SBML Model Report

Model name: "Kotte2010_Ecoli_Metabolic_Adaption"

May 6, 2016

1 General Overview

This is a document in SBML Level 2 Version 4 format. This model was created by Lukas Endler[1] at March 14th 2010 at 11:34 p. m. and last time modified at April eighth 2016 at 4:08 p. m. Table 1 gives an overview of the quantities of all components of this model.

Table 1: Number of components in this model, which are described in the following sections.

Element	Quantity	Element	Quantity
compartment types	0	compartments	2
species types	0	species	47
events	2	constraints	0
reactions	109	function definitions	0
global parameters	213	unit definitions	6
rules	12	initial assignments	0

Model Notes

This is the model described in: **Bacterial adaptation through distributed sensing of metabolic fluxes**
Oliver Kotte, Judith B Zaugg and Matthias Heinemann;Mol Sys Biol2010;**6**:355. doi:10.1038/msb.2010.10;
Abstract:
The recognition of carbon sources and the regulatory adjustments to recognized changes are

[1]EMBL-EBI, lukas@ebi.ac.uk

of particular importance for bacterial survival in fluctuating environments. Despite a thorough knowledge base of Escherichia coli's central metabolism and its regulation, fundamental aspects of the employed sensing and regulatory adjustment mechanisms remain unclear. In this paper, using a differential equation model that couples enzymatic and transcriptional regulation of E. coli's central metabolism, we show that the interplay of known interactions explains in molecular-level detail the system-wide adjustments of metabolic operation between glycolytic and gluconeogenic carbon sources. We show that these adaptations are enabled by an indirect recognition of carbon sources through a mechanism we termed distributed sensing of intracellular metabolic fluxes. This mechanism uses two general motifs to establish flux-signaling metabolites, whose bindings to transcription factors form flux sensors. As these sensors are embedded in global feedback loop architectures, closed-loop self-regulation can emerge within metabolism itself and therefore, metabolic operation may adapt itself autonomously (not requiring upstream sensing and signaling) to fluctuating carbon sources.

In its current form this SBML model is parametrized for the glucose to acetate transition and to simulate the extended diauxic shift as shown in figure 3 and scenario 6 of the attached matlab file. In this scenario the cells first are grown from an OD600 (BM) of 0.03 with a starting glucose concentration of 0.5 g/l for 8.15 h (29340 sec). Then a medium containing 5 g/l acetate is inoculated with these cells to an OD600 of 0.03 and grown for another 19.7 hours (70920 sec). Finally the cells are shifted to a medium containing both glucose and acetate at a concentration of 3 g/l with a starting OD600 of 0.0005.
The shifts where implemented using events triggering at the times determined by the parameters shift1 and shift2 (in hours). To simulate other scenarios the initial conditions need to be changed as described in the supplemental materials (supplement 1)
The original SBML model and the MATLAB file used for the calculations can be down loaded as supplementary materials of the publication from the MSB website. (supplement 2).

The units of the external metabolites are in [g/l], those of the biomass in optical density,OD_{600}, taken as dimensionless, and [micromole/(gramm dry weight)] for all intracellular metabolites. As the latter cannot be implemented in SBML, it was chosen to be micromole only and the units of the parameters are left mostly undefined.

This model originates from BioModels Database: A Database of Annotated Published Models. It is copyright (c) 2005-2010 The BioModels Team.
For more information see the terms of use.
To cite BioModels Database, please use Le Novre N., Bornstein B., Broicher A., Courtot M., Donizelli M., Dharuri H., Li L., Sauro H., Schilstra M., Shapiro B., Snoep J.L., Hucka M. (2006) BioModels Database: A Free, Centralized Database of Curated, Published, Quantitative Kinetic Models of Biochemical and Cellular Systems Nucleic Acids Res., 34: D689-D691.

2 Unit Definitions

This is an overview of eight unit definitions of which two are predefined by SBML and not mentioned in the model.

2.1 Unit od

Name OD

Definition dimensionless

2.2 Unit substance

Name micromole

Definition µmol

2.3 Unit volume

Name volume

Definition l

2.4 Unit time

Name seconds

Definition s

2.5 Unit hours

Name hours

Definition 3600 s

2.6 Unit gram_per_litre

Name gram_per_litre

Definition $g \cdot l^{-1}$

2.7 Unit area

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

Definition m^2

2.8 Unit length

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

Definition m

3 Compartments

This model contains two compartments.

Table 2: Properties of all compartments.

Id	Name	SBO	Spatial Dimensions	Size	Unit	Constant	Outside
`Environment`	Environment		3	1	litre	☑	
`Cell`	Cell		3	1	litre	☑	

3.1 Compartment `Environment`

This is a three dimensional compartment with a constant size of one litre.

Name Environment

3.2 Compartment `Cell`

This is a three dimensional compartment with a constant size of one litre.

