt} \text{DNA_32_with_32_AP_32_40_32_apyrimidinic_32_site_41_32_as_} (839) \text{part_32_of_32_b} = v_{81}$$

6.168. Species `_124_Charged_45_TYR_45_tRNAs_124_`

Name L-tyrosyl-tRNA_{tyr}

Initial amount 0 mol

This species takes part in one reaction (as a product in `TYROSINE_45_45_TRNA_45-_LIGASE_45_RXN`).

$$\frac{d}{dt} \text{_124_Charged_45_TYR_45_tRNAs_124_} = v_{180} \quad (840)$$

6.169. Species HOMO__45__SER

Name homoserine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in HOMOSERKIN__45__RXN and as a product in HOMOSERDEHYDROG__45__RXN).

$$\frac{d}{dt}\text{HOMO__45__SER} = v_{93} - v_{275} \quad (841)$$

6.170. Species __124__Quinones__124__

Name a quinone

Initial amount 0 mol

This species takes part in one reaction (as a reactant in NADH__45__DEHYDROGENASE__45__--QUINONE__45__RXN).

$$\frac{d}{dt}\text{__124__Quinones__124__} = -v_{73} \quad (842)$$

6.171. Species _2__45__PHOSPHO__45__4__45__CYTIDINE__45__5__45__DIPHOSPHO__45__2__45__C__45__MET

Name 2-phospho-4-(cytidine 5'-diphospho)-2-C-methyl-D-erythritol

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN0__45__302 and as a product in _2__46__7__46__1__46__148__45__RXN).

$$\begin{aligned} \frac{d}{dt}\text{_2__45__PHOSPHO__45__4__45__CYTIDINE__45__5__45__DIPHOSPHO__45__2__45__C__45__MET} \\ = v_{327} - v_{56} \end{aligned} \quad (843)$$

6.172. Species RIBULOSE__45__5P

Name D-ribulose-5-phosphate

Initial amount 0 mol

This species takes part in five reactions (as a reactant in RIBULP3EPIM__45__RXN, DIOHBUTANONEPSYN__45__RXN and as a product in RIB5PISOM__45__RXN, RXN__45__3341, _6PGLUCONDEHYDROG__45__RXN).

$$\frac{d}{dt}\text{RIBULOSE__45__5P} = v_{226} + v_{229} + v_{245} - v_{23} - v_{274} \quad (844)$$

6.173. Species `--124--Charged--45--CYS--45--tRNAs--124--`

Name L-cysteinyI-tRNAcys

Initial amount 0 mol

This species takes part in one reaction (as a product in `CYSTEINE--45---45--TRNA--45--LIGASE--45--RXN`).

$$\frac{d}{dt} \text{--124--Charged--45--CYS--45--tRNAs--124--} = v_{171} \quad (845)$$

6.174. Species `--124--DNA--45--with--45--Uracils--124--`

Name a DNA with uracil

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0--45--2584`).

$$\frac{d}{dt} \text{--124--DNA--45--with--45--Uracils--124--} = -v_{335} \quad (846)$$

6.175. Species `CPD--45--694`

Name cob(I)yrinate a,c-diamide

Initial amount 0 mol

This species takes part in one reaction (as a product in `R343--45--RXN`).

$$\frac{d}{dt} \text{CPD--45--694} = 2v_{284} \quad (847)$$

6.176. Species `DEOXYGUANOSINE`

Name deoxyguanosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `DEOXYGUANPHOSPHOR--45--RXN`).

$$\frac{d}{dt} \text{DEOXYGUANOSINE} = -v_{141} \quad (848)$$

6.177. Species VAL

Name L-valine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [VALINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{VAL} = -v_{65} \quad (849)$$

6.178. Species CPD__45__689

Name cob(II)yrinate a,c-diamide

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [R343__45__RXN](#)).

$$\frac{d}{dt}\text{CPD__45__689} = -2v_{284} \quad (850)$$

6.179. Species ACETYLSERINE

Name O-acetyl-L-serine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ACSERLY__45__RXN](#) and as a product in [SERINE__45__O__45__ACETTRAN__45__RXN](#)).

$$\frac{d}{dt}\text{ACETYLSERINE} = v_{230} - v_{224} \quad (851)$$

6.180. Species PUTRESCINE

Name putrescine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [SPERMIDINESYN__45__RXN](#)).

$$\frac{d}{dt}\text{PUTRESCINE} = -v_{268} \quad (852)$$

6.181. Species L__45__PANTOATE

Name L-pantoate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in PANTOATE__45__BETA__45__ALANINE__45__LIG__45__RXN).

$$\frac{d}{dt} \text{L__45__PANTOATE} = -v_{222} \quad (853)$$

6.182. Species __124__MET__45__tRNAs__124__

Name tRNAmet

Initial amount 0 mol

This species takes part in one reaction (as a reactant in METHIONINE__45____45__TRNA__45__LIGASE__45__RXN).

$$\frac{d}{dt} \text{__124__MET__45__tRNAs__124__} = -v_{126} \quad (854)$$

6.183. Species L__45__ASPARTATE__45__SEMIALDEHYDE

Name L-aspartate-semialdehyde

Initial amount 0 mol

This species takes part in three reactions (as a reactant in DIHYDRODIPICSYN__45__RXN, HOMOSERDEHYDROG__45__RXN and as a product in ASPARTATE__45__SEMIALDEHYDE__45__DEHYDROGENASE__45__RXN).

$$\frac{d}{dt} \text{L__45__ASPARTATE__45__SEMIALDEHYDE} = v_{214} - v_{67} - v_{93} \quad (855)$$

6.184. Species

BETA__45__KETO__45__CIS__45__DELTA5__45__DODECENOYL__45__ACP

Name β-keto-cis-Δ5-dodecenoyl-ACP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN0__45__2142 and as a product in RXN0__45__2141).

$$\frac{d}{dt} \text{BETA__45__KETO__45__CIS__45__DELTA5__45__DODECENOYL__45__ACP} = v_{205} - v_{207} \quad (856)$$

6.185. Species UDP

Name UDP

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [UDPREDUCT__45__RXN](#) and as a product in [UMPKI__45__RXN](#), [NACGLCTrans__45__RXN](#), [RXN__45__8976](#)).

$$\frac{d}{dt}\text{UDP} = v_{84} + v_{157} + v_{264} - v_{18} \quad (857)$$

6.186. Species PAP

Name adenosine-3',5'-bisphosphate

Initial amount 0 mol

This species takes part in two reactions (as a product in [_1__46__8__46__4__46__8__45__RXN](#), [HOLO__45__ACP__45__SYNTH__45__RXN](#)).

$$\frac{d}{dt}\text{PAP} = v_{21} + v_{190} \quad (858)$$

6.187. Species HCO3

Name HCO₃⁻

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [CARBPSYN__45__RXN](#)).

$$\frac{d}{dt}\text{HCO}_3 = -v_{158} \quad (859)$$

6.188. Species PORPHOBILINOGEN

Name porphobilinogen

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [OHMETHYLBILANESYN__45__RXN](#)).

$$\frac{d}{dt}\text{PORPHOBILINOGEN} = -4v_{299} \quad (860)$$

6.189. Species TDP

Name dTDP

Initial amount 0 mol

This species takes part in one reaction (as a product in DTMPKI__45__RXN).

$$\frac{d}{dt}\text{TDP} = v_{137} \quad (861)$$

6.190. Species __124__Purine__45__Bases__124__

Name a purine base

Initial amount 0 mol

This species takes part in two reactions (as a product in PNP__45__RXN, RXN__45__7001).

$$\frac{d}{dt}\text{__124__Purine__45__Bases__124__} = v_{86} + v_{258} \quad (862)$$

6.191. Species O__45__UREIDOHOMOSERINE

Name O-ureidohomoserine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN__45__10 and as a product in RXN__45__9).

$$\frac{d}{dt}\text{O__45__UREIDOHOMOSERINE} = v_{83} - v_{31} \quad (863)$$

6.192. Species CPD0__45__1028

Name 2-cis,6-trans,10-trans-geranylgeranyl diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN0__45__5180).

$$\frac{d}{dt}\text{CPD0__45__1028} = v_{140} \quad (864)$$

6.193. Species DIOH__45__ISOVALERATE

Name 2,3-dihydroxy-isovalerate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in DIHYDROXYISOVALDEHYDRAT__45__RXN and as a product in ACETOLACTREDUCTOISOM__45__RXN).

$$\frac{d}{dt}\text{DIOH_45_ISOVALERATE} = v_6 - v_{297} \quad (865)$$

6.194. Species _3__45__DEHYDRO__45__SHIKIMATE

Name 3-dehydro-shikimate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in SHIKIMATE__45__5__45__DEHYDROGENASE__45__RXN and as a product in _3__45__DEHYDROQUINATE__45__DEHYDRATASE__45__RXN).

$$\frac{d}{dt}\text{_3_45_DEHYDRO_45_SHIKIMATE} = v_{30} - v_{283} \quad (866)$$

6.195. Species PHOSPHO__45__ENOL__45__PYRUVATE

Name phosphoenolpyruvate

Initial amount 0 mol

This species takes part in six reactions (as a reactant in PEPDEPHOS__45__RXN, UDPNACETYLGUCOSAMENOLPYRT__45__RXN, _2__46__7__46__3__46__9__45__RXN, DAHPSYN__45__RXN, _2__46__5__46__1__46__19__45__RXN and as a product in _2PGADEHYDRAT__45__RXN).

$$\frac{d}{dt}\text{PHOSPHO_45_ENOL_45_PYRUVATE} = v_{243} - v_{68} - v_{153} - v_{172} - v_{200} - v_{311} \quad (867)$$

6.196. Species PROTEIN__45__LIPOYLLYSINE

Name H-Gcv-protein-(lipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN__45__8629).

$$\frac{d}{dt}\text{PROTEIN_45_LIPOYLLYSINE} = v_{119} \quad (868)$$

6.197. Species DELTA3__45__ISOPENTENYL__45__PP

Name isopentenyl diphosphate

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in [DECAPCISTRANSFER__45__RXN](#), [GPPSYN__45__RXN](#), [TRNA__45__ISOPENTENYLTRANSFERASE__45__RXN](#), [RXN0__45__5180](#), [1__46__17__46__1__46__2__45__RXN](#), [FPPSYN__45__RXN](#) and as a product in [ISPH2__45__RXN](#)).

$$\frac{d}{dt}\text{DELTA3__45__ISOPENTENYL__45__PP} = v_{307} - v_{43} - v_{44} - v_{114} - v_{140} - v_{173} - v_{220} \quad (869)$$

6.198. Species OROTIDINE__45__5__45__PHOSPHATE

Name orotidine-5'-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [OROTPDECARB__45__RXN](#) and as a product in [OROPRIBTRANS__45__RXN](#)).

$$\frac{d}{dt}\text{OROTIDINE__45__5__45__PHOSPHATE} = v_{309} - v_{72} \quad (870)$$

6.199. Species FRUCTOSE__45__16__45__DIPHOSPHATE

Name fructose-1,6-bisphosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [F16ALDOLASE__45__RXN](#) and as a product in [6PFRUCTPHOS__45__RXN](#)).

$$\frac{d}{dt}\text{FRUCTOSE__45__16__45__DIPHOSPHATE} = v_{303} - v_{16} \quad (871)$$

6.200. Species __124__Charged__45__THR__45__tRNAs__124__

Name L-threonyl-tRNA^{thr}

Initial amount 0 mol

This species takes part in one reaction (as a product in [THREONINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Charged__45__THR__45__tRNAs__124__} = v_{40} \quad (872)$$

6.201. Species PHENYL__45__PYRUVATE

Name phenylpyruvate

Initial amount 0 mol

This species takes part in one reaction (as a product in PREPHENATEDEHYDRAT__45__RXN).

$$\frac{d}{dt}\text{PHENYL__45__PYRUVATE} = v_{46} \quad (873)$$

6.202. Species ADENOSYL__45__HOMO__45__CYS

Name S-adenosyl-L-homocysteine

Initial amount 0 mol

This species takes part in nine reactions (as a reactant in ADENOSYLHOMOCYSTEINE__45__NUCLEOSIDASE__45__RXN and as a product in RRNA__45__ADENINE__45__N6__45__45__METHYLTRANSFERASE__45__RXN, RRNA__45__GUANINE__45__N2__45__45__METHYLTRANSFERASE__45__RXN, 2__46__1__46__1__46__61__45__RXN, TRNA__45__GUANINE__45__N1__45__45__METHYLTRANSFERASE__45__RXN, RXN__45__8675, RXN0__45__3161, UROPORIIIMETHYLTRANSA__45__RXN, TRNA__45__GUANINE__45__N7__45__45__METHYLTRANSFERASE__45__RXN).

$$\frac{d}{dt}\text{ADENOSYL__45__HOMO__45__CYS} = v_{24} + v_{97} + v_{131} + v_{145} + v_{175} + v_{234} + v_{252} + v_{281} - v_{132} \quad (874)$$

6.203. Species

__124__b__45__Keto__45__cis__45__D5__45__dodecenoyl__45__ACPs__124__

Name a β-keto-cis-Δ5-dodecenoyl-[acp]

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN0__45__2142 and as a product in RXN0__45__2141).

$$\frac{d}{dt}\text{__124__b__45__Keto__45__cis__45__D5__45__dodecenoyl__45__ACPs__124__} = v_{205} - v_{207} \quad (875)$$

6.204. Species L__45__ARGININO__45__SUCCINATE

Name L-arginino-succinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ARGSUCCINLYA__45__RXN](#) and as a product in [ARGSUCCINSYN__45__RXN](#)).

$$\frac{d}{dt}L_45_ARGININO_45_SUCCINATE = v_{47} - v_{148} \quad (876)$$

6.205. Species MET

Name L-methionine

Initial amount 0 mol

This species takes part in eight reactions (as a reactant in [S__45__ADENMETSYN__45__RXN](#), [METHIONINE__45__45__TRNA__45__LIGASE__45__RXN](#) and as a product in [RXNO__45__949](#), [RXNO__45__1342](#), [HOMOCYSMET__45__RXN](#), [2__46__8__46__1__46__8__45__RXN](#), [HEMN__45__RXN](#), [2__46__8__46__1__46__6__45__RXN](#)).

$$\frac{d}{dt}MET = 2v_1 + v_5 + v_{15} + 2v_{42} + 2v_{115} + 2v_{228} - v_{87} - v_{126} \quad (877)$$

6.206. Species DIHYDROLIPOAMIDE

Name dihydrolipoamide

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DIHYDLIPOXN__45__RXN](#)).

$$\frac{d}{dt}DIHYDROLIPOAMIDE = -v_{315} \quad (878)$$

6.207. Species CPD__45__469

Name N-acetyl-L-glutamate 5-semialdehyde

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ACETYLORNTRANSAM__45__RXN](#) and as a product in [N__45__ACETYLGLUTPREDUCT__45__RXN](#)).

$$\frac{d}{dt}CPD_45_469 = v_{279} - v_{166} \quad (879)$$

6.208. Species THIAMINE__45__P

Name thiamine-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [THI__45__P__45__KIN__45__RXN](#)).

$$\frac{d}{dt}THIAMINE_45_P = -v_{138} \quad (880)$$

6.209. Species `--124_0x_45_Thioredoxin_124--`

Name an oxidized thioredoxin

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in `RIBONUCLEOSIDE_45_DIP_45_REDUCTI_45_RXN` and as a product in `UDPREDUCT_45_RXN`, `1_46_8_46_4_46_8_45_RXN`, `CDPREDUCT_45_RXN`, `THIOREDOXIN_45_REDUCT_45_NADPH_45_RXN`, `ADPREDUCT_45_RXN`, `GDPREDUCT_45_RXN`).

$$\frac{d}{dt} \text{--124_0x_45_Thioredoxin_124--} = v_{18} + v_{21} + v_{38} + v_{227} + v_{300} + v_{319} - v_{109} \quad (881)$$

6.210. Species `--124_Reduced_45_Quinones_124--`

Name a hydroquinone

Initial amount 0 mol

This species takes part in one reaction (as a product in `NADH_45_DEHYDROGENASE_45_--QUINONE_45_RXN`).

$$\frac{d}{dt} \text{--124_Reduced_45_Quinones_124--} = v_{73} \quad (882)$$

6.211. Species `GERANYL_45_PP`

Name geranyl-diphosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `FPPSYN_45_RXN` and as a product in `GPPSYN_45_RXN`).

$$\frac{d}{dt} \text{GERANYL_45_PP} = v_{44} - v_{220} \quad (883)$$

6.212. Species `DEPHOSPHO_45_COA`

Name dephospho-CoA

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `DEPHOSPHOCOAKIN_45_RXN` and as a product in `PANTEPADENYLYLTRAN_45_RXN`).

$$\frac{d}{dt} \text{DEPHOSPHO_45_COA} = v_{39} - v_{10} \quad (884)$$

6.213. Species `--124--DNA--45--Adjacent--45--Pyrimidines--124--`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in `DEOXYRIBODIPYRIMIDINE--45--PHOTOLYASE--45--RXN`).

$$\frac{d}{dt} \text{--124--DNA--45--Adjacent--45--Pyrimidines--124--} = v_{218} \quad (885)$$

6.214. Species PANTOTHENATE

Name pantothenate

Initial amount 0 mol

This species takes part in two reactions (as a product in `PANTOATE--45--BETA--45--ALANINE--45--LIG--45--RXN`, `RXN--45--6401`).

$$\frac{d}{dt} \text{PANTOTHENATE} = v_{222} + v_{249} \quad (886)$$

6.215. Species `--124--Deoxy--45--Ribonucleoside--45--Triphosphates--124--`

Name a 2'-deoxyribonucleoside triphosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `DNA--45--DIRECTED--45--DNA--45--POLYMERASE--45--RXN`).

$$\frac{d}{dt} \text{--124--Deoxy--45--Ribonucleoside--45--Triphosphates--124--} = -v_{146} \quad (887)$$

6.216. Species `--124--DNA--45--containing--45--a--45--Apyrimidinic--45--Sites--124--`

Name a DNA containing a apyrimidinic site

Initial amount 0 mol

This species takes part in one reaction (as a product in `RXN0--45--2601`).

$$\frac{d}{dt} \text{--124--DNA--45--containing--45--a--45--Apyrimidinic--45--Sites--124--} = v_{81} \quad (888)$$