Name Cell

4 Species

This model contains 47 species. Section 9 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
BM	BM	Environment	dimensionless	⊟	⊟
ACT	ACT	Environment	$g \cdot l^{-1}$	⊟	⊟
GLC	GLC	Environment	$g \cdot l^{-1}$	⊟	⊟
ACoA	ACoA	Cell	µmol	⊟	⊟
AKG	AKG	Cell	µmol	⊟	⊟
cAMP	cAMP	Cell	µmol	⊟	⊟
FBP	FBP	Cell	µmol	⊟	⊟
G6P	G6P	Cell	µmol	⊟	⊟
GLX	GLX	Cell	µmol	⊟	⊟
ICT	ICT	Cell	µmol	⊟	⊟
MAL	MAL	Cell	µmol	⊟	⊟
OAA	OAA	Cell	µmol	⊟	⊟
PEP	PEP	Cell	µmol	⊟	⊟
PG3	PG3	Cell	µmol	⊟	⊟
PYR	PYR	Cell	µmol	⊟	⊟
AceA	AceA	Cell	µmol	⊟	⊟
AceB	AceB	Cell	µmol	⊟	⊟
AceK	AceK	Cell	µmol	⊟	⊟
Acoa2act	Acoa2act	Cell	µmol	⊟	⊟
Acs	Acs	Cell	µmol	⊟	⊟
Akg2mal	Akg2mal	Cell	µmol	⊟	⊟
CAMPdegr	CAMPdegr	Cell	µmol	⊟	⊟

Produced by SBML2LaTeX

Id	Name	Compartment	Derived Unit	Constant	Boundary Condition
Cya	Cya	Cell	µmol	⊟	⊟
Emp	Emp	Cell	µmol	⊟	⊟
Eno	Eno	Cell	µmol	⊟	⊟
Fdp	Fdp	Cell	µmol	⊟	⊟
GltA	GltA	Cell	µmol	⊟	⊟
Icd	Icd	Cell	µmol	⊟	⊟
Icd_P	Icd_P	Cell	µmol	⊟	⊟
Mdh	Mdh	Cell	µmol	⊟	⊟
Me	Me	Cell	µmol	⊟	⊟
PckA	PckA	Cell	µmol	⊟	⊟
Pdh	Pdh	Cell	µmol	⊟	⊟
PfkA	PfkA	Cell	µmol	⊟	⊟
Ppc	Ppc	Cell	µmol	⊟	⊟
PpsA	PpsA	Cell	µmol	⊟	⊟
PykF	PykF	Cell	µmol	⊟	⊟
Cra	Cra	Cell	µmol	⊟	⊟
CraFBP	CraFBP	Cell	µmol	⊟	⊟
Crp	Crp	Cell	µmol	⊟	⊟
CrpcAMP	CrpcAMP	Cell	µmol	⊟	⊟
IclR	IclR	Cell	µmol	⊟	⊟
PdhR	PdhR	Cell	µmol	⊟	⊟
PdhRPYR	PdhRPYR	Cell	µmol	⊟	⊟
EIIA	EIIA	Cell	µmol	⊟	⊟
EIIA_P	EIIA_P	Cell	µmol	⊟	⊟
EIICB	EIICB	Cell	µmol	⊟	⊟

Produced by SBML2LaTeX

5 Parameters

This model contains 213 global parameters.

Table 4: Properties of each parameter.

Id	Name	SBO	Value	Unit	Constant
env_M_ACT	env_M_ACT		60.050		☑
env_M_GLC	env_M_GLC		180.156		☑
env_uc	env_uc		$9.5 \cdot 10^{-7}$		☑
e_AceA_kcat	e_AceA_kcat		614.000		☑
e_AceA_n	e_AceA_n		4.000		☑
e_AceA_L	e_AceA_L		50100.000		☑
e_AceA_Kict	e_AceA_Kict		0.022		☑
e_AceA_Kpep	e_AceA_Kpep		0.055		☑
e_AceA_Kpg3	e_AceA_Kpg3		0.720		☑
e_AceA_Kakg	e_AceA_Kakg		0.827		☑
e_AceB_kcat	e_AceB_kcat		47.800		☑
e_AceB_Kglx	e_AceB_Kglx		0.950		☑
e_AceB_Kacoa	e_AceB_Kacoa		0.755		☑
e_AceB_Kglxacoa	e_AceB_Kglxacoa		0.719		☑
e_AceK_kcat_ki	e_AceK_kcat_ki		$3.4 \cdot 10^{12}$		☑
e_AceK_kcat_ph	e_AceK_kcat_ph		$1.7 \cdot 10^{9}$		☑
e_AceK_n	e_AceK_n		2.000		☑
e_AceK_L	e_AceK_L		10^{8}		☑
e_AceK_Kicd	e_AceK_Kicd		0.043		☑
e_AceK_Kicd_P	e_AceK_Kicd_P		0.643		☑
e_AceK_Kpep	e_AceK_Kpep		0.539		☑
e_AceK_Kpyr	e_AceK_Kpyr		0.038		☑
e_AceK_Koaa	e_AceK_Koaa		0.173		☑
e_AceK_Kglx	e_AceK_Kglx		0.866		☑
e_AceK_Kakg	e_AceK_Kakg		0.820		☑
e_AceK_Kpg3	e_AceK_Kpg3		1.570		☑
e_AceK_Kict	e_AceK_Kict		0.137		☑
e_Acoa2act_kcat	e_Acoa2act_kcat		3079.000		☑
e_Acoa2act_n	e_Acoa2act_n		2.000		☑
e_Acoa2act_L	e_Acoa2act_L		639000.000		☑
e_Acoa2act_Kacoa	e_Acoa2act_Kacoa		0.022		☑