6.217. Species PROT__45__CYS

Name a protein L-cysteine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_1__46__11__46__1__46__15__45__RXN](#), [RXN0__45__308](#)).

$$\frac{d}{dt}\text{PROT_45_CYS} = -2v_{11} - v_{52} \quad (889)$$

6.218. Species ACET

Name acetate

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [ACETATEKIN__45__RXN](#) and as a product in [ACSERLY__45__RXN](#), [RXN__45__7933](#), [ACETYLORNDEACET__45__RXN](#)).

$$\frac{d}{dt}\text{ACET} = v_{224} + v_{250} + v_{251} - v_{133} \quad (890)$$

6.219. Species OROTATE

Name orotate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [OROPRIBTRANS__45__RXN](#) and as a product in [DIHYDROOROTOX__45__RXN](#)).

$$\frac{d}{dt}\text{OROTATE} = v_{34} - v_{309} \quad (891)$$

6.220. Species GLC__45__6__45__P

Name β-D-glucose-6-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PGLUCISOM__45__RXN](#), [GLU6PDEHYDROG__45__RXN](#)).

$$\frac{d}{dt}\text{GLC_45_6_45_P} = -v_{12} - v_{78} \quad (892)$$

6.221. Species [_5_45_METHYL_45_THF](#)

Name 5-methyl-THF

Initial amount 0 mol

This species takes part in one reaction (as a product in [_1_46_5_46_1_46_20_45_-RXN](#)).

$$\frac{d}{dt} \text{_5_45_METHYL_45_THF} = v_{33} \quad (893)$$

6.222. Species [HS](#)

Name hydrogen sulfide

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ACSERLY_45_RXN](#) and as a product in [SULFITE_45_REDUCT_45_RXN](#)).

$$\frac{d}{dt} \text{HS} = v_{310} - v_{224} \quad (894)$$

6.223. Species [GLUCOSAMINE_45_1P](#)

Name D-glucosamine 1-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_2_46_3_46_1_46_157_45_-RXN](#) and as a product in [_5_46_4_46_2_46_10_45_RXN](#)).

$$\frac{d}{dt} \text{GLUCOSAMINE_45_1P} = v_{139} - v_{305} \quad (895)$$

6.224. Species [_2_45_OXOBUTANOATE](#)

Name 2-oxobutanoate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ACETOOHBUTSYN_45_RXN](#)).

$$\frac{d}{dt} \text{_2_45_OXOBUTANOATE} = -v_{152} \quad (896)$$

6.225. Species `--124--Dihydro--45--Lipoyl--45--Proteins--124--`

Name protein N6-(dihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `_1--46--8--46--1--46--4--45--RXN`).

$$\frac{d}{dt} \text{--124--Dihydro--45--Lipoyl--45--Proteins--124--} = -v_{292} \quad (897)$$

6.226. Species AMMONIA

Name ammonia

Initial amount 0 mol

This species takes part in five reactions (as a reactant in `NAD--45--SYNTH--45--NH3--45--RXN`, `GMP--45--REDUCT--45--RXN` and as a product in `DCTP--45--DEAM--45--RXN`, `RIBOFLAVINSYNDEAM--45--RXN`, `OHMETHYLBILANESYN--45--RXN`).

$$\frac{d}{dt} \text{AMMONIA} = v_{188} + v_{191} + 4v_{299} - v_{89} - v_{107} \quad (898)$$

6.227. Species CARBAMOYL--45--P

Name carbamoyl-phosphate

Initial amount 0 mol

This species takes part in four reactions (as a reactant in `ORNCARBAMTRANSFER--45--RXN`, `RXN--45--9`, `ASPCARBTRANS--45--RXN` and as a product in `CARBPSYN--45--RXN`).

$$\frac{d}{dt} \text{CARBAMOYL--45--P} = v_{158} - v_{45} - v_{83} - v_{142} \quad (899)$$

6.228. Species DGDP

Name dGDP

Initial amount 0 mol

This species takes part in two reactions (as a product in `GMKALT--45--RXN`, `GDPREDUCT--45--RXN`).

$$\frac{d}{dt} \text{DGDP} = v_{246} + v_{319} \quad (900)$$

6.229. Species `DUDP`

Name `dUDP`

Initial amount 0 mol

This species takes part in one reaction (as a product in `UDPREDUCT__45__RXN`).

$$\frac{d}{dt} \text{DUDP} = v_{18} \quad (901)$$

6.230. Species `ERYTHROSE__45__4P`

Name D-erythrose-4-phosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `DAHPSYN__45__RXN`, `2TRANSKETO--45__RXN` and as a product in `TRANSALDOL__45__RXN`).

$$\frac{d}{dt} \text{ERYTHROSE__45__4P} = v_{49} - v_{200} - v_{324} \quad (902)$$

6.231. Species `__124__General__45__Protein__45__Substrates__124__`

Name a protein

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `__2__46__3__46__1__46__181__45__-__RXN`).

$$\frac{d}{dt} \text{__124__General__45__Protein__45__Substrates__124__} = -v_{17} \quad (903)$$

6.232. Species `__124__Charged__45__MET__45__tRNAs__124__`

Name L-methionyl-tRNA^{met}

Initial amount 0 mol

This species takes part in one reaction (as a product in `METHIONINE__45____45__TRNA--45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__Charged__45__MET__45__tRNAs__124__} = v_{126} \quad (904)$$

6.233. Species `__124__CYS__45__tRNAs__124__`

Name tRNA_{cys}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `CYSTEINE__45__45__TRNA__45__45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__CYS__45__tRNAs__124__} = -v_{171} \quad (905)$$

6.234. Species `__2__45__KETO__45__ISOVALERATE`

Name 2-keto-isovalerate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `__2__45__ISOPROPYLMALATESYN__45__RXN`, `__3__45__CH3__45__2__45__OXOBUTANOATE__45__OH__45__CH3__45__XFER__45__RXN` and as a product in `DIHYDROXYISOVALDEHYDRAT__45__RXN`).

$$\frac{d}{dt} \text{__2__45__KETO__45__ISOVALERATE} = v_{297} - v_{286} - v_{330} \quad (906)$$

6.235. Species `__124__Charged__45__HIS__45__tRNAs__124__`

Name L-histidyl-tRNA_{his}

Initial amount 0 mol

This species takes part in one reaction (as a product in `HISTIDINE__45__45__TRNA__45__45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__Charged__45__HIS__45__tRNAs__124__} = v_{79} \quad (907)$$

6.236. Species `__124__Charged__45__ILE__45__tRNAs__124__`

Name L-isoleucyl-tRNA_{ile}

Initial amount 0 mol

This species takes part in one reaction (as a product in `ISOLEUCINE__45__45__TRNA__45__45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__Charged__45__ILE__45__tRNAs__124__} = v_{125} \quad (908)$$

6.237. Species

[_124_Protein_45_3_45_phospho_45_L_45_histidines_124_](#)

Name a protein-Nπ-phospho-L-histidine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [LACTOSEPHOSPHO_45_RXN](#), [_2_46_7_46_1_46_69_45_RXN](#), [FRUCTOSEPHOSPHO_45_RXN](#) and as a product in [_2_46_7_46_3_46_9_45_RXN](#)).

$$\begin{aligned} \frac{d}{dt} \text{_124_Protein_45_3_45_phospho_45_L_45_histidines_124_} & \quad (909) \\ &= v_{172} - v_{66} - v_{106} - v_{326} \end{aligned}$$

6.238. Species

[DCDP](#)

Name dCDP

Initial amount 0 mol

This species takes part in one reaction (as a product in [CDPREDUCT_45_RXN](#)).

$$\frac{d}{dt} \text{DCDP} = v_{38} \quad (910)$$

6.239. Species

[GAP](#)

Name D-glyceraldehyde-3-phosphate

Initial amount 0 mol

This species takes part in nine reactions (as a reactant in [TRANSALDOL_45_RXN](#), [TRIOSEPISOMERIZATION_45_RXN](#), [DXS_45_RXN](#), [GAPOXNPHOSPHN_45_RXN](#) and as a product in [F16ALDOLASE_45_RXN](#), [TRYPSYN_45_RXN](#), [_1TRANSKETO_45_RXN](#), [RXNO_45_2381](#), [_2TRANSKETO_45_RXN](#)).

$$\frac{d}{dt} \text{GAP} = v_{16} + v_{193} + v_{255} + v_{282} + v_{324} - v_{49} - v_{53} - v_{159} - v_{332} \quad (911)$$

6.240. Species

[FRUCTOSE_45_6P](#)

Name fructose-6-phosphate

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in [L_45_GLN_45_FRUCT_45_6_45_P_45_AMINOTRANS_45_RXN](#), [_6PFRUCTPHOS_45_RXN](#) and as a product in [PGLUCISOM_45_RXN](#), [TRANSALDOL_45_RXN](#), [RXN_45_6182](#), [MANNPDEHYDROG_45_RXN](#), [_2TRANSKETO_45_RXN](#)).

$$\frac{d}{dt}\text{FRUCTOSE}_45_6\text{P} = v_{12} + v_{49} + v_{204} + v_{211} + v_{324} - v_{160} - v_{303} \quad (912)$$

6.241. Species [_2_45_ACETO_45_LACTATE](#)

Name 2-acetolactate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ACETOLACTREDUCTOISOM_45_RXN](#) and as a product in [ACETOLACTSYN_45_RXN](#)).

$$\frac{d}{dt}_2_45_ACETO_45_LACTATE = v_{273} - v_6 \quad (913)$$

6.242. Species [_124_ASN_45_tRNAs_124_](#)

Name tRNAasn

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN](#)).

$$\frac{d}{dt}_{124_ASN_45_tRNAs_124_} = -v_{270} \quad (914)$$

6.243. Species [_124_Lipoyl_45_Protein_124_](#)

Name protein N6-(lipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a product in [_1_46_8_46_1_46_4_45_RXN](#)).

$$\frac{d}{dt}_{124_Lipoyl_45_Protein_124_} = v_{292} \quad (915)$$

6.244. Species `__124__Ubiquinols__124__`

Name a ubiquinol

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN0__45__5268` and as a product in `NADH__45__DEHYDROG__45__A__45__RXN`).

$$\frac{d}{dt} \text{__124__Ubiquinols__124__} = v_{95} - 2v_{316} \quad (916)$$

6.245. Species `__124__GLN__45__tRNAs__124__`

Name tRNA^{Gln}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `GLUTAMINE__45__45__TRNA__45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__GLN__45__tRNAs__124__} = -v_{71} \quad (917)$$

6.246. Species `ACETYL__45__GLU`

Name N-acetyl-L-glutamate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `ACETYLGLUTKIN__45__RXN` and as a product in `N__45__ACETYLTRANSFER__45__RXN`).

$$\frac{d}{dt} \text{ACETYL__45__GLU} = v_{285} - v_{167} \quad (918)$$

6.247. Species

`DNA__32__with__32__uracil__32__due__32__to__32__misincorporation__32__or__32__deamination__32__of__32__cytosine__46__`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0__45__2584`).

$$\begin{aligned} \frac{d}{dt} \text{DNA__32__with__32__uracil__32__due__32__to__32__misincorporation__32__or__32__deamination__32__of__32__cytosine__46__} \\ = -v_{335} \end{aligned} \quad (919)$$

6.248. Species [N__45__ACETYL__45__D__45__GLUCOSAMINE__45__1__45__P](#)

Name N-acetyl-glucosamine-1-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [NAG1P__45__URIDYLTRANS__45__RXN](#) and as a product in [2__46__3__46__1__46__157__45__RXN](#)).

$$\frac{d}{dt} \text{N__45__ACETYL__45__D__45__GLUCOSAMINE__45__1__45__P} = v_{305} - v_{124} \quad (920)$$

6.249. Species [2__45__3__45__DIHYDRODIPICOLINATE](#)

Name L-2,3-dihydrodipicolinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DIHYDROPICRED__45__RXN](#) and as a product in [DIHYDRODIPICSYN__45__RXN](#)).

$$\frac{d}{dt} \text{2__45__3__45__DIHYDRODIPICOLINATE} = v_{67} - v_{121} \quad (921)$$

6.250. Species [DADP](#)

Name dADP

Initial amount 0 mol

This species takes part in one reaction (as a product in [ADPREDUCT__45__RXN](#)).

$$\frac{d}{dt} \text{DADP} = v_{300} \quad (922)$$

6.251. Species [SPERMIDINE](#)

Name spermidine

Initial amount 0 mol

This species takes part in one reaction (as a product in [SPERMIDINESYN__45__RXN](#)).

$$\frac{d}{dt} \text{SPERMIDINE} = v_{268} \quad (923)$$

6.252. Species PROTOPORPHYRINOGEN

Name protoporphyrinogen IX

Initial amount 0 mol

This species takes part in one reaction (as a product in [HEMN__45__RXN](#)).

$$\frac{d}{dt}\text{PROTOPORPHYRINOGEN} = v_{115} \quad (924)$$

6.253. Species __124__Octanoyl__45__ACPs__124__

Name an octanoyl-[acp]

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0__45__947](#), [_2__46__3__46__1__46__181__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Octanoyl__45__ACPs__124__} = -v_{13} - v_{17} \quad (925)$$

6.254. Species

[__124__Protein__45__6__45__N__45__octanoyl__45__lysine__124__](#)

Name a protein 6-N-(octanoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [_2__46__8__46__1__46__8__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Protein__45__6__45__N__45__octanoyl__45__lysine__124__} = -v_{42} \quad (926)$$

6.255. Species _2__45__THIOURIDINE

Name 2-thiouridine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__2023](#)).

$$\frac{d}{dt}\text{_2__45__THIOURIDINE} = v_{74} \quad (927)$$

6.256. Species CPD0__45__1065

Name aminopropylcadaverine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__5217](#)).

$$\frac{d}{dt} \text{CPD0__45__1065} = v_{70} \quad (928)$$

6.257. Species

[_2__45__AMINO__45__3__45__OXO__45__4__45__PHOSPHONOOXYBUTYRATE](#)

Name (2S)-2-amino-3-oxo-4-phosphonooxybutanoate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__8447](#)).

$$\frac{d}{dt} \text{_2__45__AMINO__45__3__45__OXO__45__4__45__PHOSPHONOOXYBUTYRATE} = -v_{123} \quad (929)$$

6.258. Species ACETYL__45__P

Name acetylphosphate

Initial amount 0 mol

This species takes part in two reactions (as a product in [PHOSACETYLTRANS__45__RXN](#), [ACETATEKIN__45__RXN](#)).

$$\frac{d}{dt} \text{ACETYL__45__P} = v_{36} + v_{133} \quad (930)$$

6.259. Species PANTOYL__45__LACTONE

Name pantoyl lactone

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__6401](#)).

$$\frac{d}{dt} \text{PANTOYL__45__LACTONE} = -v_{249} \quad (931)$$

6.260. Species CPD__45__564

Name S-ribosyl-L-homocysteine

Initial amount 0 mol

This species takes part in one reaction (as a product in [ADENOSYLHOMOCYSTEINE__45__NUCLEOSIDASE__45__RXN](#)).

$$\frac{d}{dt}\text{CPD_45_564} = v_{132} \quad (932)$$

6.261. Species GLYCERALD

Name glyceraldehyde

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN__45__8631](#)).

$$\frac{d}{dt}\text{GLYCERALD} = v_{96} \quad (933)$$

6.262. Species __124__Acetoacetyl__45__ACPs__124__

Name an acetoacetyl-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a product in [_3__45__OXOACYL__45__ACP__45__SYNTH__45__BASE__45__RXN](#)).

$$\frac{d}{dt}\text{_124_Acetoacetyl_45_ACPs_124_} = v_{122} \quad (934)$$

6.263. Species PREPHENATE

Name prephenate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PREPHENATEDEHYDRAT__45__RXN](#) and as a product in [CHORISMATEMUT__45__RXN](#)).

$$\frac{d}{dt}\text{PREPHENATE} = v_8 - v_{46} \quad (935)$$

6.264. Species NICOTINAMIDE_NUCLEOTIDE

Name nicotinamide mononucleotide

Initial amount 0 mol

This species takes part in one reaction (as a product in [DNA__45__LIGASE__45__NAD__43__-__45__RXN](#)).

$$\frac{d}{dt}\text{NICOTINAMIDE_NUCLEOTIDE} = v_{296} \quad (936)$$

6.265. Species __124__LEU__45__tRNAs__124__

Name tRNA^{Leu}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [LEUCINE__45____45__TRNA__45__-__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{__124__LEU__45__tRNAs__124__} = -v_{314} \quad (937)$$

6.266. Species UDP__45__ACETYLMURAMOYL__45__ALA

Name UDP-N-acetylmuramoyl-L-alanine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [UDP__45__NACMURALA__45__GLU__45__LIG__45__RXN](#) and as a product in [UDP__45__NACMUR__45__ALA__45__LIG__45__RXN](#)).

$$\frac{d}{dt}\text{UDP__45__ACETYLMURAMOYL__45__ALA} = v_{336} - v_{94} \quad (938)$$

6.267. Species URIDINE

Name uridine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__2023](#)).

$$\frac{d}{dt}\text{URIDINE} = -v_{74} \quad (939)$$

6.268. Species PYRUVATE

Name pyruvate

Initial amount 0 mol

This species takes part in ten reactions (as a reactant in [DIHYDRODIPICSYN__45__RXN](#), [ACETOHBUTSYN__45__RXN](#), [DXS__45__RXN](#), [RXN0__45__1134](#), [ACETOLACTSYN__45__RXN](#), [PYRUVDEH__45__RXN](#) and as a product in [PEPDEPHOS__45__RXN](#), [_2__46__7__46__3__46__9__45__RXN](#), [RXN0__45__5240](#), [ANTHRANSYN__45__RXN](#)).

$$\frac{d}{dt}\text{PYRUVATE} = v_{68} + v_{172} + v_{271} + v_{302} - v_{67} - v_{152} - v_{159} - v_{177} - 2v_{273} - v_{312} \quad (940)$$

6.269. Species CIS__45__DELTA3__45__DECENOYL__45__ACP

Name cis-Δ3-decenoyl-ACP

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__2141](#)).

$$\frac{d}{dt}\text{CIS__45__DELTA3__45__DECENOYL__45__ACP} = -v_{205} \quad (941)$$

6.270. Species CPD__45__7100

Name 2-isopropyl-3-oxosuccinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN__45__7800](#) and as a product in [_3__45__ISOPROPYLMALDEHYDROG__45__RXN](#)).

$$\frac{d}{dt}\text{CPD__45__7100} = v_{161} - v_{169} \quad (942)$$

6.271. Species LEU

Name L-leucine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [LEUCINE__45____45__TRNA__45__-LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{LEU} = -v_{314} \quad (943)$$

6.272. Species [_124_ALA_45_tRNAs_124_](#)

Name tRNAala

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [ALANINE_45_45_TRNA_45-LIGASE_45_RXN](#)).

$$\frac{d}{dt} _124_ALA_45_tRNAs_124_ = -v_{176} \quad (944)$$

6.273. Species [_124_0xo_45_glutarate_45_dehydro_45_suc_45_DH_45-lipoyl_124_](#)

Name dihydrolipoyltranssuccinylase N6-(S-succinyldihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0_45_1147](#) and as a product in [_20XOGLUTDECARB_45_RXN](#)).

$$\begin{aligned} \frac{d}{dt} _124_0xo_45_glutarate_45_dehydro_45_suc_45_DH_45_lipoyl_124_ \\ = v_{320} - v_{192} \end{aligned} \quad (945)$$

6.274. Species [L_45_ORNITHINE](#)

Name L-ornithine

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [ORNCARBAMTRANSFER_45_RXN](#), [RXN_45_7562](#) and as a product in [ACETYLORNDEACET_45_RXN](#)).

$$\frac{d}{dt} L_45_ORNITHINE = v_{251} - v_{45} - v_{168} \quad (946)$$

6.275. Species [D_45_GLUCOSAMINE_45_6_45_P](#)

Name D-glucosamine-6-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_5_46_4_46_2_46_10_45-_RXN](#) and as a product in [L_45_GLN_45_FRUCT_45_6_45_P_45_AMINOTRANS_45-_RXN](#)).

$$\frac{d}{dt} D_45_GLUCOSAMINE_45_6_45_P = v_{160} - v_{139} \quad (947)$$

6.276. Species `--124--Charged--45--VAL--45--tRNAs--124--`

Name L-valyl-tRNAval

Initial amount 0 mol

This species takes part in one reaction (as a product in `VALINE--45--45--TRNA--45--LIGASE--45--RXN`).

$$\frac{d}{dt} \text{--124--Charged--45--VAL--45--tRNAs--124--} = v_{65} \quad (948)$$

6.277. Species `UNDECAPRENYL--45--P`

Name undecaprenyl phosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `PHOSNACMURPENTATRANS--45--RXN`, `RXN--45--8975` and as a product in `UNDECAPRENYL--45--DIPHOSPHATASE--45--RXN`).

$$\frac{d}{dt} \text{UNDECAPRENYL--45--P} = v_{269} - v_{77} - v_{265} \quad (949)$$

6.278. Species `L--45--GLUTAMATE_GAMMA--45--SEMIALDEHYDE`

Name L-glutamate γ-semialdehyde

Initial amount 0 mol

This species takes part in one reaction (as a product in `RXN--45--7562`).

$$\frac{d}{dt} \text{L--45--GLUTAMATE_GAMMA--45--SEMIALDEHYDE} = v_{168} \quad (950)$$

6.279. Species `--124--Charged--45--ALA--45--tRNAs--124--`

Name L-alanyl-tRNAala

Initial amount 0 mol

This species takes part in one reaction (as a product in `ALANINE--45--45--TRNA--45--LIGASE--45--RXN`).

$$\frac{d}{dt} \text{--124--Charged--45--ALA--45--tRNAs--124--} = v_{176} \quad (951)$$

6.280. Species [_124_Purine_45_Ribonucleosides_124_](#)

Name a purine ribonucleoside

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PNP_45_RXN](#), [RXN_45_7001](#)).

$$\frac{d}{dt} \text{--124_Purine_45_Ribonucleosides_124_} = -v_{86} - v_{258} \quad (952)$$

6.281. Species [ENZYME_45_S_45_SULFANYLCYSTEINE](#)

Name a protein-S-sulfanylcysteine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_308](#)).

$$\frac{d}{dt} \text{ENZYME_45_S_45_SULFANYLCYSTEINE} = v_{52} \quad (953)$$

6.282. Species [SHIKIMATE](#)

Name shikimate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [SHIKIMATE_45_KINASE_45_RXN](#) and as a product in [SHIKIMATE_45_5_45_DEHYDROGENASE_45_RXN](#)).

$$\frac{d}{dt} \text{SHIKIMATE} = v_{283} - v_{235} \quad (954)$$

6.283. Species [_124_Nucleoside_45_Diphosphates_124_](#)

Name a nucleoside diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [_2_46_7_46_7_46_8_45_RXN](#)).

$$\frac{d}{dt} \text{--124_Nucleoside_45_Diphosphates_124_} = v_{266} \quad (955)$$

6.284. Species [_124_UDP_45_NAcMur_45_Peptides_124_](#)

Name a UDP-N-acetylmuramoyl-pentapeptide

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN_45_8973](#)).

$$\frac{d}{dt} \text{_124_UDP_45_NAcMur_45_Peptides_124_} = v_{263} \quad (956)$$

6.285. Species [SIROHEME](#)

Name siroheme

Initial amount 0 mol

This species takes part in one reaction (as a product in [SIROHEME_45_FERROCHELAT_45_RXN](#)).

$$\frac{d}{dt} \text{SIROHEME} = v_{32} \quad (957)$$

6.286. Species [_2_45_C_45_METHYL_45_D_45_ERYTHRITOL_45_4_45_PHOSPHATE](#)

Name 2-C-methyl-D-erythritol-4-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_2_46_7_46_7_46_60_45_-RXN](#) and as a product in [DXPREDISOM_45_RXN](#)).

$$\frac{d}{dt} \text{_2_45_C_45_METHYL_45_D_45_ERYTHRITOL_45_4_45_PHOSPHATE} = v_{322} - v_{187} \quad (958)$$

6.287. Species [PHOSPHORIBOSYL_45_FORMAMIDO_45_CARBOXAMIDE](#)

Name phosphoribosyl-formamido-carboxamide

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [IMPCYCLOHYDROLASE_45_RXN](#) and as a product in [AICARTRANSFORM_45_RXN](#)).

$$\frac{d}{dt} \text{PHOSPHORIBOSYL_45_FORMAMIDO_45_CARBOXAMIDE} = v_{318} - v_{80} \quad (959)$$

6.288. Species PHOSPHORIBOSYL__45__AMP

Name phosphoribosyl-AMP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [HISTCYCLOHYD__45__RXN](#) and as a product in [HISTPRATPHYD__45__RXN](#)).

$$\frac{d}{dt}\text{PHOSPHORIBOSYL__45__AMP} = v_{203} - v_{334} \quad (960)$$

6.289. Species TMP

Name dTMP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DTMPKI__45__RXN](#) and as a product in [THYMIDYLATESYN__45__RXN](#)).

$$\frac{d}{dt}\text{TMP} = v_{99} - v_{137} \quad (961)$$

6.290. Species __124__SER__45__tRNAs__124__

Name tRNAs_{er}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [SERINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{__124__SER__45__tRNAs__124__} = -v_{162} \quad (962)$$

6.291. Species G3P

Name 3-phosphoglycerate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PHOSGLYPHOS__45__RXN](#), [_3PGAREARR__45__RXN](#)).

$$\frac{d}{dt}\text{G3P} = -v_{240} - v_{277} \quad (963)$$

6.292. Species `_124_Peptides_45_with_45_Leader_45_Sequence_124_`

Name a peptide with a leader sequence

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `_3_46_4_46_21_46_89_45_-RXN`).

$$\frac{d}{dt} \text{_124_Peptides_45_with_45_Leader_45_Sequence_124_} = -v_{41} \quad (964)$$

6.293. Species `FRU`

Name D-fructose

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `FRUCTOSEPHOSPHO_45_RXN`).

$$\frac{d}{dt} \text{FRU} = -v_{326} \quad (965)$$

6.294. Species `tRNA_32_with_32_7_45_aminomethyl_45_7_45_-deazaguanine_32_at_32_position_32_34`

Name NA

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN0_45_1342` and as a product in `RXN0_45_1321`).

$$\begin{aligned} \frac{d}{dt} \text{_tRNA_32_with_32_7_45_aminomethyl_45_7_45_deazaguanine_32_at_32_position_32_34} \\ = v_{48} - v_5 \end{aligned} \quad (966)$$

6.295. Species `DIHYDROLIPOYL_45_GCVH`

Name H-Gcv-protein-(dihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN_45_8629`).

$$\frac{d}{dt} \text{DIHYDROLIPOYL_45_GCVH} = -v_{119} \quad (967)$$

6.296. Species [_124_Pyruvate_45_dehydrogenase_45_lipoate_124_](#)

Name lipoate acetyltransferase N6-(lipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0_45_1134](#) and as a product in [RXN0_45_1132](#)).

$$\frac{d}{dt} \text{_124_Pyruvate_45_dehydrogenase_45_lipoate_124_} = v_{179} - v_{177} \quad (968)$$

6.297. Species [_124_GLY_45_tRNAs_124_](#)

Name tRNAgly

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [GLYCINE_45_45_TRNA_45_-LIGASE_45_RXN](#)).

$$\frac{d}{dt} \text{_124_GLY_45_tRNAs_124_} = -v_{26} \quad (969)$$

6.298. Species [CARBAMYUL_45_L_45_ASPARTATE](#)

Name N-carbamoyl-L-aspartate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DIHYDROOROT_45_RXN](#) and as a product in [ASPCARBTRANS_45_RXN](#)).

$$\frac{d}{dt} \text{CARBAMYUL_45_L_45_ASPARTATE} = v_{142} - v_{76} \quad (970)$$

6.299. Species [CPD_45_2961](#)

Name 6-phospho-D-gluconate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [RXN_45_3341](#), [_6PGLUCONDEHYDROG-_45_RXN](#) and as a product in [_6PGLUCONOLACT_45_RXN](#)).

$$\frac{d}{dt} \text{CPD_45_2961} = v_7 - v_{229} - v_{245} \quad (971)$$

6.300. Species L__45__CANALINE

Name L-canaline

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__9](#)).

$$\frac{d}{dt}L_45_CANALINE = -v_{83} \quad (972)$$

6.301. Species CPD__45__5725

Name tetrahydrofolate-L-glutamate

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN__45__6102](#)).

$$\frac{d}{dt}CPD_45_5725 = v_{51} \quad (973)$$

6.302. Species __124__Deoxy__45__Ribonucleoside__45__Diphosphates__124__

Name a 2'-deoxyribonucleoside diphosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RIBONUCLEOSIDE__45__DIP__45__REDUCTI__45__RXN](#), [RXNO__45__1](#)).

$$\frac{d}{dt}__124__Deoxy__45__Ribonucleoside__45__Diphosphates__124__ = -v_{109} - v_{111} \quad (974)$$

6.303. Species CPD__45__5727

Name 5,10-methenyl-tetrahydropteroyl-[γ-Glu](n)

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN__45__6282](#)).

$$\frac{d}{dt}CPD_45_5727 = -v_{215} \quad (975)$$

6.304. Species `--124--N--45--Substituted--45--Aminoacyl--45--tRNA--124--`

Name N-substituted aminoacyl-tRNA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `AMINOCYL--45--TRNA--45--HYDROLASE--45--RXN`).

$$\frac{d}{dt} \text{--124--N--45--Substituted--45--Aminoacyl--45--tRNA--124--} = -v_{248} \quad (976)$$

6.305. Species `CPD--45--9451`

Name isopropylmaleate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN--45--8991` and as a product in `_3--45--ISOPROPYLMALISOM--45--RXN`).

$$\frac{d}{dt} \text{CPD--45--9451} = v_{295} - v_{288} \quad (977)$$

6.306. Species `--124--Oxidized--45--flavodoxins--124--`

Name an oxidized flavodoxin

Initial amount 0 mol

This species takes part in one reaction (as a product in `FLAVONADPREDUCT--45--RXN`).

$$\frac{d}{dt} \text{--124--Oxidized--45--flavodoxins--124--} = v_{182} \quad (978)$$

6.307. Species `D--45--GLT`

Name D-glutamate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `UDP--45--NACMURALA--45--GLU--45--LIG--45--RXN` and as a product in `GLUTRACE--45--RXN`).

$$\frac{d}{dt} \text{D--45--GLT} = v_{27} - v_{94} \quad (979)$$

6.308. Species LACTOSE

Name lactose

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [LACTOSEPHOSPHO__45__RXN](#)).

$$\frac{d}{dt}\text{LACTOSE} = -v_{66} \quad (980)$$

6.309. Species CDP

Name CDP

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [CDPREDUCT__45__RXN](#)).

$$\frac{d}{dt}\text{CDP} = -v_{38} \quad (981)$$

6.310. Species UDP__45__N__45__ACETYL__45__D__45__GLUCOSAMINE

Name UDP-N-acetyl-D-glucosamine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [UDPNACETYLGLUCOSAMENOLPYRTRANS__45__RXN](#), [NACGLCTrans__45__RXN](#), [RXN__45__8976](#) and as a product in [NAG1P__45__URIDYLTRANS__45__RXN](#)).

$$\frac{d}{dt}\text{UDP__45__N__45__ACETYL__45__D__45__GLUCOSAMINE} = v_{124} - v_{153} - v_{157} - v_{264} \quad (982)$$

6.311. Species ACP

Name a hol-[acp]

Initial amount 0 mol

This species takes part in five reactions (as a product in [RXN0__45__947](#), [_2__46__3__46__1__46__181__45__RXN](#), [_3__45__OXOACYL__45__ACP__45__SYNTH__45__RXN](#), [HOLO__45__ACP__45__SYNTH__45__RXN](#), [RXN0__45__2141](#)).

$$\frac{d}{dt}\text{ACP} = v_{13} + v_{17} + v_{135} + v_{190} + v_{205} \quad (983)$$

6.312. Species UDP__45__N__45__ACETYLMURAMATE

Name UDP-N-acetylmuramate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in UDP__45__NACMUR__45__ALA__45__LIG__45__RXN and as a product in UDPNACETYLMURAMATEDEHYDROG__45__RXN).

$$\frac{d}{dt}\text{UDP__45__N__45__ACETYLMURAMATE} = v_{298} - v_{336} \quad (984)$$

6.313. Species GTP

Name GTP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in GTP__45__CYCLOHYDRO__45__II__45__RXN, ADENYLOSUCCINATE__45__SYNTHASE__45__RXN).

$$\frac{d}{dt}\text{GTP} = -v_{91} - v_{201} \quad (985)$$

6.314. Species CANAVANINOSUCCINATE

Name canavaninosuccinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN__45__22 and as a product in RXN__45__10).

$$\frac{d}{dt}\text{CANAVANINOSUCCINATE} = v_{31} - v_4 \quad (986)$$

6.315. Species INDOLE__45__3__45__GLYCEROL__45__P

Name indole-3-glycerol-phosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in TRYPSYN__45__RXN, RXN0__45__2381 and as a product in IGPSYN__45__RXN).

$$\frac{d}{dt}\text{INDOLE__45__3__45__GLYCEROL__45__P} = v_{129} - v_{193} - v_{282} \quad (987)$$

6.316. Species `--124--Protein--45--Dithiols--124--`

Name a protein dithiol

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0--45--882`).

$$\frac{d}{dt} \text{--124--Protein--45--Dithiols--124--} = -v_{323} \quad (988)$$

6.317. Species `--124--apo--45--ACP--124--`

Name an apo-[acp]

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `HOLO--45--ACP--45--SYNTH--45--RXN`).

$$\frac{d}{dt} \text{--124--apo--45--ACP--124--} = -v_{190} \quad (989)$$

6.318. Species `_2_45_D_45_THREO_45_HYDROXY_45_3_45_CARBOXY_45--ISOCAPROATE`

Name 3-isopropylmalate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `_3_45_ISOPROPYLMALDEHYDROG--45--RXN` and as a product in `RXN--45--8991`).

$$\begin{aligned} \frac{d}{dt} \text{_2_45_D_45_THREO_45_HYDROXY_45_3_45_CARBOXY_45--ISOCAPROATE} \\ = v_{288} - v_{161} \end{aligned} \quad (990)$$

6.319. Species `METHYLENE_45_THF_45_GLU_45_N`

Name a 5,10-methylene-tetrahydrofolate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN0--45--2921` and as a product in `RXN0--45--2921`).

$$\frac{d}{dt} \text{METHYLENE_45_THF_45_GLU_45_N} = v_{127} - v_{127} \quad (991)$$

6.320. Species CARBON__45__DIOXIDE

Name CO2

Initial amount 0 mol

This species takes part in 22 reactions (as a reactant in DETHIOBIOTIN__45__SYN__45__RXN and as a product in PREPHENATEDEHYDRAT__45__RXN, OROTPDECARB__45__RXN, HEMN__45__RXN, _3__45__OXOACYL__45__ACP__45__SYNTH__45__BASE__45__RXN, RXN__45__8447, IGPSYN__45__RXN, _3__45__OXOACYL__45__ACP__45__SYNTH__45__RXN, ACETOOHBUTSYN__45__RXN, DXS__45__RXN, RXN__45__7800, RXNO__45__1134, MALONYL__45__ACPDECARBOX__45__RXN, RXNO__45__2141, DIAMINOPIMDECARB__45__RXN, RXN__45__3341, _6PGLUCONDEHYDROG__45__RXN, ACETOLACTSYN__45__RXN, PYRUVDEH__45__RXN, _20XOGLUTARATEDEH__45__RXN, _20XOGLUTDECARB__45__RXN, SAMDECARB__45__RXN).

$$\begin{aligned} \frac{d}{dt} \text{CARBON__45__DIOXIDE} = & v_{46} + v_{72} + 2v_{115} + v_{122} + v_{123} + v_{129} + v_{135} + v_{152} \\ & + v_{159} + v_{169} + v_{177} + v_{189} + v_{205} + v_{216} + v_{229} \\ & + v_{245} + v_{273} + v_{312} + v_{317} + v_{320} + v_{328} - v_{209} \end{aligned} \quad (992)$$