Id	Name	SBO	Value	Unit	Constant
e_Acoa2act_Kpyr	e_Acoa2act_Kpyr		0.022		☑
e_Acs_kcat	e_Acs_kcat		340.000		☑
e_Acs_Kact	e_Acs_Kact		0.001		☑
e_Akg2mal_kcat	e_Akg2mal_kcat		1530.000		☑
e_Akg2mal_Kakg	e_Akg2mal_Kakg		0.548		☑
e_CAMPdegr_kcat	e_CAMPdegr_kcat		1000.000		☑
e_CAMPdegr_KcAMP	e_CAMPdegr_KcAMP		0.100		☑
e_Cya_kcat	e_Cya_kcat		993.000		☑
e_Cya_KEIIA	e_Cya_KEIIA		0.002		☑
e_Emp_kcat_f	e_Emp_kcat_f		1000.000		☑
e_Emp_kcat_r	e_Emp_kcat_r		848.000		☑
e_Emp_Kfbp	e_Emp_Kfbp		5.920		☑
e_Emp_Kpg3	e_Emp_Kpg3		16.600		☑
e_Eno_kcatf	e_Eno_kcatf		695.000		☑
e_Eno_kcatr	e_Eno_kcatr		522.000		☑
e_Eno_Kpg3	e_Eno_Kpg3		4.760		☑
e_Eno_Kpep	e_Eno_Kpep		1.110		☑
e_Fdp_kcat	e_Fdp_kcat		192.000		☑
e_Fdp_n	e_Fdp_n		4.000		☑
e_Fdp_L	e_Fdp_L		4000000.000		☑
e_Fdp_Kfbp	e_Fdp_Kfbp		0.003		☑
e_Fdp_Kpep	e_Fdp_Kpep		0.300		☑
e_GltA_kcat	e_GltA_kcat		1614.000		☑
e_GltA_Koaa	e_GltA_Koaa		0.029		☑
e_GltA_Kacoa	e_GltA_Kacoa		0.212		☑
e_GltA_Koaaacoa	e_GltA_Koaaacoa		0.029		☑
e_GltA_Kakg	e_GltA_Kakg		0.630		☑
e_Icd_kcat	e_Icd_kcat		695.000		☑
e_Icd_n	e_Icd_n		2.000		☑
e_Icd_L	e_Icd_L		127.000		☑
e_Icd_Kict	e_Icd_Kict		$1.6 \cdot 10^{-4}$		☑
e_Icd_Kpep	e_Icd_Kpep		0.334		☑
e_Mdh_kcat	e_Mdh_kcat		773.000		☑
e_Mdh_n	e_Mdh_n		1.700		☑
e_Mdh_Kmal	e_Mdh_Kmal		10.100		☑
e_Me_kcat	e_Me_kcat		1879.000		☑

Id	Name	SBO	Value	Unit	Constant
e_Me_n	e_Me_n		1.330		☑
e_Me_L	e_Me_L		104000.000		☑
e_Me_Kmal	e_Me_Kmal		0.006		☑
e_Me_Kacoa	e_Me_Kacoa		3.640		☑
e_Me_Kcamp	e_Me_Kcamp		6.540		☑
e_PckA_kcat	e_PckA_kcat		55.500		☑
e_PckA_Koaa	e_PckA_Koaa		0.184		☑
e_PckA_Kpep	e_PckA_Kpep		1000.000		☑
e_Pdh_kcat	e_Pdh_kcat		1179.000		☑
e_Pdh_n	e_Pdh_n		2.650		☑
e_Pdh_L	e_Pdh_L		3.400		☑
e_Pdh_Kpyr	e_Pdh_Kpyr		0.128		☑
e_Pdh_KpyrI	e_Pdh_KpyrI		0.231		☑
e_Pdh_Kglx	e_Pdh_Kglx		0.218		☑
e_PfkA_kcat	e_PfkA_kcat		908000.000		☑
e_PfkA_n	e_PfkA_n		4.000		☑
e_PfkA_L	e_PfkA_L		$9.5 \cdot 10^{7}$		☑
e_PfkA_Kg6p	e_PfkA_Kg6p		0.022		☑
e_PfkA_Kpep	e_PfkA_Kpep		0.138		☑
e_Ppc_kcat	e_Ppc_kcat		5635.000		☑
e_Ppc_n	e_Ppc_n		3.000		☑
e_Ppc_L	e_Ppc_L		5200000.000		☑
e_Ppc_Kpep	e_Ppc_Kpep		0.048		☑
e_Ppc_Kfbp	e_Ppc_Kfbp		0.408		☑
e_PpsA_kcat	e_PpsA_kcat		1.320		☑
e_PpsA_n	e_PpsA_n		2.000		☑
e_PpsA_L	e_PpsA_L		10^{-79}		☑
e_PpsA_Kpyr	e_PpsA_Kpyr		0.002		☑
e_PpsA_Kpep	e_PpsA_Kpep		0.001		☑
e_PykF_kcat	e_PykF_kcat		5749.000		☑
e_PykF_n	e_PykF_n		4.000		☑
e_PykF_L	e_PykF_L		100000.000		☑
e_PykF_Kpep	e_PykF_Kpep		5.000		☑
e_PykF_Kfbp	e_PykF_Kfbp		0.413		☑
pts_k1	pts_k1		116.000		☑
pts_km1	pts_km1		46.300		☑
pts_k4	pts_k4		2520.000		☑
pts_KEIIA	pts_KEIIA		0.009		☑
pts_Kglc	pts_Kglc		0.001		☑
tf_Cra_scale	tf_Cra_scale		100.000		☑
tf_Cra_kfbp	tf_Cra_kfbp		1.360		☑
tf_Cra_n	tf_Cra_n		2.000		☑