6.321. Species SULFATE

Name sulfate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in SULFATE__45__ADENYLYLTRANS__45__RXN).

$$\frac{d}{dt} \text{SULFATE} = -v_{294} \quad (993)$$

6.322. Species __124__Lysine__45__or__45__DAP__124__

Name an L-lysine or meso-2,6-diaminoheptanedioate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN__45__8972).

$$\frac{d}{dt} \text{__124__Lysine__45__or__45__DAP__124__} = -v_{259} \quad (994)$$

6.323. Species UDP__45__ACETYL__45__CARBOXYVINYL__45__GLUCOSAMINE

Name UDP-GlcNAc-enolpyruvate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [UDPNACETYLMURAMATEDEHYDROG-__45__RXN](#) and as a product in [UDPNACETYLGLUCOSAMENOLPYRTRANS__45__RXN](#)).

$$\frac{d}{dt}\text{UDP_45_ACETYL_45_CARBOXYVINYL_45_GLUCOSAMINE} = v_{153} - v_{298} \quad (995)$$

6.324. Species __124__Pi__124__

Name phosphate

Initial amount 0 mol

This species takes part in 48 reactions (as a reactant in [DEOXYADENPHOSPHOR__45__RXN](#), [GUANPHOSPHOR__45__RXN](#), [PHOSACETYLTRANS__45__RXN](#), [INOPHOSPHOR__45__RXN](#), [ADENPHOSPHOR__45__RXN](#), [PNP__45__RXN](#), [DEOXYGUANPHOSPHOR__45__RXN](#), [DEOXYINOPHOSPHOR__45__RXN](#), [RXNO__45__5199](#), [2__46__7__46__7__46__8__45__RXN](#), [PTAALT__45__RXN](#), [GAPOXNPHOSPHN__45__RXN](#) and as a product in [INORGPYROPHOSPHAT__45__RXN](#), [DIHYDROFOLATESYNTH__45__RXN](#), [CHORISMATE__45__SYNTHASE__45__RXN](#), [ORNCARBAMTRANSFER__45__RXN](#), [RXN__45__6102](#), [RXN__45__9](#), [S__45__ADENMETSYN__45__RXN](#), [GLUTATHIONE__45__SYN__45__RXN](#), [UDP__45__NACMURALA__45__GLU__45__LIG__45__RXN](#), [3__45__DEHYDROQUINATE__45__SYNTHASE__45__RXN](#), [RXNO__45__2921](#), [6__46__3__46__2__46__10__45__RXN](#), [MYO__45__INOSITOL__45__10R__45__4__45__MONOPHOSPHATASE__45__RXN](#), [ASPCARBTRANS__45__RXN](#), [RXN__45__8442](#), [UDP__45__NACMURALGLDAPLIG__45__RXN](#), [UDPNACETYLGLUCOSAMENOLPYRTRANS__45__RXN](#), [CARBPSYN__45__RXN](#), [GLUTCYSLIG__45__RXN](#), [THRESYN__45__RXN](#), [DAHPSYN__45__RXN](#), [ADENYLOSUCCINATE__45__SYNTHASE__45__RXN](#), [DETHIOBIOTIN__45__SYN__45__RXN](#), [ASPARTATE__45__SEMIALDEHYDE__45__DEHYDROGENASE__45__RXN](#), [RXN__45__3742](#), [CTPSYN__45__RXN](#), [HISTIDPHOS__45__RXN](#), [FORMYLTHFGLUSYNTH__45__RXN](#), [RXN__45__8972](#), [UDP__45__NACMURALGLDAPAALIG__45__RXN](#), [RXN__45__8973](#), [UNDECAPRENYL__45__DIPHOSPHATASE__45__RXN](#), [N__45__ACETYLGLUTPREDUCT__45__RXN](#), [2__46__5__46__1__46__19__45__RXN](#), [FOLYLPOLYGLUTAMATESYNTH__45__RXN](#), [UDP__45__NACMUR__45__ALA__45__LIG__45__RXN](#)).

$$\begin{aligned} \frac{d}{dt}\text{__124__Pi__124__} = & 2v_2 + v_{14} + v_{35} + v_{45} + v_{51} + v_{83} + v_{87} + v_{90} + v_{94} + v_{113} + v_{127} \\ & + v_{128} + v_{130} + v_{142} + v_{147} + v_{150} + v_{153} + v_{158} + v_{164} + v_{186} \\ & + v_{200} + v_{201} + v_{209} + v_{214} + v_{233} + v_{247} + v_{254} + v_{256} + v_{259} \\ & + v_{260} + v_{263} + v_{269} + v_{279} + v_{311} + v_{313} + v_{336} - v_3 - v_{25} - v_{36} \\ & - v_{50} - v_{64} - v_{86} - v_{141} - v_{151} - v_{181} - v_{266} - v_{291} - v_{332} \end{aligned} \quad (996)$$

6.325. Species

[_124_tRNA_45_Containing_45_N1_45_Methylguanine_124_](#)

Name tRNA containing N1-methylguanine

Initial amount 0 mol

This species takes part in one reaction (as a product in [TRNA_45_GUANINE_45_N1_45-_45_METHYLTRANSFERASE_45_RXN](#)).

$$\frac{d}{dt} \text{_124_tRNA_45_Containing_45_N1_45_Methylguanine_124_} = v_{145} \quad (997)$$

6.326. Species [_124_General_45_RNA_45_Substrates_124_](#)

Name an RNA

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [_2_46_7_46_7_46_8_45-_RXN](#), [_3_46_1_46_13_46_1_45_RXN](#) and as a product in [_2_46_7_46_7_46_8-_45_RXN](#), [_3_46_1_46_13_46_1_45_RXN](#)).

$$\frac{d}{dt} \text{_124_General_45_RNA_45_Substrates_124_} = v_{266} + v_{325} - v_{266} - v_{325} \quad (998)$$

6.327. Species FUM

Name fumarate

Initial amount 0 mol

This species takes part in four reactions (as a product in [RXN_45_22](#), [AICARSYN_45-_RXN](#), [ARGSUCCINLYA_45_RXN](#), [AMPSYN_45_RXN](#)).

$$\frac{d}{dt} \text{FUM} = v_4 + v_{75} + v_{148} + v_{174} \quad (999)$$

6.328. Species [SUC_45_COA](#)

Name succinyl-CoA

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [TETHYDPICSUCC_45_RXN](#) and as a product in [RXN0_45_1147](#), [_20XOGLUTARATEDEH_45_RXN](#)).

$$\frac{d}{dt} \text{SUC_45_COA} = v_{192} + v_{317} - v_{183} \quad (1000)$$

6.329. Species CADAVERINE

Name cadaverine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0_45_5217](#)).

$$\frac{d}{dt}\text{CADAVERINE} = -v_{70} \quad (1001)$$

6.330. Species _124_Folatepolyglutamate_45_n_124_

Name a folylpolyglutamate(n)

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN_45_3742](#) and as a product in [RXN_45_3742](#)).

$$\frac{d}{dt}\text{_124_Folatepolyglutamate_45_n_124_} = v_{233} - v_{233} \quad (1002)$$

6.331. Species _124_Charged_45_GLN_45_tRNAs_124_

Name L-glutaminyI-tRNA_{Gln}

Initial amount 0 mol

This species takes part in one reaction (as a product in [GLUTAMINE_45_45_TRNA_45-_LIGASE_45_RXN](#)).

$$\frac{d}{dt}\text{_124_Charged_45_GLN_45_tRNAs_124_} = v_{71} \quad (1003)$$

6.332. Species D_45_ALANINE

Name D-alanine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0_45_5240](#)).

$$\frac{d}{dt}\text{D_45_ALANINE} = -v_{271} \quad (1004)$$

6.333. Species CPD__45__4211

Name dimethylallyl-diphosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in GPPSYN__45__RXN, RXN__45__4543 and as a product in RXN0__45__884).

$$\frac{d}{dt} \text{CPD_45_4211} = v_{321} - v_{44} - v_{58} \quad (1005)$$

6.334. Species THR

Name L-threonine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in THREONINE__45____45__TRNA__45__LIGASE__45__RXN and as a product in THRESYN__45__RXN).

$$\frac{d}{dt} \text{THR} = v_{186} - v_{40} \quad (1006)$$

6.335. Species __124__Protein__45__Red__45__Disulfides__124__

Name a protein with reduced sulfide groups

Initial amount 0 mol

This species takes part in one reaction (as a reactant in DISULFOXRED__45__RXN).

$$\frac{d}{dt} \text{__124__Protein__45__Red__45__Disulfides__124__} = -v_{22} \quad (1007)$$

6.336. Species THF

Name tetrahydrofolate

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in RXN__45__6102, GLYOHMETRANS__45__RXN, RXN__45__2881 and as a product in DIHYDROFOLATEREDUCT__45__RXN, METHIONYL__45__TRNA__45__FORMYLTRANSFERASE__45__RXN, AICARTRANSFORM__45__RXN, _3__45__CH3__45__2__45__OXOBUTANOATE__45__OH__45__CH3__45__XFER__45__RXN).

$$\frac{d}{dt} \text{THF} = v_{185} + v_{199} + v_{318} + v_{330} - v_{51} - v_{165} - v_{198} \quad (1008)$$

6.337. Species LACTOSE__45__6P

Name lactose 6'-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in LACTOSEPHOSPHO__45__RXN).

$$\frac{d}{dt}\text{LACTOSE_45_6P} = v_{66} \quad (1009)$$

6.338. Species HISTIDINOL

Name histidinol

Initial amount 0 mol

This species takes part in three reactions (as a reactant in RXN__45__8001, HISTOLDEHYD__45__RXN and as a product in HISTIDPHOS__45__RXN).

$$\frac{d}{dt}\text{HISTIDINOL} = v_{254} - v_{221} - v_{231} \quad (1010)$$

6.339. Species

__124__tRNA__45__Containing__45__6Isopentenyladenosine__124__

Name tRNA containing 6-Isopentenyladenosine

Initial amount 0 mol

This species takes part in one reaction (as a product in TRNA__45__ISOPENTENYLTRANSFERASE__45__RXN).

$$\frac{d}{dt}\text{__124__tRNA_45_Containing_45_6Isopentenyladenosine_124__} = v_{114} \quad (1011)$$

6.340. Species __124__HIS__45__tRNAs__124__

Name tRNA_{His}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in HISTIDINE__45__45__TRNA__45__LIGASE__45__RXN).

$$\frac{d}{dt}\text{__124__HIS_45__tRNAs_124__} = -v_{79} \quad (1012)$$

6.341. Species [_5_45_METHYLTHIOADENOSINE](#)

Name S-methyl-5'-thioadenosine

Initial amount 0 mol

This species takes part in two reactions (as a product in [RXNO_45_5217](#), [SPERMIDINESYN-_45_RXN](#)).

$$\frac{d}{dt} _5_45_METHYLTHIOADENOSINE = v_{70} + v_{268} \quad (1013)$$

6.342. Species [_3_45_P_45_SERINE](#)

Name 3-phospho-serine

Initial amount 0 mol

This species takes part in one reaction (as a product in [PSERTRANSAM_45_RXN](#)).

$$\frac{d}{dt} _3_45_P_45_SERINE = v_{237} \quad (1014)$$

6.343. Species [_124_Alkyl_45_Hydro_45_Peroxides_124_](#)

Name an alkylhydroperoxide

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [_1_46_11_46_1_46_15_45_-RXN](#)).

$$\frac{d}{dt} _124_Alkyl_45_Hydro_45_Peroxides_124_ = -v_{11} \quad (1015)$$

6.344. Species [DIHYDROSIROHYDROCHLORIN](#)

Name precorrin-2

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DIMETHUROPORDEHYDROG_45_-RXN](#) and as a product in [RXN_45_8675](#)).

$$\frac{d}{dt} DIHYDROSIROHYDROCHLORIN = v_{175} - v_{69} \quad (1016)$$

6.345. Species ACYL_45_ACP

Name an acyl-[acp]

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [_3_45_OXOACYL_45_ACP_45-_SYNTH_45_RXN](#) and as a product in [ENOYL_45_ACP_45_REDUCT_45_NADH_45_RXN](#), [ENOYL_45_ACP_45_REDUCT_45_NADPH_45_RXN](#)).

$$\frac{d}{dt} \text{ACYL_45_ACP} = v_{103} + v_{210} - v_{135} \quad (1017)$$

6.346. Species UBIQUINOL_45_8

Name ubiquinol-8

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [CYT_45_UBIQUINOL_45_OXID-_45_RXN](#)).

$$\frac{d}{dt} \text{UBIQUINOL_45_8} = -2v_{212} \quad (1018)$$

6.347. Species INOSINE

Name inosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [INOPHOSPHOR_45_RXN](#)).

$$\frac{d}{dt} \text{INOSINE} = -v_{50} \quad (1019)$$

6.348. Species _124_VAL_45_tRNAs_124_

Name tRNA^{Val}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [VALINE_45_45_TRNA_45-_LIGASE_45_RXN](#)).

$$\frac{d}{dt} \text{_124_VAL_45_tRNAs_124_} = -v_{65} \quad (1020)$$

6.349. Species `--124_DNA_45_With_45_G_45_A_45_Mismatch_124_`

Name DNA with G-A mismatch

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0_45_2661`).

$$\frac{d}{dt} \text{--124_DNA_45_With_45_G_45_A_45_Mismatch_124_} = -v_{202} \quad (1021)$$

6.350. Species `FARNESYL_45_PP`

Name (E,E)-farnesyl diphosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `RXN0_45_5180`, `HEMEOSYN_45_RXN` and as a product in `FPPSYN_45_RXN`).

$$\frac{d}{dt} \text{FARNESYL_45_PP} = v_{220} - v_{140} - v_{163} \quad (1022)$$

6.351. Species `CHORISMATE`

Name chorismate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `CHORISMATEMUT_45_RXN`, `ANTHRANSYN_45_RXN` and as a product in `CHORISMATE_45_SYNTHASE_45_RXN`).

$$\frac{d}{dt} \text{CHORISMATE} = v_{35} - v_8 - v_{302} \quad (1023)$$

6.352. Species `MYO_45_INOSITOL`

Name myo-inositol

Initial amount 0 mol

This species takes part in one reaction (as a product in `MYO_45_INOSITOL_45_10R_45_4_45_MONOPHOSPHATASE_45_RXN`).

$$\frac{d}{dt} \text{MYO_45_INOSITOL} = v_{130} \quad (1024)$$

6.353. Species L_45_BETA_45_ASPARTYL_45_P

Name L-aspartyl-4-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ASPARTATE_45_SEMIALDEHYDE_45_DEHYDROGENASE_45_RXN](#) and as a product in [ASPARTATEKIN_45_RXN](#)).

$$\frac{d}{dt} \text{L_45_BETA_45_ASPARTYL_45_P} = v_{85} - v_{214} \quad (1025)$$

6.354. Species _124_N_45_Substituted_45_Amino_45_Acids_124_

Name an N-substituted amino acid

Initial amount 0 mol

This species takes part in one reaction (as a product in [AMINOCYL_45_TRNA_45_HYDROLASE_45_RXN](#)).

$$\frac{d}{dt} \text{_124_N_45_Substituted_45_Amino_45_Acids_124_} = v_{248} \quad (1026)$$

6.355. Species ADP

Name ADP

Initial amount 0 mol

This species takes part in 41 reactions (as a reactant in [PROPKIN_45_RXN](#), [PEPDEPHOS_45_RXN](#), [ADPREDUCT_45_RXN](#) and as a product in [DEPHOSPHOCOAKIN_45_RXN](#), [DIHYDROFOLATESYNTH_45_RXN](#), [RIBOFLAVINKIN_45_RXN](#), [RXN_45_6102](#), [UMPKI_45_RXN](#), [ASPARTATEKIN_45_RXN](#), [GLUTATHIONE_45_SYN_45_RXN](#), [ADENYLYLSULFKIN_45_RXN](#), [UDP_45_NACMURALA_45_GLU_45_LIG_45_RXN](#), [RXNO_45_2921](#), [_6_46_3_46_2_46_10_45_RXN](#), [ACETATEKIN_45_RXN](#), [_3_46_6_46_1_46_41_45_RXN](#), [DTMPKI_45_RXN](#), [THI_45_P_45_KIN_45_RXN](#), [UDP_45_NACMURALGLDAPLIG_45_RXN](#), [ADENYL_45_KIN_45_RXN](#), [CARBPSYN_45_RXN](#), [GLUTCYSLIG_45_RXN](#), [ACETYLGLUTKIN_45_RXN](#), [RXN_45_7958](#), [DETHIOBIOTIN_45_SYN_45_RXN](#), [RXN_45_3742](#), [SHIKIMATE_45_KINASE_45_RXN](#), [PHOSGLYPHOS_45_RXN](#), [GMKALT_45_RXN](#), [CTPSYN_45_RXN](#), [FORMYLTHFGLUSYNTH_45_RXN](#), [NAD_45_KIN_45_RXN](#), [RXN_45_8972](#), [UDP_45_NACMURALGLDAPAALIG_45_RXN](#), [GUANYL_45_KIN_45_RXN](#), [RXN_45_8973](#), [HOMOSERKIN_45_RXN](#), [_6PFRUCTPHOS_45_RXN](#), [FOLYLPOLYGLUTAMATESYNTH_45_RXN](#), [_2_46_7_46_1_46_148_45_RXN](#), [UDP_45_NACMUR_45_ALA_45_LIG_45_RXN](#)).

$$\begin{aligned} \frac{d}{dt} \text{ADP} = & v_{10} + v_{14} + v_{28} + v_{51} + v_{84} + v_{85} + v_{90} + v_{92} + v_{94} + v_{127} + v_{128} + v_{133} \\ & + 2v_{136} + v_{137} + v_{138} + v_{150} + 2v_{154} + 2v_{158} + v_{164} + v_{167} + v_{195} \\ & + v_{209} + v_{233} + v_{235} + v_{240} + v_{246} + v_{247} + v_{256} + v_{257} + v_{259} + v_{260} \\ & + v_{262} + v_{263} + v_{275} + v_{303} + v_{313} + v_{327} + v_{336} - v_{37} - v_{68} - v_{300} \end{aligned} \quad (1027)$$