Id	Name	SBO	Value	Unit	Constant
tf_Crp_scale	tf_Crp_scale		10^{8}		☑
tf_Crp_kcamp	tf_Crp_kcamp		0.895		☑
tf_Crp_n	tf_Crp_n		1.000		☑
tf_PdhR_scale	tf_PdhR_scale		100.000		☑
tf_PdhR_kpyr	tf_PdhR_kpyr		0.164		☑
tf_PdhR_n	tf_PdhR_n		1.000		☑
g_aceBAK_vcra_unbound	g_aceBAK_vcra_unbound		$1.9 \cdot 10^{-9}$		☑
g_aceBAK_vcra_bound	g_aceBAK_vcra_bound		$2 \cdot 10^{-6}$		☑
g_aceBAK_Kcra	g_aceBAK_Kcra		0.004		☑
g_aceBAK_aceBfactor	g_aceBAK_aceBfactor		0.300		☑
g_aceBAK_aceKfactor	g_aceBAK_aceKfactor		0.030		☑
g_aceBAK_KDNA	g_aceBAK_KDNA		2.190		☑
g_aceBAK_KP	g_aceBAK_KP		0.897		☑
g_aceBAK_KPprime	g_aceBAK_KPprime		0.003		☑
g_aceBAK_KG	g_aceBAK_KG		0.005		☑
g_aceBAK_L	g_aceBAK_L		923.000		☑
g_aceBAK_kcat_iclr	g_aceBAK_kcat_iclr		$9.3 \cdot 10^{-4}$		☑
g_aceBAK_DNA	g_aceBAK_DNA		1.000		☑
g_aceBAK_vcrp_bound	g_aceBAK_vcrp_bound		$2.3 \cdot 10^{-10}$		☑
g_aceBAK_vcrp_unbound	g_aceBAK_vcrp_unbound		$2 \cdot 10^{-8}$		☑
g_aceBAK_Kcrp	g_aceBAK_Kcrp		0.341		☑
g_acs_vcrp_unbound	g_acs_vcrp_unbound		0.000		☑
g_acs_vcrp_bound	g_acs_vcrp_bound		$1.2 \cdot 10^{-6}$		☑
g_acs_n	g_acs_n		2.310		☑
g_acs_Kcrp	g_acs_Kcrp		0.005		☑
g_akg2mal_vcrp_unbound	g_akg2mal_vcrp_unbound		0.000		☑

Id	Name	SBO	Value	Unit	Constant
g_akg2mal_vcrp_bound	g_akg2mal_vcrp_bound		$1.4 \cdot 10^{-6}$		☑
g_akg2mal_Kcrp	g_akg2mal_Kcrp		0.091		☑
g_akg2mal_n	g_akg2mal_n		0.740		☑
g_emp_vcra_unbound	g_emp_vcra_unbound		$6.2 \cdot 10^{-7}$		☑
g_emp_vcra_bound	g_emp_vcra_bound		0.000		☑
g_emp_Kcra	g_emp_Kcra		0.090		☑
g_emp_vcrp_unbound	g_emp_vcrp_unbound		0.000		☑
g_emp_vcrp_bound	g_emp_vcrp_bound		$4.7 \cdot 10^{-7}$		☑
g_emp_Kcrp	g_emp_Kcrp		0.012		☑
g_eno_vcra_unbound	g_eno_vcra_unbound		$6.8 \cdot 10^{-7}$		☑
g_eno_vcra_bound	g_eno_vcra_bound		0.000		☑
g_eno_Kcra	g_eno_Kcra		0.016		☑
g_fdp_vcra_unbound	g_fdp_vcra_unbound		0.000		☑
g_fdp_vcra_bound	g_fdp_vcra_bound		$4.5 \cdot 10^{-8}$		☑
g_fdp_Kcra	g_fdp_Kcra		0.001		☑
g_gltA_vcrp_unbound	g_gltA_vcrp_unbound		0.000		☑
g_gltA_vcrp_bound	g_gltA_vcrp_bound		$2.3 \cdot 10^{-6}$		☑
g_gltA_Kcrp	g_gltA_Kcrp		0.040		☑
g_gltA_n	g_gltA_n		1.070		☑
g_icd_vcra_unbound	g_icd_vcra_unbound		$1.1 \cdot 10^{-7}$		☑
g_icd_vcra_bound	g_icd_vcra_bound		$8.5 \cdot 10^{-7}$		☑
g_icd_Kcra	g_icd_Kcra		0.001		☑
g_mdh_vcrp_unbound	g_mdh_vcrp_unbound		0.000		☑
g_mdh_vcrp_bound	g_mdh_vcrp_bound		$9.1 \cdot 10^{-6}$		☑
g_mdh_Kcrp	g_mdh_Kcrp		0.060		☑