6.356. Species `--124--Protein--45--Disulfides--124--`

Name a protein disulfide

Initial amount 0 mol

This species takes part in two reactions (as a product in `_1_46_11_46_1_46_15_45_--RXN`, `RXN0_45_882`).

$$\frac{d}{dt} \text{--124--Protein--45--Disulfides--124--} = v_{11} + v_{323} \quad (1028)$$

6.357. Species UMP

Name UMP

Initial amount 0 mol

This species takes part in four reactions (as a reactant in `UMPKI_45_RXN` and as a product in `OROTPDECARB_45_RXN`, `PHOSNACMURPENTATRANS_45_RXN`, `RXN_45_8975`).

$$\frac{d}{dt} \text{UMP} = v_{72} + v_{77} + v_{265} - v_{84} \quad (1029)$$

6.358. Species `DEAMIDO_45_NAD`

Name deamido-NAD

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `NAD_45_SYNTH_45_NH3_45_--RXN`, `NAD_45_SYNTH_45_GLN_45_RXN` and as a product in `NICONUCADENYLYLTRAN_45_RXN`).

$$\frac{d}{dt} \text{DEAMIDO_45_NAD} = v_{287} - v_{89} - v_{253} \quad (1030)$$

6.359. Species PROPIONYL__45__COA

Name propionyl-CoA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in PTAALT__45__RXN).

$$\frac{d}{dt}\text{PROPIONYL__45__COA} = -v_{291} \quad (1031)$$

6.360. Species DNA__32__apurinic__32__or__32__apyrimidinic__32__40__AP__41__32__site__32__following__32__glycosidic__32__bond__32__cleavage__32__during__32__repair__32__process

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN0__45__2581).

$$\frac{d}{dt}\text{DNA__32__apurinic__32__or__32__apyrimidinic__32__40__AP__41__32__site__32__following__32__glycosidic__32__bond__32__cleavage__32__during__32__repair__32__process} = -v_{333}$$

6.361. Species HYPOXANTHINE

Name hypoxanthine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in HYPXPRIBOSYLTRAN__45__RXN, HYPOXANPRIBOSYLTRAN__45__RXN and as a product in INOPHOSPHOR__45__RXN, DEOXYINOPHOSPHOR__45__RXN).

$$\frac{d}{dt}\text{HYPOXANTHINE} = v_{50} + v_{151} - v_{82} - v_{239} \quad (1033)$$

6.362. Species _10__45__FORMYL__45__THF

Name 10-formyl-tetrahydrofolate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in METHIONYL__45__TRNA__45__FORMYLTRANSFERASE__45__RXN, AICARTRANSFORM__45__RXN and as a product in METHENYLTHFCYCLOHYDRO__45__RXN).

$$\frac{d}{dt}\text{_10__45__FORMYL__45__THF} = v_{236} - v_{199} - v_{318} \quad (1034)$$

6.363. Species `O_45_PHOSPHO_45_L_45_HOMOSERINE`

Name O-phospho-L-homoserine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `THRESYN_45_RXN` and as a product in `HOMOSERKIN_45_RXN`).

$$\frac{d}{dt}O_45_PHOSPHO_45_L_45_HOMOSERINE = v_{275} - v_{186} \quad (1035)$$

6.364. Species `SHIKIMATE_45_5P`

Name shikimate-3-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `_2_46_5_46_1_46_19_45_-RXN` and as a product in `SHIKIMATE_45_KINASE_45_RXN`).

$$\frac{d}{dt}SHIKIMATE_45_5P = v_{235} - v_{311} \quad (1036)$$

6.365. Species `guanine_45_34_32_of_32_tRNA_32_with_32_a_32_GU_40_N_41_32_anticodon`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `RXN0_45_1321`).

$$\frac{d}{dt}guanine_45_34_32_of_32_tRNA_32_with_32_a_32_GU_40_N_41_32_anticodon = -v_{48} \quad (1037)$$

6.366. Species `_3_45_ENOLPYRUVYL_45_SHIKIMATE_45_5P`

Name 5-enolpyruvyl-shikimate-3-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `CHORISMATE_45_SYNTHASE_45_RXN` and as a product in `_2_46_5_46_1_46_19_45_RXN`).

$$\frac{d}{dt}_3_45_ENOLPYRUVYL_45_SHIKIMATE_45_5P = v_{311} - v_{35} \quad (1038)$$

6.367. Species PAPS

Name phosphoadenosine-5'-phosphosulfate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [1_46_8_46_4_46_8_45_-RXN](#) and as a product in [ADENYLYLSULFKIN_45_RXN](#)).

$$\frac{d}{dt}\text{PAPS} = v_{92} - v_{21} \quad (1039)$$

6.368. Species SER

Name L-serine

Initial amount 0 mol

This species takes part in six reactions (as a reactant in [SERINE_45_45_TRNA_45_-LIGASE_45_RXN](#), [GLYOHEMETRANS_45_RXN](#), [TRYPSYN_45_RXN](#), [SERINE_45_0_45_ACETTRAN_45_RXN](#), [RXN0_45_2161](#), [RXN0_45_2382](#)).

$$\frac{d}{dt}\text{SER} = -v_{162} - v_{165} - v_{193} - v_{230} - v_{244} - v_{304} \quad (1040)$$

6.369. Species CPD_45_9038

Name precorrin-1

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN_45_8675](#) and as a product in [UROPORIIIMETHYLTRANSA_45_RXN](#)).

$$\frac{d}{dt}\text{CPD}_45_9038 = v_{252} - v_{175} \quad (1041)$$

6.370. Species _124_Ubiquinones_124_

Name a ubiquinone

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [NADH_45_DEHYDROG_45_A_45_RXN](#) and as a product in [RXN0_45_5268](#)).

$$\frac{d}{dt}\text{_124_Ubiquinones_124_} = 2v_{316} - v_{95} \quad (1042)$$

6.371. Species CPD__45__602

Name 5-amino-6-(5'-phosphoribosylamino)uracil

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RIBOFLAVINSYNREDUC__45__RXN and as a product in RIBOFLAVINSYNDEAM__45__RXN).

$$\frac{d}{dt}\text{CPD_45_602} = v_{191} - v_{232} \quad (1043)$$

6.372. Species

[_1__45__AMINO__45__PROPAN__45__2__45__ONE__45__3__45__PHOSPHATE](#)

Name 1-amino-propan-2-one-3-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN__45__8447).

$$\frac{d}{dt}\text{_1__45__AMINO__45__PROPAN__45__2__45__ONE__45__3__45__PHOSPHATE} = v_{123} \quad (1044)$$

6.373. Species

[__124__Pyruvate__45__dehydrogenase__45__acetylDHLipoyl__124__](#)

Name lipoate acetyltransferase N6-(S-acetyldihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in RXN0__45__1133 and as a product in RXN0__45__1134).

$$\frac{d}{dt}\text{__124__Pyruvate__45__dehydrogenase__45__acetylDHLipoyl__124__} = v_{177} - v_{178} \quad (1045)$$

6.374. Species THIAMINE__45__PYROPHOSPHATE

Name thiamine diphosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in THI__45__P__45__KIN__45__RXN).

$$\frac{d}{dt}\text{THIAMINE__45__PYROPHOSPHATE} = v_{138} \quad (1046)$$

6.375. Species `_124_Charged_45_GLY_45_tRNAs_124_`

Name glycyl-tRNAgly

Initial amount 0 mol

This species takes part in one reaction (as a product in `GLYCINE_45_45_TRNA_45-_LIGASE_45_RXN`).

$$\frac{d}{dt} \text{_124_Charged_45_GLY_45_tRNAs_124_} = v_{26} \quad (1047)$$

6.376. Species `D_45_6_45_P_45_GLUCONO_45_DELTA_45_LACTONE`

Name D-glucono-δ-lactone-6-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `_6PGLUCONOLACT_45_RXN` and as a product in `GLU6PDEHYDROG_45_RXN`).

$$\frac{d}{dt} \text{_D_45_6_45_P_45_GLUCONO_45_DELTA_45_LACTONE} = v_{78} - v_7 \quad (1048)$$

6.377. Species `_7_45_8_45_DIHYDROPTEROATE`

Name 7,8-dihydropteroate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `DIHYDROFOLATESYNTH_45_RXN`).

$$\frac{d}{dt} \text{_7_45_8_45_DIHYDROPTEROATE} = -v_{14} \quad (1049)$$

6.378. Species `DNA_45_N`

Name DNAn

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `DNA_45_DIRECTED_45_DNA-_45_POLYMERASE_45_RXN` and as a product in `DNA_45_DIRECTED_45_DNA_45_POLYMERASE-_45_RXN`).

$$\frac{d}{dt} \text{_DNA_45_N} = v_{146} - v_{146} \quad (1050)$$

6.379. Species [_124__tRNA__45__Containing__45__Guanine__124__](#)

Name tRNA containing guanine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [QUEUOSINE__45__TRNA__45__-__RIBOSYLTRANSFERASE__45__RXN](#)).

$$\frac{d}{dt} \text{_124_tRNA_45_Containing_45_Guanine_124_} = -v_{54} \quad (1051)$$

6.380. Species [GUANINE](#)

Name guanine

Initial amount 0 mol

This species takes part in six reactions (as a reactant in [GUANPRIBOSYLTRAN__45__RXN](#) and as a product in [GUANPHOSPHOR__45__RXN](#), [RXNO__45__1321](#), [QUEUOSINE__45__TRNA__45__-__RIBOSYLTRANSFERASE__45__RXN](#), [DEOXYGUANPHOSPHOR__45__RXN](#), [RXNO__45__5199](#)).

$$\frac{d}{dt} \text{GUANINE} = v_{25} + v_{48} + v_{54} + v_{141} + v_{181} - v_{143} \quad (1052)$$

6.381. Species [AMINO__45__RIBOSYLAMINO__45__1H__45__3H__45__PYR__45__DIONE](#)

Name 5-amino-6-ribitylamino-2,4(1H,3H)-pyrimidinedione

Initial amount 0 mol

This species takes part in one reaction (as a product in [RIBOFLAVIN__45__SYN__45__RXN](#)).

$$\frac{d}{dt} \text{AMINO__45__RIBOSYLAMINO__45__1H__45__3H__45__PYR__45__DIONE} = v_{120} \quad (1053)$$

6.382. Species [NIACINE](#)

Name nicotinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [NICOTINATEPRIBOSYLTRANS__45__RXN](#), [RXN__45__8442](#)).

$$\frac{d}{dt} \text{NIACINE} = -v_{116} - v_{147} \quad (1054)$$

6.383. Species S8

Name S0

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [2_46_8_46_1_46_8_45_-RXN](#)).

$$\frac{d}{dt}S8 = -2v_{42} \quad (1055)$$

6.384. Species C_45_0_45_P_32_bond_32_3_38_apos_59_32_to_32-AP_32_site_32_in_32_DNA_32_intact

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [4_46_2_46_99_46_18_45_-RXN](#)).

$$\frac{d}{dt}C_45_0_45_P_32_bond_32_3_38_apos_59_32_to_32_AP_32_site_32_in_32_DNA_32_intact = -v_{170} \quad (1056)$$

6.385. Species 2_45_KETO_45_3_45_METHYL_45_VALERATE

Name 2-keto-3-methyl-valerate

Initial amount 0 mol

This species takes part in one reaction (as a product in [DIHYDROXYMETVALDEHYDRAT_45_-RXN](#)).

$$\frac{d}{dt}2_45_KETO_45_3_45_METHYL_45_VALERATE = v_{144} \quad (1057)$$

6.386. Species GLUTATHIONE

Name glutathione

Initial amount 0 mol

This species takes part in three reactions (as a product in [GLUTATHIONE_45_SYN_45_-RXN](#), [GLYOXII_45_RXN](#), [RXN_45_7919](#)).

$$\frac{d}{dt}GLUTATHIONE = v_{90} + v_{155} + v_{293} \quad (1058)$$

6.387. Species `--124--Sugar--124--`

Name a sugar

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `_2_46_7_46_1_46_69_45_-RXN`).

$$\frac{d}{dt} \text{--124--Sugar--124--} = -v_{106} \quad (1059)$$

6.388. Species `--124--Charged_45_SER_45_tRNAs--124--`

Name L-seryl-tRNA^{ser}

Initial amount 0 mol

This species takes part in one reaction (as a product in `SERINE_45_45_TRNA_45-LIGASE_45_RXN`).

$$\frac{d}{dt} \text{--124--Charged_45_SER_45_tRNAs--124--} = v_{162} \quad (1060)$$

6.389. Species `OCTANOYL_45_ACP`

Name octanoyl-ACP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RXN0_45_947`, `_2_46_3_46_1_46_181_45_RXN`).

$$\frac{d}{dt} \text{OCTANOYL_45_ACP} = -v_{13} - v_{17} \quad (1061)$$

6.390. Species `--124--Some_45_tRNA--124--`

Name a tRNA

Initial amount 0 mol

This species takes part in ten reactions (as a reactant in `RXN_45_4543`, `TRNA_45-ADENYLYLTRANSFERASE_45_RXN`, `TRNA_45-CYTIDYLYLTRANSFERASE_45_RXN`, `TRNA_45-ISOPENTENYLTRANSFERASE_45_RXN`, `_2_46_1_46_1_46_61_45_RXN`, `TRNA_45-GUANINE_45_N1_45_45_METHYLTRANSFERASE_45_RXN`, `TRNA_45_GUANINE_45_N7-45_45_METHYLTRANSFERASE_45_RXN` and as a product in `TRNA_45-ADENYLYLTRANSFERASE-45_RXN`, `TRNA_45-CYTIDYLYLTRANSFERASE_45_RXN`, `AMINOCYL_45_TRNA_45_HYDROLASE-45_RXN`).

$$\begin{aligned} \frac{d}{dt} \text{--124--Some_45_tRNA--124--} = & v_{102} + v_{108} + v_{248} - v_{58} - v_{102} \\ & - v_{108} - v_{114} - v_{131} - v_{145} - v_{281} \end{aligned} \quad (1062)$$

6.391. Species `_124_L_45_seryl_45_SEC_45_tRNAs_124_`**Name** L-seryl-tRNA^{sec}**Initial amount** 0 molThis species takes part in one reaction (as a product in `RXN0_45_2161`).

$$\frac{d}{dt} \text{_124_L_45_seryl_45_SEC_45_tRNAs_124_} = v_{244} \quad (1063)$$

6.392. Species `NICOTINATE_NUCLEOTIDE`**Name** nicotinate nucleotide**Initial amount** 0 molThis species takes part in two reactions (as a reactant in `NICONUCADENYLYLTRAN_45_RXN` and as a product in `NICOTINATEPRIBOSYLTRANS_45_RXN`).

$$\frac{d}{dt} \text{NICOTINATE_NUCLEOTIDE} = v_{116} - v_{287} \quad (1064)$$

6.393. Species `_124_Charged_45_ASP_45_tRNAs_124_`**Name** L-aspartyl-tRNA^{asp}**Initial amount** 0 molThis species takes part in one reaction (as a product in `ASPARTATE_45_45_TRNA_45-_LIGASE_45_RXN`).

$$\frac{d}{dt} \text{_124_Charged_45_ASP_45_tRNAs_124_} = v_{242} \quad (1065)$$

6.394. Species `P_45_RIBOSYL_45_4_45_SUCCCARB_45_AMINOIMIDAZOLE`**Name** 5'-phosphoribosyl-4-(N-succinocarboxamide)-5-aminoimidazole**Initial amount** 0 molThis species takes part in one reaction (as a reactant in `AICARSYN_45_RXN`).

$$\frac{d}{dt} \text{P_45_RIBOSYL_45_4_45_SUCCCARB_45_AMINOIMIDAZOLE} = -v_{75} \quad (1066)$$

6.395. Species MESO__45__DIAMINOPIMELATE

Name meso-diaminopimelate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in UDP__45__NACMURALGLDAPLIG__45__RXN, DIAMINOPIMDECARB__45__RXN and as a product in DIAMINOPIMEPIM__45__RXN).

$$\frac{d}{dt}\text{MESO__45__DIAMINOPIMELATE} = v_{290} - v_{150} - v_{216} \quad (1067)$$

6.396. Species DIHYDROXY__45__BUTANONE__45__P

Name 3,4-dihydroxy-2-butanone-4-P

Initial amount 0 mol

This species takes part in one reaction (as a product in DIOHBUTANONEPSYN__45__RXN).

$$\frac{d}{dt}\text{DIHYDROXY__45__BUTANONE__45__P} = v_{274} \quad (1068)$$

6.397. Species __124__DNA__45__With__45__Mismatched__45__Adenine__124__

Name DNA with removed adenine mismatch leaving an AP site

Initial amount 0 mol

This species takes part in one reaction (as a product in RXN0__45__2661).

$$\frac{d}{dt}\text{__124__DNA__45__With__45__Mismatched__45__Adenine__124__} = v_{202} \quad (1069)$$

6.398. Species WATER

Name H2O

Initial amount 0 mol

This species takes part in 71 reactions (as a reactant in INORGPYROPHOSPHAT__45__RXN, _6PGLUCONOLACT__45__RXN, RXN0__45__5225, SUCCDIAMINOPIMDESUCC__45__RXN, _3__46__5__46__1__46__28__45__RXN, S__45__ADENMETSYN__45__RXN, HISTALDEHYD__45__RXN, GTP__45__CYCLOHYDRO__45__II__45__RXN, RIBONUCLEOSIDE__45__DIP__45__REDUCTI__45__RXN, RXN0__45__1, _3__46__4__46__11__46__1__45__RXN, MYO__45__INOSITOL__45__10R__45__4__45__MONOPHOSPHATASE__45__RXN, ADENOSYLHOMOCYSTEINE__45__NUCLEOSIDASE__45__RXN, _3__46__6__46__1__46__41__45__RXN, GLYOXII__45__RXN, CARBPSYN__45__RXN, HEMEOSYN__45__RXN, _1__46__17__46__1__46__2__45__RXN, TETHYDPICSUCC__45__RXN, THRESYN__45__RXN,