Id	Name	SBO	Value	Unit	Constant
g_pckA_vcra_unbound	g_pckA_vcra_unbound		0.000		☑
g_pckA_vcra_bound	g_pckA_vcra_bound		$2.5 \cdot 10^{-6}$		☑
g_pckA_Kcra	g_pckA_Kcra		0.005		☑
g_pdh_vpdhr_unbound	g_pdh_vpdhr_unbound		$3.6 \cdot 10^{-7}$		☑
g_pdh_vpdhr_bound	g_pdh_vpdhr_bound		$1.3 \cdot 10^{-9}$		☑
g_pdh_Kpdhr	g_pdh_Kpdhr		0.003		☑
g_pfkA_vcra_unbound	g_pfkA_vcra_unbound		$8.2 \cdot 10^{-7}$		☑
g_pfkA_vcra_bound	g_pfkA_vcra_bound		$6.6 \cdot 10^{-9}$		☑
g_pfkA_Kcra	g_pfkA_Kcra		$6.3 \cdot 10^{-7}$		☑
g_ppsA_vcra_unbound	g_ppsA_vcra_unbound		0.000		☑
g_ppsA_vcra_bound	g_ppsA_vcra_bound		$3.3 \cdot 10^{-6}$		☑
g_ppsA_Kcra	g_ppsA_Kcra		0.017		☑
g_pykF_vcra_unbound	g_pykF_vcra_unbound		$3.9 \cdot 10^{-7}$		☑
g_pykF_vcra_bound	g_pykF_vcra_bound		$2.1 \cdot 10^{-9}$		☑
g_pykF_Kcra	g_pykF_Kcra		0.002		☑
d_k_degr	d_k_degr		$2.8 \cdot 10^{-5}$		☑
bm_k_expr	bm_k_expr		20000.000		☑
bm_muACT	bm_muACT		$5.6 \cdot 10^{-5}$		☑
bm_muGLC	bm_muGLC		$1.8 \cdot 10^{-4}$		☑
bm_GLC_ACoA	bm_GLC_ACoA		1.880		☑
bm_GLC_AKG	bm_GLC_AKG		0.978		☑
bm_GLC_G6P	bm_GLC_G6P		0.154		☑
bm_GLC_OAA	bm_GLC_OAA		6.400		☑
bm_GLC_PEP	bm_GLC_PEP		0.423		☑
bm_GLC_PG3	bm_GLC_PG3		0.049		☑
bm_GLC_PYR	bm_GLC_PYR		0.553		☑
bm_ACT_ACoA	bm_ACT_ACoA		0.108		☑
bm_ACT_AKG	bm_ACT_AKG		0.056		☑
bm_ACT_G6P	bm_ACT_G6P		0.076		☑
bm_ACT_OAA	bm_ACT_OAA		1.430		☑
bm_ACT_PEP	bm_ACT_PEP		0.047		☑
bm_ACT_PG3	bm_ACT_PG3		0.066		☑

Id	Name	SBO	Value	Unit	Constant
bm_ACT_PYR	bm_ACT_PYR		5.185		☑
alphaGLC	alphaGLC		0.000		☐
alphaACT	alphaACT		0.000		☐
mu	mu		0.000		☐
k_bm_ACoA	k_bm_ACoA		0.000		☐
k_bm_AKG	k_bm_AKG		0.000		☐
k_bm_G6P	k_bm_G6P		0.000		☐
k_bm_OAA	k_bm_OAA		0.000		☐
k_bm_PEP	k_bm_PEP		0.000		☐
k_bm_PG3	k_bm_PG3		0.000		☐
k_bm_PYR	k_bm_PYR		0.000		☐
SS_Me	SS_Me		0.000		☐
SS_Ppc	SS_Ppc		0.000		☐
shift1	shift1		8.150	3600 s	☑
shift2	shift2		27.850	3600 s	☑
GLC_1	GLC_1		0.000	$g \cdot l^{-1}$	☑
GLC_2	GLC_2		3.000	$g \cdot l^{-1}$	☑
ACT_1	ACT_1		5.000	$g \cdot l^{-1}$	☑
ACT_2	ACT_2		3.000	$g \cdot l^{-1}$	☑
BM_1	BM_1		0.030		☑
BM_2	BM_2		$5 \cdot 10^{-4}$		☑

6 Rules

This is an overview of twelve rules.

6.1 Rule alphaGLC

Rule alphaGLC is an assignment rule for parameter alphaGLC:

$$\text{alphaGLC} = \frac{[\text{GLC}]}{[\text{GLC}] + \text{pts\_Kglc}} \tag{1}$$

6.2 Rule alphaACT

Rule alphaACT is an assignment rule for parameter alphaACT:

$$\text{alphaACT} = \frac{[\text{ACT}]}{[\text{ACT}] + \text{e\_Acs\_Kact}} \cdot \left(1 - \frac{[\text{GLC}]}{[\text{GLC}] + \text{pts\_Kglc}}\right) \tag{2}$$

6.3 Rule mu

Rule mu is an assignment rule for parameter mu:

$$\text{mu} = \text{alphaGLC} \cdot \text{bm\_muGLC} + \text{alphaACT} \cdot \text{bm\_muACT} \tag{3}$$

6.4 Rule k_bm_ACoA

Rule k_bm_ACoA is an assignment rule for parameter k_bm_ACoA:

$$\text{k\_bm\_ACoA} = \text{alphaGLC} \cdot \text{bm\_GLC\_ACoA} + \text{alphaACT} \cdot \text{bm\_ACT\_ACoA} \tag{4}$$

6.5 Rule k_bm_AKG

Rule k_bm_AKG is an assignment rule for parameter k_bm_AKG:

$$\text{k\_bm\_AKG} = \text{alphaGLC} \cdot \text{bm\_GLC\_AKG} + \text{alphaACT} \cdot \text{bm\_ACT\_AKG} \tag{5}$$

6.6 Rule k_bm_G6P

Rule k_bm_G6P is an assignment rule for parameter k_bm_G6P:

$$\text{k\_bm\_G6P} = \text{alphaGLC} \cdot \text{bm\_GLC\_G6P} + \text{alphaACT} \cdot \text{bm\_ACT\_G6P} \tag{6}$$

6.7 Rule k_bm_OAA

Rule k_bm_OAA is an assignment rule for parameter k_bm_OAA:

$$\text{k\_bm\_OAA} = \text{alphaGLC} \cdot \text{bm\_GLC\_OAA} + \text{alphaACT} \cdot \text{bm\_ACT\_OAA} \tag{7}$$

6.8 Rule k_bm_PEP

Rule k_bm_PEP is an assignment rule for parameter k_bm_PEP:

$$\text{k\_bm\_PEP} = \text{alphaGLC} \cdot \text{bm\_GLC\_PEP} + \text{alphaACT} \cdot \text{bm\_ACT\_PEP} \tag{8}$$

6.9 Rule k_bm_PG3

Rule k_bm_PG3 is an assignment rule for parameter k_bm_PG3:

$$\text{k\_bm\_PG3} = \text{alphaGLC} \cdot \text{bm\_GLC\_PG3} + \text{alphaACT} \cdot \text{bm\_ACT\_PG3} \tag{9}$$

6.10 Rule k_bm_PYR

Rule k_bm_PYR is an assignment rule for parameter k_bm_PYR:

$$\text{k\_bm\_PYR} = \text{alphaGLC} \cdot \text{bm\_GLC\_PYR} + \text{alphaACT} \cdot \text{bm\_ACT\_PYR} \tag{10}$$

6.11 Rule SS_Me

Rule SS_Me is an assignment rule for parameter SS_Me:

$$\text{SS\_Me} = \text{alphaGLC} \cdot 9.99714 \cdot 10^{-4} + \text{alphaACT} \cdot 0.003399346 \tag{11}$$

6.12 Rule SS_Ppc

Rule SS_Ppc is an assignment rule for parameter SS_Ppc:

$$\text{SS\_Ppc} = \text{alphaGLC} \cdot 9.99714 \cdot 10^{-4} + \text{alphaACT} \cdot 2.79893 \cdot 10^{-4} \tag{12}$$

7 Events

This is an overview of two events. Each event is initiated whenever its trigger condition switches from `false` to `true`. A delay function postpones the effects of an event to a later time point. At the time of execution, an event can assign values to species, parameters or compartments if these are not set to constant.

7.1 Event event_0

Name first shift

Trigger condition

$$\text{time} \geq 3600 \cdot \text{shift1} \tag{13}$$

Assignments

$$\text{GLC} = \text{GLC\_1} \tag{14}$$
$$\text{ACT} = \text{ACT\_1} \tag{15}$$
$$[\text{BM}] = \text{BM\_1} \tag{16}$$

7.2 Event event_1

Name second shift

Trigger condition

$$\text{time} \geq 3600 \cdot \text{shift2} \tag{17}$$

Assignments

$$\text{GLC} = \text{GLC\_2} \tag{18}$$
$$\text{ACT} = \text{ACT\_2} \tag{19}$$
$$[\text{BM}] = \text{BM\_2} \tag{20}$$

8 Reactions

This model contains 109 reactions. All reactions are listed in the following table and are subsequently described in detail. If a reaction is affected by a modifier, the identifier of this species is written above the reaction arrow.