DCTP_45_DEAM_45_RXN, RIBOFLAVINSYNDEAM_45_RXN, DUTP_45_PYROP_45_RXN, METHIONYL_45_TRNA_45_FORMYLTRANSFERASE_45_RXN, DAHPSYN_45_RXN, HISTPRATPHYD_45_RXN, RXN_45_6282, RXNO_45_385, METHENYLTHFCYCLOHYDRO_45_RXN, CTPSYN_45_RXN, AMINOCYL_45_TRNA_45_HYDROLASE_45_RXN, RXN_45_7933, ACETYLORNDEACET_45_RXN, NAD_45_SYNTH_45_GLN_45_RXN, HISTIDPHOS_45_RXN, 3_46_5_46_1_46_88_45_RXN, UNDECAPRENYL_45_DIPHOSPHATASE_45_RXN, 2_45_ISOPROPYLMALATESYN_45_RXN, RXN_45_8991, RXN_45_7919, 3_45_ISOPROPYLMALISOM_45_RXN, OHMETHYLBILANESYN_45_RXN, 3_45_CH3_45_2_45_OXOBUTANOATE_45_OH_45_CH3_45_XFER_45_RXN, HISTCYCLOHYD_45_RXN and as a product in 1_46_11_46_1_46_15_45_RXN, UDPREDUCT_45_RXN, 3_45_DEHYDROQUINATE_45_DEHYDRATASE_45_RXN, CDPREDUCT_45_RXN, PREPHENATEDEHYDRAT_45_RXN, DIHYDRODIPICSYN_45_RXN, DIHYDROOROT_45_RXN, IMPCYCLOHYDROLASE_45_RXN, IGPSYN_45_RXN, DIHYDROXYMETVALDEHYDRAT_45_RXN, GLYOHMETTRANS_45_RXN, TRYPSYN_45_RXN, RXN_45_2881, CYT_45_UBIQUINOL_45_OXID_45_RXN, IMIDPHOSDEHYD_45_RXN, 2PGADEHYDRAT_45_RXN, 3_45_ISOPROPYLMALISOM_45_RXN, DIHYDROXYISOVALDEHYDRAT_45_RXN, ADPREDUCT_45_RXN, RXNO_45_2382, ISPH2_45_RXN, SULFITE_45_REDUCT_45_RXN, RXNO_45_5268, GDPREDUCT_45_RXN, RXNO_45_884, RXNO_45_882, FRUCTOSEPHOSPHO_45_RXN).

$$\begin{aligned} \frac{d}{dt} \text{WATER} = & v_{11} + v_{18} + v_{30} + v_{38} + v_{46} + 2v_{67} + v_{76} + v_{80} + v_{129} + v_{144} + v_{165} + v_{193} + v_{198} \\ & + 2v_{212} + v_{213} + v_{243} + v_{295} + v_{297} + v_{300} + v_{304} + v_{307} + 3v_{310} + 2v_{316} + v_{319} \\ & + v_{321} + v_{323} + v_{326} - v_2 - v_7 - v_{55} - v_{57} - v_{62} - v_{87} - v_{88} - 3v_{91} - v_{109} - v_{111} \\ & - v_{117} - v_{130} - v_{132} - v_{136} - v_{155} - v_{158} - v_{163} - v_{173} - v_{183} - v_{186} - v_{188} - v_{191} \\ & - v_{194} - v_{199} - v_{200} - v_{203} - v_{215} - v_{219} - v_{236} - v_{247} - v_{248} - v_{250} - v_{251} \\ & - v_{253} - v_{254} - v_{267} - v_{269} - v_{286} - v_{288} - v_{293} - v_{295} - v_{299} - v_{330} - v_{334} \end{aligned} \quad (1070)$$

6.399. Species 124_Deoxynucleotides_124_

Name a deoxynucleotide

Initial amount 0 mol

This species takes part in two reactions (as a reactant in DNA_45_LIGASE_45_NAD_43_45_RXN and as a product in DNA_45_LIGASE_45_NAD_43_45_RXN).

$$\frac{d}{dt} \text{124_Deoxynucleotides_124_} = v_{296} - v_{296} \quad (1071)$$

6.400. Species DEOXY_45_RIBOSE_45_5P

Name deoxyribose-5-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in D_45_PPENTOMUT_45_RXN).

$$\frac{d}{dt} \text{DEOXY_45_RIBOSE_45_5P} = v_{238} \quad (1072)$$

6.401. Species `--124--rRNAs--124--`

Name rRNA

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `RRNA_45_ADENINE_45_N6-_45_45_METHYLTRANSFERASE_45_RXN`, `RRNA_45_GUANINE_45_N2_45_45_METHYLTRANSFERASE_45_RXN`).

$$\frac{d}{dt} \text{--124--rRNAs--124--} = -v_{24} - v_{97} \quad (1073)$$

6.402. Species `--124_Red_45_Thioredoxin--124--`

Name a reduced thioredoxin

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in `UDPREDUCT_45_RXN`, `1_46_8_46_4_46_8_45_RXN`, `CDPREDUCT_45_RXN`, `THIOREDOXIN_45_REDUCT_45_NADPH_45_RXN`, `ADPREDUCT_45_RXN`, `GDPREDUCT_45_RXN` and as a product in `RIBONUCLEOSIDE_45_DIP_45_REDUCTI_45_RXN`).

$$\frac{d}{dt} \text{--124_Red_45_Thioredoxin--124--} = v_{109} - v_{18} - v_{21} - v_{38} - v_{227} - v_{300} - v_{319} \quad (1074)$$

6.403. Species `--124_Charged_45_GLT_45_tRNAs--124--`

Name L-glutamyl-tRNAGlu

Initial amount 0 mol

This species takes part in one reaction (as a product in `GLURS_45_RXN`).

$$\frac{d}{dt} \text{--124_Charged_45_GLT_45_tRNAs--124--} = v_{105} \quad (1075)$$

6.404. Species `NACMUR`

Name N-acetylmuramate

Initial amount 0 mol

This species takes part in one reaction (as a product in `3_46_5_46_1_46_28_45_RXN`).

$$\frac{d}{dt} \text{NACMUR} = v_{62} \quad (1076)$$

6.405. Species ALPHA_45_GLC_45_6_45_P

Name α-D-glucose 6-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in RXN_45_6182).

$$\frac{d}{dt} \text{ALPHA_45_GLC_45_6_45_P} = -v_{204} \quad (1077)$$

6.406. Species _124_Charged_45_LEU_45_tRNAs_124_

Name L-leucyl-tRNA^{Leu}

Initial amount 0 mol

This species takes part in one reaction (as a product in LEUCINE_45_45_TRNA_45_-LIGASE_45_RXN).

$$\frac{d}{dt} \text{_124_Charged_45_LEU_45_tRNAs_124_} = v_{314} \quad (1078)$$

6.407. Species D_45_ALA_45_D_45_ALA

Name D-alanyl-D-alanine

Initial amount 0 mol

This species takes part in three reactions (as a reactant in _6_46_3_46_2_46_10_45_-RXN, UDP_45_NACMURALGLDAPAALIG_45_RXN, RXN_45_8973).

$$\frac{d}{dt} \text{D_45_ALA_45_D_45_ALA} = -v_{128} - v_{260} - v_{263} \quad (1079)$$

6.408. Species DELTA1_45_PIPERIDEINE_45_2_45_6_45_DICARBOXYLATE

Name tetrahydrodipicolinate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in TETHYDPICSUCC_45_RXN and as a product in DIHYDROPICRED_45_RXN).

$$\frac{d}{dt} \text{DELTA1_45_PIPERIDEINE_45_2_45_6_45_DICARBOXYLATE} = v_{121} - v_{183} \quad (1080)$$

6.409. Species SIROHYDROCHLORIN

Name sirohydrochlorin

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [SIROHEME__45__FERROCHELAT__45__RXN](#) and as a product in [DIMETHUROPORDEHYDROG__45__RXN](#)).

$$\frac{d}{dt}\text{SIROHYDROCHLORIN} = v_{69} - v_{32} \quad (1081)$$

6.410. Species __124__GLT__45__tRNAs__124__

Name tRNAGlu

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [GLURS__45__RXN](#)).

$$\frac{d}{dt}\text{__124__GLT__45__tRNAs__124__} = -v_{105} \quad (1082)$$

6.411. Species CPD__45__8259

Name nicotinate riboside

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN__45__8442](#)).

$$\frac{d}{dt}\text{CPD__45__8259} = v_{147} \quad (1083)$$

6.412. Species S__45__LACTOYL__45__GLUTATHIONE

Name S-lactoyl-glutathione

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [GLYOXII__45__RXN](#)).

$$\frac{d}{dt}\text{S__45__LACTOYL__45__GLUTATHIONE} = -v_{155} \quad (1084)$$

6.413. Species

`_124_N_45_formyl_45_L_45_methionyl_45_tRNAfmet_124_`

Name N-formyl-L-methionyl-tRNAfmet

Initial amount 0 mol

This species takes part in one reaction (as a product in `METHIONYL_45_TRNA_45_FORMYLTRANSFERASE_45_RXN`).

$$\frac{d}{dt} \text{_124_N_45_formyl_45_L_45_methionyl_45_tRNAfmet_124_} = v_{199} \quad (1085)$$

6.414. Species `_2K_45_4CH3_45_PENTANOATE`

Name 2-ketoisocaproate

Initial amount 0 mol

This species takes part in one reaction (as a product in `RXN_45_7800`).

$$\frac{d}{dt} \text{_2K_45_4CH3_45_PENTANOATE} = v_{169} \quad (1086)$$

6.415. Species PROTON

Name H+

Initial amount 0 mol

This species takes part in 26 reactions (as a reactant in `ACETOLACTREDUCTOISOM_45_RXN`, `_1_46_6_46_99_46_5_45_RXN`, `_1_46_5_46_1_46_20_45_RXN`, `HOMOSERDEHYDROG_45_RXN`, `NADH_45_DEHYDROG_45_A_45_RXN`, `DIHYDROPICREG_45_RXN`, `RXN_45_8447`, `FMNREDUCT_45_RXN`, `RIBOFLAVINSYNREDUC_45_RXN`, `SUPEROX_45_DISMUT_45_RXN`, `ISPH2_45_RXN`, `RXN0_45_5268`, `RXN0_45_884` and as a product in `SIROHEME_45_FERROCHELAT_45_RXN`, `GLU6PDEHYDROG_45_RXN`, `RXN_45_8629`, `_3_45_ISOPROPYLMALDEHYDROG_45_RXN`, `RXN0_45_1132`, `FLAVONADPREDUCT_45_RXN`, `_1_46_18_46_1_46_2_45_RXN`, `RXN_45_8001`, `THIOREDOXIN_45_REDUCT_45_NADPH_45_RXN`, `RXN_45_7719`, `RXN_45_7716`, `_1_46_8_46_1_46_4_45_RXN`, `RXN0_45_5268`).

$$\begin{aligned} \frac{d}{dt} \text{PROTON} = & 2v_{32} + v_{78} + v_{119} + v_{161} + v_{179} + v_{182} + v_{206} + 2v_{221} + v_{227} \\ & + v_{278} + v_{280} + v_{292} + 4v_{316} - v_6 - v_{29} - v_{33} - v_{93} - v_{95} \\ & - v_{121} - v_{123} - v_{134} - v_{232} - 2v_{289} - v_{307} - 4v_{316} - v_{321} \end{aligned} \quad (1087)$$

6.416. Species `_4_45_PHOSPHONOOXY_45_THREONINE`

Name 4-(phosphonooxy)-threonine

Initial amount 0 mol

This species takes part in one reaction (as a product in `PSERTRANSAMPYR_45_RXN`).

$$\frac{d}{dt} \text{_4_45_PHOSPHONOOXY_45_THREONINE} = v_{60} \quad (1088)$$

6.417. Species `_2_45_KETOGLUTARATE`

Name 2-ketoglutarate

Initial amount 0 mol

This species takes part in eight reactions (as a reactant in `RXN_45_7562`, `_2OXOGLUTARATEDEH-_45_RXN`, `_2OXOGLUTDECARB_45_RXN` and as a product in `PSERTRANSAMPYR_45_RXN`, `HISTAMINOTRANS_45_RXN`, `ACETYLORNTRANSAM_45_RXN`, `PSERTRANSAM_45_RXN`, `SUCCINYLDIAMINOPIMTRA_45_RXN`).

$$\frac{d}{dt} \text{_2_45_KETOGLUTARATE} = v_{60} + v_{149} + v_{166} + v_{237} + v_{272} - v_{168} - v_{317} - v_{320} \quad (1089)$$

6.418. Species `XYLULOSE_45_5_45_PHOSPHATE`

Name D-xylulose-5-phosphate

Initial amount 0 mol

This species takes part in three reactions (as a reactant in `_1TRANSKETO_45_RXN`, `_2TRANSKETO-_45_RXN` and as a product in `RIBULP3EPIM_45_RXN`).

$$\frac{d}{dt} \text{XYLULOSE_45_5_45_PHOSPHATE} = v_{23} - v_{255} - v_{324} \quad (1090)$$

6.419. Species `GLYCEROL`

Name glycerol

Initial amount 0 mol

This species takes part in one reaction (as a product in `CARDIOLIPSYN_45_RXN`).

$$\frac{d}{dt} \text{GLYCEROL} = v_{104} \quad (1091)$$

6.420. Species ACETALD

Name acetaldehyde

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_5234](#)).

$$\frac{d}{dt}\text{ACETALD} = v_{261} \quad (1092)$$

6.421. Species

[_124_0xo_45_glutarate_45_dehydrogenase_45_lipoyl_124_](#)

Name dihydrolipoyltranssuccinylase N6-(lipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_20XOGLUTDECARB_45_RXN](#) and as a product in [RXN_45_7716](#)).

$$\frac{d}{dt}\text{_124_0xo_45_glutarate_45_dehydrogenase_45_lipoyl_124_} = v_{280} - v_{320} \quad (1093)$$

6.422. Species [_2C_45_METH_45_D_45_ERYTHRITOL_45_CYCLODIPHOSPHATE](#)

Name 2-C-methyl-D-erythritol-2,4-cyclodiphosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0_45_882](#) and as a product in [RXN0_45_302](#)).

$$\frac{d}{dt}\text{_2C_45_METH_45_D_45_ERYTHRITOL_45_CYCLODIPHOSPHATE} = v_{56} - v_{323} \quad (1094)$$

6.423. Species FMNH2

Name FMNH2

Initial amount 0 mol

This species takes part in two reactions (as a product in [FMNREDUCT_45_RXN](#), [R343_45_](#)
[_RXN](#)).

$$\frac{d}{dt}\text{FMNH2} = v_{134} + v_{284} \quad (1095)$$

6.424. Species GMP

Name GMP

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [GUANYL__45__KIN__45__RXN](#) and as a product in [GMP__45__REDUCT__45__RXN](#), [GUANPRIBOSYLTRAN__45__RXN](#)).

$$\frac{d}{dt}\text{GMP} = v_{107} + v_{143} - v_{262} \quad (1096)$$

6.425. Species HYDROGEN__45__PEROXIDE

Name H2O2

Initial amount 0 mol

This species takes part in two reactions (as a product in [DIHYDROOROTOX__45__RXN](#), [SUPEROX--__45__DISMUT__45__RXN](#)).

$$\frac{d}{dt}\text{HYDROGEN__45__PEROXIDE} = v_{34} + v_{289} \quad (1097)$$

6.426. Species FMN

Name FMN

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [FADSYN__45__RXN](#), [FMNREDUCT--__45__RXN](#), [R343__45__RXN](#) and as a product in [RIBOFLAVINKIN__45__RXN](#)).

$$\frac{d}{dt}\text{FMN} = v_{28} - v_{61} - v_{134} - v_{284} \quad (1098)$$

6.427. Species CPD__45__8537

Name tRNA pseudouridine

Initial amount 0 mol

This species takes part in one reaction (as a product in [TRNA__45__PSEUDOURIDINE__45__--SYNTHASE__45__I__45__RXN](#)).

$$\frac{d}{dt}\text{CPD__45__8537} = v_9 \quad (1099)$$

6.428. Species PPI

Name diphosphate

Initial amount 0 mol

This species takes part in 58 reactions (as a reactant in INORGPYROPHOSPHAT__45__RXN and as a product in GLYCINE__45__45__TRNA__45__LIGASE__45__RXN, RXN__45__10, PANTEPADENYLYLTRAN__45__RXN, THREONINE__45__45__TRNA__45__LIGASE__45__RXN, DECAPCISTRANSFER__45__RXN, GPPSYN__45__RXN, ARGSUCCINSYN__45__RXN, RXN__45__4543, ATPPHOSPHORIBOSYLTRANS__45__RXN, FADSYN__45__RXN, PHENYLALANINE__45__45__TRNA__45__LIGASE__45__RXN, VALINE__45__45__TRNA__45__LIGASE__45__RXN, GLUTAMINE__45__45__TRNA__45__LIGASE__45__RXN, RXNO__45__2023, HISTIDINE__45__45__TRNA__45__LIGASE__45__RXN, HYPXPRIBOSYLTRAN__45__RXN, S__45__ADENMETSYN__45__RXN, NAD__45__SYNTH__45__NH3__45__RXN, GTP__45__CYCLOHYDRO__45__II__45__RXN, DNA__45__DIRECTED__45__RNA__45__POLYMERASE__45__RXN, TRYPTOPHAN__45__45__TRNA__45__LIGASE__45__RXN, ARGININE__45__45__TRNA__45__LIGASE__45__RXN, TRNA__45__ADENYLYLTRANSFERASE__45__RXN, GLURS__45__RXN, TRNA__45__CYTIDYLYLTRANSFERASE__45__RXN, TRNA__45__ISOPENTENYLTRANSFERASE__45__RXN, NICOTINATEPRIBOSYLTRANS__45__RXN, PRTRANS__45__RXN, NAG1P__45__URIDYLTRANS__45__RXN, ISOLEUCINE__45__45__TRNA__45__LIGASE__45__RXN, METHIONINE__45__45__TRNA__45__LIGASE__45__RXN, RXNO__45__5180, GUANPRIBOSYLTRAN__45__RXN, DNA__45__DIRECTED__45__DNA__45__POLYMERASE__45__RXN, SERINE__45__45__TRNA__45__LIGASE__45__RXN, HEMEOSYN__45__RXN, CYSTEINE__45__45__TRNA__45__LIGASE__45__RXN, ALANINE__45__45__TRNA__45__LIGASE__45__RXN, TYROSINE__45__45__TRNA__45__LIGASE__45__RXN, 2__46__7__46__7__46__60__45__RXN, DUTP__45__PYROP__45__RXN, HISTPRATPHYD__45__RXN, RXNO__45__385, FPPSYN__45__RXN, PANTOATE__45__BETA__45__ALANINE__45__LIG__45__RXN, XANPRIBOSYLTRAN__45__RXN, HYPOXANPRIBOSYLTRAN__45__RXN, PROLINE__45__45__TRNA__45__LIGASE__45__RXN, ASPARTATE__45__45__TRNA__45__LIGASE__45__RXN, RXNO__45__2161, NAD__45__SYNTH__45__GLN__45__RXN, ASPARAGINE__45__45__TRNA__45__LIGASE__45__RXN, NICONUCADENYLYLTRAN__45__RXN, SULFATE__45__ADENYLYLTRANS__45__RXN, OROPRIBTRANS__45__RXN, LEUCINE__45__45__TRNA__45__LIGASE__45__RXN, LYSINE__45__45__TRNA__45__LIGASE__45__RXN).

$$\begin{aligned} \frac{d}{dt} \text{PPI} = & v_{26} + v_{31} + v_{39} + v_{40} + v_{43} + v_{44} + v_{47} + v_{58} + v_{59} + v_{61} + v_{63} + v_{65} + v_{71} \\ & + v_{74} + v_{79} + v_{82} + v_{87} + v_{89} + v_{91} + v_{98} + v_{100} + v_{101} + v_{102} + v_{105} + v_{108} \\ & + v_{114} + v_{116} + v_{118} + v_{124} + v_{125} + v_{126} + v_{140} + v_{143} + v_{146} + v_{162} + v_{163} \\ & + v_{171} + v_{176} + v_{180} + v_{187} + v_{194} + v_{203} + v_{219} + v_{220} + v_{222} + v_{225} + v_{239} \\ & + v_{241} + v_{242} + v_{244} + v_{253} + v_{270} + v_{287} + v_{294} + v_{309} + v_{314} + v_{329} - v_2 \end{aligned} \quad (1100)$$

6.429. Species __124__BCAA__45__dehydrogenase__45__lipoyl__124__

Name lipoamide acyltransferase N6-(lipoyl)lysine

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN__45__7719](#)).

$$\frac{d}{dt} \text{__124__BCAA__45__dehydrogenase__45__lipoyl__124__} = v_{278} \quad (1101)$$

6.430. Species TRP

Name L-tryptophan

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [TRYPTOPHAN__45____45__TRNA-__45__LIGASE__45__RXN](#) and as a product in [TRYPSYN__45__RXN](#), [RXN0__45__2382](#)).

$$\frac{d}{dt} \text{TRP} = v_{193} + v_{304} - v_{100} \quad (1102)$$

6.431. Species CH33ADO

Name 5'-deoxyadenosine

Initial amount 0 mol

This species takes part in four reactions (as a product in [RXN0__45__949](#), [_2__46__8__46__-__1__46__8__45__RXN](#), [HEMN__45__RXN](#), [_2__46__8__46__1__46__6__45__RXN](#)).

$$\frac{d}{dt} \text{CH33ADO} = 2v_1 + 2v_{42} + 2v_{115} + 2v_{228} \quad (1103)$$

6.432. Species CPD__45__8533

Name AP site on DNA created by glycosylase in repair process

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__2582](#)).

$$\frac{d}{dt} \text{CPD__45__8533} = -v_{331} \quad (1104)$$

6.433. Species CPD__45__8532

Name AP site removed from DNA

Initial amount 0 mol

This species takes part in two reactions (as a product in [RXN0__45__2582](#), [RXN0__45__-__2581](#)).

$$\frac{d}{dt} \text{CPD__45__8532} = v_{331} + v_{333} \quad (1105)$$

6.434. Species B_45_KETOACYL_45_ACP

Name a β-ketoacyl-[acp]

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [_3_45_OXOACYL_45_ACP_45-REDUCT_45_RXN](#) and as a product in [_3_45_OXOACYL_45_ACP_45_SYNTH_45_RXN](#)).

$$\frac{d}{dt}B_45_KETOACYL_45_ACP = v_{135} - v_{184} \quad (1106)$$

6.435. Species RIBOFLAVIN

Name riboflavin

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RIBOFLAVINKIN_45_RXN](#) and as a product in [RIBOFLAVIN_45_SYN_45_RXN](#)).

$$\frac{d}{dt}RIBOFLAVIN = v_{120} - v_{28} \quad (1107)$$

6.436. Species CPD_45_8538

Name tRNA uridine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [TRNA_45_PSEUDOURIDINE_45-SYNTHASE_45_I_45_RXN](#)).

$$\frac{d}{dt}CPD_45_8538 = -v_9 \quad (1108)$$

6.437. Species METHIONYL_45_PEPTIDE

Name methionyl peptide

Initial amount 0 mol

This species takes part in one reaction (as a product in [_3_46_5_46_1_46_88_45-RXN](#)).

$$\frac{d}{dt}METHIONYL_45_PEPTIDE = v_{267} \quad (1109)$$

6.438. Species [_124__SEC__45__tRNAs__124__](#)

Name tRNAsec

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__2161](#)).

$$\frac{d}{dt} \text{_124_SEC_45_tRNAs_124_} = -v_{244} \quad (1110)$$

6.439. Species [_124__Octanoylated__45__domains__124__](#)

Name an octanoylated domain

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0__45__949](#) and as a product in [RXN0__45__947](#)).

$$\frac{d}{dt} \text{_124__Octanoylated__45__domains__124_} = v_{13} - v_1 \quad (1111)$$

6.440. Species ANTHRANILATE

Name anthranilate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PRTRANS__45__RXN](#) and as a product in [ANTHRANSYN__45__RXN](#)).

$$\frac{d}{dt} \text{ANTHRANILATE} = v_{302} - v_{118} \quad (1112)$$

6.441. Species [L__45__HISTIDINOL__45__P](#)

Name L-histidinol-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [HISTIDPHOS__45__RXN](#) and as a product in [HISTAMINOTRANS__45__RXN](#)).

$$\frac{d}{dt} \text{L__45__HISTIDINOL__45__P} = v_{149} - v_{254} \quad (1113)$$

6.442. Species UDP__45__AAGM__45__DIAMINOHEPTANEDIOATE

Name UDP-N-acetylmuramoyl-L-alanyl-D-glutamyl-meso-2,6-diaminoheptanedioate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in UDP__45__NACMURALGLDAPAALIG__45__RXN and as a product in UDP__45__NACMURALGLDAPLIG__45__RXN).

$$\frac{d}{dt}\text{UDP__45__AAGM__45__DIAMINOHEPTANEDIOATE} = v_{150} - v_{260} \quad (1114)$$

6.443. Species XANTHOSINE__45__5__45__PHOSPHATE

Name xanthosine-5-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in XANPRIBOSYLTRAN__45__RXN).

$$\frac{d}{dt}\text{XANTHOSINE__45__5__45__PHOSPHATE} = v_{225} \quad (1115)$$

6.444. Species GLY

Name glycine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in GLYCINE__45__45__TRNA__45__LIGASE__45__RXN, GLUTATHIONE__45__SYN__45__RXN and as a product in GLYOHMETRANS__45__RXN, RXNO__45__5234).

$$\frac{d}{dt}\text{GLY} = v_{165} + v_{261} - v_{26} - v_{90} \quad (1116)$$

6.445. Species GUANOSINE

Name guanosine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in GUANPHOSPHOR__45__RXN, RXNO__45__5199).

$$\frac{d}{dt}\text{GUANOSINE} = -v_{25} - v_{181} \quad (1117)$$

6.446. Species CMP

Name CMP

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0_45_302](#)).

$$\frac{d}{dt}\text{CMP} = v_{56} \quad (1118)$$

6.447. Species ADENOSYL_45_P4

Name 5',5''-diadenosine tetraphosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [_3_46_6_46_1_46_41_45_-RXN](#)).

$$\frac{d}{dt}\text{ADENOSYL_45_P4} = -v_{136} \quad (1119)$$

6.448. Species GLN

Name L-glutamine

Initial amount 0 mol

This species takes part in seven reactions (as a reactant in [GLUTAMINE_45_45_TRNA-_45_LIGASE_45_RXN](#), [GLUTAMIDOTRANS_45_RXN](#), [CARBPSYN_45_RXN](#), [L_45_GLN_45-FRUCT_45_6_45_P_45_AMINOTRANS_45_RXN](#), [CTPSYN_45_RXN](#), [NAD_45_SYNTH_45-_GLN_45_RXN](#), [ANTHRANSYN_45_RXN](#)).

$$\frac{d}{dt}\text{GLN} = -v_{71} - v_{112} - v_{158} - v_{160} - v_{247} - v_{253} - v_{302} \quad (1120)$$

6.449. Species _1_45_KETO_45_2_45_METHYLVALERATE

Name 2,3-dihydroxy-3-methylvalerate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DIHYDROXYMETVALDEHYDRAT-_45_RXN](#) and as a product in [ACETOHBUTREDUCTOISOM_45_RXN](#)).

$$\frac{d}{dt}\text{_1_45_KETO_45_2_45_METHYLVALERATE} = v_{276} - v_{144} \quad (1121)$$

6.450. Species GLT

Name L-glutamate

Initial amount 0 mol

This species takes part in 22 reactions (as a reactant in [DIHYDROFOLATESYNTH__45__RXN](#), [GLUTRACE__45__RXN](#), [RXN__45__6102](#), [PSERTRANSAMPYR__45__RXN](#), [GLURS__45__RXN](#), [RXNO__45__2921](#), [HISTAMINOTRANS__45__RXN](#), [GLUTCYSLIG__45__RXN](#), [ACETYLORNTRANSAM__45__RXN](#), [RXN__45__3742](#), [PSERTRANSAM__45__RXN](#), [FORMYLTHFGLUSYNTH__45__RXN](#), [SUCCINYLDIAMINOPIMTRANS__45__RXN](#), [N__45__ACETYLTRANSFER__45__RXN](#), [FOLYLPOLYGLUTAMATESYNTH__45__RXN](#) and as a product in [GLUTAMIDOTRANS__45__RXN](#), [CARBPSYN__45__RXN](#), [L__45__GLN__45__FRUCT__45__6__45__P__45__AMINOTRANS__45__RXN](#), [RXN__45__7562](#), [CTPSYN__45__RXN](#), [NAD__45__SYNTH__45__GLN__45__RXN](#), [ANTHRANSYN__45__RXN](#)).

$$\frac{d}{dt}\text{GLT} = v_{112} + v_{158} + v_{160} + v_{168} + v_{247} + v_{253} + v_{302} - v_{14} - v_{27} - v_{51} - v_{60} - v_{105} - v_{127} - v_{149} - v_{164} - v_{166} - v_{233} - v_{237} - v_{256} - v_{272} - v_{285} - v_{313} \quad (1122)$$

6.451. Species PRPP

Name 5-phosphoribosyl 1-pyrophosphate

Initial amount 0 mol

This species takes part in nine reactions (as a reactant in [ATPPHOSPHORIBOSYLTRANS__45__RXN](#), [HYPXPRIOSYLTRAN__45__RXN](#), [NICOTINATEPRIOSYLTRANS__45__RXN](#), [PRTRANS__45__RXN](#), [GUANPRIOSYLTRAN__45__RXN](#), [XANPRIOSYLTRAN__45__RXN](#), [HYPOXANPRIOSYLTRAN__45__RXN](#), [OROPRIOTRANS__45__RXN](#) and as a product in [PRPPSYN__45__RXN](#)).

$$\frac{d}{dt}\text{PRPP} = v_{217} - v_{59} - v_{82} - v_{116} - v_{118} - v_{143} - v_{225} - v_{239} - v_{309} \quad (1123)$$

6.452. Species __124__THR__45__tRNAs__124__

Name tRNA^{thr}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [THREONINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{__124__THR__45__tRNAs__124__} = -v_{40} \quad (1124)$$

6.453. Species [_124__TYR__45__tRNAs__124__](#)

Name tRNA^{Tyr}

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [TYROSINE__45____45__TRNA__45-__LIGASE__45__RXN](#)).

$$\frac{d}{dt} \text{_124_TYR_45_tRNAs_124_} = -v_{180} \quad (1125)$$

6.454. Species [_8__45__AMINO__45__7__45__OXONONANOATE](#)

Name 7-keto-8-aminopelargonate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DAPASYN__45__RXN](#)).

$$\frac{d}{dt} \text{_8__45__AMINO__45__7__45__OXONONANOATE} = -v_{223} \quad (1126)$$

6.455. Species [CPD__45__8200](#)

Name a properly matched DNA base pair

Initial amount 0 mol

This species takes part in one reaction (as a product in [RXN0__45__2625](#)).

$$\frac{d}{dt} \text{CPD__45__8200} = v_{110} \quad (1127)$$

6.456. Species [L__45__ALPHA__45__ALANINE](#)

Name L-alanine

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [ALANINE__45____45__TRNA-__45__LIGASE__45__RXN](#), [UDP__45__NACMUR__45__ALA__45__LIG__45__RXN](#) and as a product in [RXN0__45__308](#), [RXN0__45__2023](#)).

$$\frac{d}{dt} \text{L__45__ALPHA__45__ALANINE} = v_{52} + v_{74} - v_{176} - v_{336} \quad (1128)$$

6.457. Species `_124_Protein_45_0x_45_Disulfides_124_`

Name a protein with oxidized disulfide bonds

Initial amount 0 mol

This species takes part in one reaction (as a product in `DISULFOXRED_45_RXN`).

$$\frac{d}{dt} \text{_124_Protein_45_0x_45_Disulfides_124_} = v_{22} \quad (1129)$$

6.458. Species AMP

Name AMP

Initial amount 0 mol

This species takes part in 31 reactions (as a reactant in `ADENYL_45_KIN_45_RXN` and as a product in `GLYCINE_45_45_TRNA_45_LIGASE_45_RXN`, `RXN_45_10`, `THREONINE_45_45_TRNA_45_LIGASE_45_RXN`, `ARGSUCCINSYN_45_RXN`, `PHENYLALANINE_45_45_TRNA_45_LIGASE_45_RXN`, `VALINE_45_45_TRNA_45_LIGASE_45_RXN`, `GLUTAMINE_45_45_TRNA_45_LIGASE_45_RXN`, `RXN0_45_2023`, `HISTIDINE_45_45_TRNA_45_LIGASE_45_RXN`, `NAD_45_SYNTH_45_NH3_45_RXN`, `TRYPTOPHAN_45_45_TRNA_45_LIGASE_45_RXN`, `ARGININE_45_45_TRNA_45_LIGASE_45_RXN`, `GLURS_45_RXN`, `ISOLEUCINE_45_45_TRNA_45_LIGASE_45_RXN`, `METHIONINE_45_45_TRNA_45_LIGASE_45_RXN`, `SERINE_45_45_TRNA_45_LIGASE_45_RXN`, `CYSTEINE_45_45_TRNA_45_LIGASE_45_RXN`, `AMPSYN_45_RXN`, `ALANINE_45_45_TRNA_45_LIGASE_45_RXN`, `TYROSINE_45_45_TRNA_45_LIGASE_45_RXN`, `PRPPSYN_45_RXN`, `PANTOATE_45_BETA_45_ALANINE_45_LIG_45_RXN`, `PROLINE_45_45_TRNA_45_LIGASE_45_RXN`, `ASPARTATE_45_45_TRNA_45_LIGASE_45_RXN`, `RXN0_45_2161`, `NAD_45_SYNTH_45_GLN_45_RXN`, `ASPARAGINE_45_45_TRNA_45_LIGASE_45_RXN`, `DNA_45_LIGASE_45_NAD_43_45_RXN`, `LEUCINE_45_45_TRNA_45_LIGASE_45_RXN`, `LYSINE_45_45_TRNA_45_LIGASE_45_RXN`).

$$\begin{aligned} \frac{d}{dt} \text{AMP} = & v_{26} + v_{31} + v_{40} + v_{47} + v_{63} + v_{65} + v_{71} + v_{74} + v_{79} + v_{89} + v_{100} \\ & + v_{101} + v_{105} + v_{125} + v_{126} + v_{162} + v_{171} + v_{174} + v_{176} + v_{180} + v_{217} \\ & + v_{222} + v_{241} + v_{242} + v_{244} + v_{253} + v_{270} + v_{296} + v_{314} + v_{329} - v_{154} \end{aligned} \quad (1130)$$

6.459. Species UTP

Name UTP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `NAG1P_45_URIDYLTRANS_45_RXN`, `CTPSYN_45_RXN`).

$$\frac{d}{dt} \text{UTP} = -v_{124} - v_{247} \quad (1131)$$

6.460. Species FORMATE

Name formate

Initial amount 0 mol

This species takes part in three reactions (as a product in [GTP__45__CYCLOHYDRO__45__II__45__RXN](#), [_3__46__5__46__1__46__88__45__RXN](#), [DIOHBUTANONEPSYN__45__RXN](#)).

$$\frac{d}{dt}\text{FORMATE} = v_{91} + v_{267} + v_{274} \quad (1132)$$

6.461. Species DEOXY__45__RIBOSE__45__1P

Name deoxyribose-1-phosphate

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [D__45__PPENTOMUT__45__RXN](#) and as a product in [DEOXYADENPHOSPHOR__45__RXN](#), [DEOXYGUANPHOSPHOR__45__RXN](#), [DEOXYINOPHOSPHOR__45__RXN](#)).

$$\frac{d}{dt}\text{DEOXY__45__RIBOSE__45__1P} = v_3 + v_{141} + v_{151} - v_{238} \quad (1133)$$

6.462. Species PRO

Name L-proline

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [PROLINE__45__45__TRNA__45__LIGASE__45__RXN](#)).

$$\frac{d}{dt}\text{PRO} = -v_{241} \quad (1134)$$

6.463. Species DUTP

Name dUTP

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DUTP__45__PYROP__45__RXN](#) and as a product in [DCTP__45__DEAM__45__RXN](#)).

$$\frac{d}{dt}\text{DUTP} = v_{188} - v_{194} \quad (1135)$$

6.464. Species FRU1P

Name fructose-1-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN__45__8631](#) and as a product in [FRUCTOSEPHOSPHO__45__RXN](#)).