Table 5: Overview of all reactions

№	Id	Name	Reaction Equation	SBO
1	bm_ACoA	bm_ACoA	$\mathrm{ACoA} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
2	bm_AKG	bm_AKG	$\mathrm{AKG} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
3	bm_G6P	bm_G6P	$\mathrm{G6P} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
4	bm_OAA	bm_OAA	$\mathrm{OAA} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
5	bm_PEP	bm_PEP	$\mathrm{PEP} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
6	bm_PG3	bm_PG3	$\mathrm{PG3} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
7	bm_PYR	bm_PYR	$\mathrm{PYR} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
8	pts_r1	pts_r1	$\mathrm{PEP} + \mathrm{EIIA} \rightleftharpoons \mathrm{PYR} + \mathrm{EIIA\_P}$	
9	pts_r4	pts_r4	$\mathrm{EIIA\_P} \xrightarrow{\mathrm{EIICB,\ GLC}} \mathrm{G6P} + \mathrm{EIIA}$	
10	e_AceK_Ki	e_AceK_Ki	$\mathrm{Icd} \xrightarrow{\mathrm{AKG,\ AceK,\ GLX,\ ICT,\ OAA,\ PEP,\ PG3,\ PYR}} \mathrm{Icd\_P}$	
11	e_AceK_Ph	e_AceK_Ph	$\mathrm{Icd\_P} \xrightarrow{\mathrm{AKG,\ AceK,\ OAA,\ PEP,\ PG3,\ PYR}} \mathrm{Icd}$	
12	tf_Cra	tf_Cra	$\mathrm{Cra} \overset{\mathrm{FBP}}{\rightleftharpoons} \mathrm{CraFBP}$	
13	tf_Crp	tf_Crp	$\mathrm{Crp} \overset{\mathrm{cAMP}}{\rightleftharpoons} \mathrm{CrpcAMP}$	
14	tf_PdhR	tf_PdhR	$\mathrm{PdhR} \overset{\mathrm{PYR}}{\rightleftharpoons} \mathrm{PdhRPYR}$	
15	e_AceA	e_AceA	$\mathrm{ICT} \xrightarrow{\mathrm{AceA,\ PEP,\ PG3}} \mathrm{AKG} + \mathrm{GLX}$	
16	e_AceB	e_AceB	$\mathrm{ACoA} + \mathrm{GLX} \xrightarrow{\mathrm{AceB}} \mathrm{MAL}$	

Produced by SBML2LaTeX

№	Id	Name	Reaction Equation	SBO
17	e_Acoa2act	e_Acoa2act	$\mathrm{ACoA} \xrightarrow{\mathrm{Acoa2act,\ PYR}} \emptyset$	
18	e_Acs	e_Acs	$\emptyset \xrightarrow{\mathrm{ACT,\ Acs}} \mathrm{ACoA}$	
19	e_Akg2mal	e_Akg2mal	$\mathrm{AKG} \xrightarrow{\mathrm{Akg2mal}} \mathrm{MAL}$	
20	e_CAMPdegr	e_CAMPdegr	$\mathrm{cAMP} \xrightarrow{\mathrm{CAMPdegr}} \emptyset$	
21	e_Cya	e_Cya	$\emptyset \xrightarrow{\mathrm{Cya,\ EIIA\_P}} \mathrm{cAMP}$	
22	e_Emp	e_Emp	$0 \cdot 5\,\mathrm{FBP} \xrightleftharpoons{\mathrm{Emp}} \mathrm{PG3}$	
23	e_Eno	e_Eno	$\mathrm{PG3} \xrightleftharpoons{\mathrm{Eno}} \mathrm{PEP}$	
24	e_Fdp	e_Fdp	$\mathrm{FBP} \xrightarrow{\mathrm{Fdp,\ PEP}} \mathrm{G6P}$	
25	e_GltA	e_GltA	$\mathrm{ACoA} + \mathrm{OAA} \xrightarrow{\mathrm{AKG,\ GltA}} \mathrm{ICT}$	
26	e_Icd	e_Icd	$\mathrm{ICT} \xrightarrow{\mathrm{Icd,\ PEP}} \mathrm{AKG}$	
27	e_Mdh	e_Mdh	$\mathrm{MAL} \xrightarrow{\mathrm{Mdh}} \mathrm{OAA}$	
28	e_Me	e_Me	$\mathrm{MAL} \xrightarrow{\mathrm{ACoA,\ Me,\ cAMP}} \mathrm{PYR}$	
29	e_PckA	e_PckA	$\mathrm{OAA} \xrightarrow{\mathrm{PckA}} \mathrm{PEP}$	
30	e_Pdh	e_Pdh	$\mathrm{PYR} \xrightarrow{\mathrm{GLX,\ Pdh}} \mathrm{ACoA}$	
31	e_PfkA	e_PfkA	$\mathrm{G6P} \xrightarrow{\mathrm{PEP,\ PfkA}} \mathrm{FBP}$	
32	e_Ppc	e_Ppc	$\mathrm{PEP} \xrightarrow{\mathrm{FBP,\ Ppc}} \mathrm{OAA}$	
33	e_PpsA	e_PpsA	$\mathrm{PYR} \xrightarrow{\mathrm{PpsA}} \mathrm{PEP}$	
34	e_PykF	e_PykF	$\mathrm{PEP} \xrightarrow{\mathrm{FBP,\ PykF}} \mathrm{PYR}$	
35	g_aceA	g_aceA	$\emptyset \xrightarrow{\mathrm{ACT,\ Cra,\ CrpcAMP,\ GLC,\ GLX,\ IclR,\ PYR}} \mathrm{AceA}$	
36	g_aceB	g_aceB	$\emptyset \xrightarrow{\mathrm{ACT,\ Cra,\ CrpcAMP,\ GLC,\ GLX,\ IclR,\ PYR}} \mathrm{AceB}$	