$$\frac{d}{dt}\text{FRU1P} = v_{326} - v_{96} \quad (1136)$$

6.465. Species [_2__45__ACETO__45__2__45__HYDROXY__45__BUTYRATE](#)

Name 2-aceto-2-hydroxy-butyrate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [ACETO0HBUTREDUCTOISOM__45__RXN](#) and as a product in [ACETO0HBUTSYN__45__RXN](#)).

$$\frac{d}{dt}\text{_2__45__ACETO__45__2__45__HYDROXY__45__BUTYRATE} = v_{152} - v_{276} \quad (1137)$$

6.466. Species [_124__Sulfurated__45__Sulfur__45__Acceptors__124__](#)

Name a sulfurated sulfur donor

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN__45__5984](#), [_2__46__8__46__1__46__6__45__RXN](#)).

$$\frac{d}{dt}\text{_124__Sulfurated__45__Sulfur__45__Acceptors__124__} = -v_{197} - v_{228} \quad (1138)$$

6.467. Species [PANTETHEINE__45__P](#)

Name pantetheine 4'-phosphate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [PANTEPADENYLYLTRAN__45__RXN](#)).

$$\frac{d}{dt}\text{PANTETHEINE__45__P} = -v_{39} \quad (1139)$$

6.468. Species MALONYL__45__ACP

Name a malonyl-[acp]

Initial amount 0 mol

This species takes part in four reactions (as a reactant in [_3__45__OXOACYL__45__ACP__45__SYNTH__45__BASE__45__RXN](#), [_3__45__OXOACYL__45__ACP__45__SYNTH__45__RXN](#), [MALONYL__45__ACPDECARBOX__45__RXN](#), [RXNO__45__2141](#)).

$$\frac{d}{dt}\text{MALONYL__45__ACP} = -v_{122} - v_{135} - v_{189} - v_{205} \quad (1140)$$

6.469. Species DETHIOBIOTIN

Name dethiobiotin

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [RXN__45__5984](#), [_2__46__8__46__1__46__6__45__RXN](#) and as a product in [DETHIOBIOTIN__45__SYN__45__RXN](#)).

$$\frac{d}{dt}\text{DETHIOBIOTIN} = v_{209} - v_{197} - v_{228} \quad (1141)$$

6.470. Species DPG

Name 1,3-diphosphateglycerate

Initial amount 0 mol

This species takes part in two reactions (as a product in [PHOSGLYPHOS__45__RXN](#), [GAPOXNPHOSPHN__45__RXN](#)).

$$\frac{d}{dt}\text{DPG} = v_{240} + v_{332} \quad (1142)$$

6.471. Species DEOXYXYLULOSE__45__5P

Name 1-deoxy-D-xylulose 5-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [DXPREDISOM__45__RXN](#) and as a product in [DXS__45__RXN](#)).

$$\frac{d}{dt}\text{DEOXYXYLULOSE__45__5P} = v_{159} - v_{322} \quad (1143)$$

6.472. Species BIOTIN

Name biotin

Initial amount 0 mol

This species takes part in two reactions (as a product in [RXN__45__5985](#), [_2__46__8__46__1__46__6__45__RXN](#)).

$$\frac{d}{dt}\text{BIOTIN} = v_{196} + v_{228} \quad (1144)$$

6.473. Species CO__45__A

Name coenzyme A

Initial amount 0 mol

This species takes part in 13 reactions (as a reactant in [RXNO__45__1133](#), [HOLO__45__ACP__45__SYNTH__45__RXN](#), [RXNO__45__1147](#), [PYRUVDEH__45__RXN](#), [_20XOGLUTARATEDEH__45__RXN](#) and as a product in [DEPHOSPHOCOAKIN__45__RXN](#), [PHOSACETYLTRANS__45__RXN](#), [TETHYDPICSUCC__45__RXN](#), [SERINE__45__O__45__ACETTRAN__45__RXN](#), [N__45__ACETYLTRANSFER__45__RXN](#), [_2__45__ISOPROPYLMALATESYN__45__RXN](#), [PTAALT__45__RXN](#), [_2__46__3__46__1__46__157__45__RXN](#)).

$$\begin{aligned} \frac{d}{dt}\text{CO__45__A} = & v_{10} + v_{36} + v_{183} + v_{230} + v_{285} + v_{286} + v_{291} \\ & + v_{305} - v_{178} - v_{190} - v_{192} - v_{312} - v_{317} \end{aligned} \quad (1145)$$

6.474. Species CARDIOLIPIN

Name cardiolipin

Initial amount 0 mol

This species takes part in one reaction (as a product in [CARDIOLIPSYN__45__RXN](#)).

$$\frac{d}{dt}\text{CARDIOLIPIN} = v_{104} \quad (1146)$$

6.475. Species __124__Sugar__45__Phosphate__124__

Name a sugar phosphate

Initial amount 0 mol

This species takes part in one reaction (as a product in [_2__46__7__46__1__46__69__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Sugar__45__Phosphate__124__} = v_{106} \quad (1147)$$

6.476. Species CTP

Name CTP

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [TRNA__45__CYTIDYLYLTRANSFERASE--__45__RXN](#), [_2__46__7__46__7__46__60__45__RXN](#) and as a product in [CTPSYN__45__RXN](#)).

$$\frac{d}{dt}\text{CTP} = v_{247} - v_{108} - v_{187} \quad (1148)$$

6.477. Species THF__45__GLU__45__N

Name a tetrahydrofolate polyglutamate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [FOLYLPOLYGLUTAMATESYNTH--__45__RXN](#) and as a product in [FOLYLPOLYGLUTAMATESYNTH__45__RXN](#)).

$$\frac{d}{dt}\text{THF__45__GLU__45__N} = v_{313} - v_{313} \quad (1149)$$

6.478. Species __124__Peptidoglycans__124__

Name a peptidoglycan

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [_3__46__5__46__1__46__28--__45__RXN](#), [_2__46__4__46__1__46__129__45__RXN](#) and as a product in [_2__46__4__46__1__46--__129__45__RXN](#)).

$$\frac{d}{dt}\text{__124__Peptidoglycans__124__} = v_{306} - v_{62} - v_{306} \quad (1150)$$

6.479. Species

[S__45__ADENOSYL__45__4__45__METHYLTHIO__45__2__45__OXOBUTANOATE](#)

Name S-adenosyl-4-methylthio-2-oxobutanoate

Initial amount 0 mol

This species takes part in one reaction (as a product in [DAPASYN__45__RXN](#)).

$$\frac{d}{dt}\text{S__45__ADENOSYL__45__4__45__METHYLTHIO__45__2__45__OXOBUTANOATE} = v_{223} \quad (1151)$$

6.480. Species [_124_Prenyl_45_tRNAs_124_](#)**Name** prenyl-tRNA**Initial amount** 0 mol

This species takes part in one reaction (as a product in [RXN_45_4543](#)).

$$\frac{d}{dt} \text{_124_Prenyl_45_tRNAs_124_} = v_{58} \quad (1152)$$

6.481. Species [_3_45_CARBOXY_45_3_45_HYDROXY_45_ISOCAPROATE](#)**Name** 2-isopropylmalate**Initial amount** 0 mol

This species takes part in two reactions (as a reactant in [_3_45_ISOPROPYLMALISOM_45_RXN](#) and as a product in [_2_45_ISOPROPYLMALATESYN_45_RXN](#)).

$$\frac{d}{dt} \text{_3_45_CARBOXY_45_3_45_HYDROXY_45_ISOCAPROATE} = v_{286} - v_{295} \quad (1153)$$

6.482. Species DGTP**Name** dGTP**Initial amount** 0 mol

This species takes part in one reaction (as a reactant in [RXN0_45_385](#)).

$$\frac{d}{dt} \text{DGTP} = -v_{219} \quad (1154)$$

6.483. Species [CPD_45_5662](#)**Name** 9-mercaptodethiobiotin**Initial amount** 0 mol

This species takes part in two reactions (as a reactant in [RXN_45_5985](#) and as a product in [RXN_45_5984](#)).

$$\frac{d}{dt} \text{CPD_45_5662} = v_{197} - v_{196} \quad (1155)$$

6.484. Species `__124__ILE__45__tRNAs__124__`

Name tRNAile

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `ISOLEUCINE__45____45__TRNA__45__LIGASE__45__RXN`).

$$\frac{d}{dt} \text{__124__ILE__45__tRNAs__124__} = -v_{125} \quad (1156)$$

6.485. Species ADENINE

Name adenine

Initial amount 0 mol

This species takes part in four reactions (as a product in `DEOXYADENPHOSPHOR__45__RXN`, `RXN0__45__1342`, `ADENPHOSPHOR__45__RXN`, `ADENOSYLHOMOCYSTEINE__45__NUCLEOSIDASE__45__RXN`).

$$\frac{d}{dt} \text{ADENINE} = v_3 + v_5 + v_{64} + v_{132} \quad (1157)$$

6.486. Species

`tRNA__32__with__32__epoxyqueuosine__32__at__32__position__32__34`

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a product in `RXN0__45__1342`).

$$\frac{d}{dt} \text{tRNA__32__with__32__epoxyqueuosine__32__at__32__position__32__34} = v_5 \quad (1158)$$

6.487. Species `CPD__45__7695`

Name N-acetylmuramoyl-L-alanyl-D-glutamyl-L-lysyl-D-alanyl-D-alanine-diphosphoundecaprenyl-N-acetylglucosamine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in `__2__46__4__46__1__46__129__45__RXN` and as a product in `RXN__45__8976`).

$$\frac{d}{dt} \text{CPD__45__7695} = v_{264} - v_{306} \quad (1159)$$

6.488. Species

[_124_Pyruvate_45_dehydrogenase_45_dihydrolipoate_124_](#)

Name lipoate acetyltransferase N6-(dihydrolipoyl)lysine

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [RXN0_45_1132](#) and as a product in [RXN0_45_1133](#)).

$$\frac{d}{dt} \text{_124_Pyruvate_45_dehydrogenase_45_dihydrolipoate_124_} = v_{178} - v_{179} \quad (1160)$$

6.489. Species [_3_45_P_45_HYDROXYPYRUVATE](#)

Name 3-phospho-hydroxypyruvate

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [PSERTRANSAM_45_RXN](#)).

$$\frac{d}{dt} \text{_3_45_P_45_HYDROXYPYRUVATE} = -v_{237} \quad (1161)$$

6.490. Species [QUEUEINE](#)

Name queueine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [QUEUEOSINE_45_TRNA_45_-RIBOSYLTRANSFERASE_45_RXN](#)).

$$\frac{d}{dt} \text{QUEUEINE} = -v_{54} \quad (1162)$$

6.491. Species [IMIDAZOLE_45_ACETOL_45_P](#)

Name imidazole acetol-phosphate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [HISTAMINOTRANS_45_RXN](#) and as a product in [IMIDPHOSDEHYD_45_RXN](#)).

$$\frac{d}{dt} \text{IMIDAZOLE_45_ACETOL_45_P} = v_{213} - v_{149} \quad (1163)$$

6.492. Species S03

Name sulfite

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [SULFITE__45__REDUCT__45__RXN](#) and as a product in [_1__46__8__46__4__46__8__45__RXN](#)).

$$\frac{d}{dt}S03 = v_{21} - v_{310} \quad (1164)$$

6.493. Species SUPER__45__OXIDE

Name O2-

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [SUPEROX__45__DISMUT__45__RXN](#)).

$$\frac{d}{dt}SUPER_45_OXIDE = -2v_{289} \quad (1165)$$

6.494. Species _7__45__AMINOMETHYL__45__7__45__DEAZAGUANINE

Name 7-aminomethyl-7-deazaguanine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0__45__1321](#)).

$$\frac{d}{dt}_7_45_AMINOMETHYL_45_7_45_DEAZAGUANINE = -v_{48} \quad (1166)$$

6.495. Species _5__45__10__45__METHENYL__45__THF

Name 5,10-methenyltetrahydrofolate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [METHENYLTHFCYCLOHYDRO__45__RXN](#) and as a product in [METHYLENETHFDEHYDROG__45__NADP__45__RXN](#)).

$$\frac{d}{dt}_5_45_10_45_METHENYL_45_THF = v_{19} - v_{236} \quad (1167)$$

6.496. Species [_124_Alcohols_124_](#)

Name an alcohol

Initial amount 0 mol

This species takes part in one reaction (as a product in [_1_46_11_46_1_46_15_45_-RXN](#)).

$$\frac{d}{dt} \text{_124_Alcohols_124_} = v_{11} \quad (1168)$$

6.497. Species [_124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_](#)

Name a 2,3,4-saturated fatty acyl-[acp]

Initial amount 0 mol

This species takes part in three reactions (as a reactant in [_3_45_OXOACYL_45_ACP_45_-SYNTH_45_RXN](#) and as a product in [ENOYL_45_ACP_45_REDUCT_45_NADH_45_RXN](#), [ENOYL_45_ACP_45_REDUCT_45_NADPH_45_RXN](#)).

$$\frac{d}{dt} \text{_124_Saturated_45_Fatty_45_Acyl_45_ACPs_124_} = v_{103} + v_{210} - v_{135} \quad (1169)$$

6.498. Species [S_32_rRNA](#)

Name NA

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [RXN0_45_3161](#)).

$$\frac{d}{dt} \text{S_32_rRNA} = -v_{234} \quad (1170)$$

6.499. Species [L_45_1_45_PHOSPHATIDYL_45_GLYCEROL](#)

Name an L-1-phosphatidyl-glycerol

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [CARDIOLIPSYN_45_RXN](#)).

$$\frac{d}{dt} \text{L_45_1_45_PHOSPHATIDYL_45_GLYCEROL} = -2v_{104} \quad (1171)$$

6.500. Species `_124_A11_45_ACPs_124_`

Name all acyl carrier proteins

Initial amount 0 mol

This species takes part in one reaction (as a product in `_3_45_OXOACYL_45_ACP_45_-SYNTH_45_BASE_45_RXN`).

$$\frac{d}{dt} _124_A11_45_ACPs_124_ = v_{122} \quad (1172)$$

6.501. Species `S_45_ADENOSYLMETHIONINE`

Name S-adenosyl-L-methionine

Initial amount 0 mol

This species takes part in 16 reactions (as a reactant in `RXN0_45_949`, `RXN0_45_-1342`, `RRNA_45_ADENINE_45_N6_45_45_METHYLTRANSFERASE_45_RXN`, `_2_46_8-46_1_46_8_45_RXN`, `RRNA_45_GUANINE_45_N2_45_45_METHYLTRANSFERASE_45_RXN`, `HEMN_45_RXN`, `_2_46_1_46_1_46_61_45_RXN`, `TRNA_45_GUANINE_45_N1-45_45_METHYLTRANSFERASE_45_RXN`, `RXN_45_8675`, `DAPASYN_45_RXN`, `_2_46_8-46_1_46_6_45_RXN`, `RXN0_45_3161`, `UROPORIIIMETHYLTRANSA_45_RXN`, `TRNA_45_GUANINE_45_N7_45_45_METHYLTRANSFERASE_45_RXN`, `SAMDECARB_45_RXN` and as a product in `S_45_ADENMETSYN_45_RXN`).

$$\begin{aligned} \frac{d}{dt} S_45_ADENOSYLMETHIONINE = & v_{87} - 2v_{11} - v_{5} - v_{24} - 2v_{42} - v_{97} - 2v_{115} - v_{131} - v_{145} \\ & - v_{175} - v_{223} - 2v_{228} - v_{234} - v_{252} - v_{281} - v_{328} \end{aligned} \quad (1173)$$

6.502. Species `DEOXYINOSINE`

Name deoxyinosine

Initial amount 0 mol

This species takes part in one reaction (as a reactant in `DEOXYINOPHOSPHOR_45_RXN`).

$$\frac{d}{dt} \text{DEOXYINOSINE} = -v_{151} \quad (1174)$$

6.503. Species [_124_Charged_45_PRO_45_tRNAs_124_](#)

Name L-prolyl-tRNA_{pro}

Initial amount 0 mol

This species takes part in one reaction (as a product in [PROLINE_45_45_TRNA_45-_LIGASE_45_RXN](#)).

$$\frac{d}{dt} \text{_124_Charged_45_PRO_45_tRNAs_124_} = v_{241} \quad (1175)$$

6.504. Species [CPD_45_8624](#)

Name peptidylproline (ω = 180)

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [PEPTIDYLPROLYL_45_ISOMERASE-_45_RXN](#)).

$$\frac{d}{dt} \text{CPD_45_8624} = -v_{308} \quad (1176)$$

6.505. Species [CPD_45_8625](#)

Name peptidylproline (ω = 0)

Initial amount 0 mol

This species takes part in one reaction (as a product in [PEPTIDYLPROLYL_45_ISOMERASE-_45_RXN](#)).

$$\frac{d}{dt} \text{CPD_45_8625} = v_{308} \quad (1177)$$

6.506. Species [DCTP](#)

Name dCTP

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DCTP_45_DEAM_45_RXN](#)).

$$\frac{d}{dt} \text{DCTP} = -v_{188} \quad (1178)$$

6.507. Species N__45__5__45__PHOSPHORIBOSYL__45__ANTHRANILATE

Name N-(5'-phosphoribosyl)-anthranilate

Initial amount 0 mol

This species takes part in two reactions (as a reactant in [PRAISOM__45__RXN](#) and as a product in [PRTRANS__45__RXN](#)).

$$\frac{d}{dt} \text{N__45__5__45__PHOSPHORIBOSYL__45__ANTHRANILATE} = v_{118} - v_{20} \quad (1179)$$

6.508. Species DEOXYNUCLEOTIDESM

Name (deoxynucleotides)(m)

Initial amount 0 mol

This species takes part in one reaction (as a reactant in [DNA__45__LIGASE__45__NAD__43-__45__RXN](#)).

$$\frac{d}{dt} \text{DEOXYNUCLEOTIDESM} = -v_{296} \quad (1180)$$

A. Model Consistency Report

The given SBML document contains one issue, which is listed in the remainder of this model report. The messages and identification codes shown here are those reported by the [SBML.org online validator](#).

A.1. Warning

This SBML document contains one warning.

Warning 80501 As a principle of best modeling practice, the size of a <compartment> should be set to a value rather than be left undefined. Doing so improves the portability of models between different simulation and analysis systems, and helps make it easier to detect potential errors in models.

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