Produced by SBML2LaTeX

Produced by SBML2LaTeX

№	Id	Name	Reaction Equation	SBO
37	g_aceK	g_aceK	$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC, GLX, IclR, PYR}} \text{AceK}$	
38	g_acoa2act	g_acoa2act	$\emptyset \longrightarrow \text{Acoa2act}$	
39	g_acs	g_acs	$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Acs}$	
40	g_akg2mal	g_akg2mal	$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Akg2mal}$	
41	g_cAMPdegr	g_cAMPdegr	$\emptyset \longrightarrow \text{CAMPdegr}$	
42	g_cra	g_cra	$\emptyset \longrightarrow \text{Cra}$	
43	g_crp	g_crp	$\emptyset \longrightarrow \text{Crp}$	
44	g_cya	g_cya	$\emptyset \longrightarrow \text{Cya}$	
45	g_emp	g_emp	$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC}} \text{Emp}$	
46	g_eno	g_eno	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Eno}$	
47	g_fdp	g_fdp	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Fdp}$	
48	g_gltA	g_gltA	$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{GltA}$	
49	g_icd	g_icd	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Icd}$	
50	g_iclr	g_iclr	$\emptyset \longrightarrow \text{IclR}$	
51	g_mdh	g_mdh	$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Mdh}$	
52	g_me	g_me	$\emptyset \xrightarrow{\text{ACT, GLC}} \text{Me}$	
53	g_pckA	g_pckA	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PckA}$	
54	g_pdh	g_pdh	$\emptyset \xrightarrow{\text{ACT, GLC, PdhR}} \text{Pdh}$	
55	g_pdhr	g_pdhr	$\emptyset \longrightarrow \text{PdhR}$	
56	g_pfkA	g_pfkA	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PfkA}$	
57	g_ppc	g_ppc	$\emptyset \xrightarrow{\text{ACT, GLC}} \text{Ppc}$	
58	g_ppsA	g_ppsA	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PpsA}$	

№	Id	Name	Reaction Equation	SBO
59	g_pykF	g_pykF	$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PykF}$	
60	g_EIIA	g_EIIA	$\emptyset \longrightarrow \text{EIIA}$	
61	g_EIICB	g_EIICB	$\emptyset \longrightarrow \text{EIICB}$	
62	d_AceA	d_AceA	$\text{AceA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
63	d_AceB	d_AceB	$\text{AceB} \xrightarrow{\text{ACT, GLC}} \emptyset$	
64	d_AceK	d_AceK	$\text{AceK} \xrightarrow{\text{ACT, GLC}} \emptyset$	
65	d_Acoa2act	d_Acoa2act	$\text{Acoa2act} \longrightarrow \emptyset$	
66	d_Acs	d_Acs	$\text{Acs} \xrightarrow{\text{ACT, GLC}} \emptyset$	
67	d_Akg2mal	d_Akg2mal	$\text{Akg2mal} \xrightarrow{\text{ACT, GLC}} \emptyset$	
68	d_CAMPdegr	d_CAMPdegr	$\text{CAMPdegr} \longrightarrow \emptyset$	
69	d_Cra	d_Cra	$\text{Cra} \longrightarrow \emptyset$	
70	d_CraFBP	d_CraFBP	$\text{CraFBP} \longrightarrow \emptyset$	
71	d_Crp	d_Crp	$\text{Crp} \longrightarrow \emptyset$	
72	d_CrpcAMP	d_CrpcAMP	$\text{CrpcAMP} \longrightarrow \emptyset$	
73	d_Cya	d_Cya	$\text{Cya} \longrightarrow \emptyset$	
74	d_Emp	d_Emp	$\text{Emp} \xrightarrow{\text{ACT, GLC}} \emptyset$	
75	d_Eno	d_Eno	$\text{Eno} \xrightarrow{\text{ACT, GLC}} \emptyset$	
76	d_Fdp	d_Fdp	$\text{Fdp} \xrightarrow{\text{ACT, GLC}} \emptyset$	
77	d_GltA	d_GltA	$\text{GltA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
78	d_Icd	d_Icd	$\text{Icd} \xrightarrow{\text{ACT, GLC}} \emptyset$	
79	d_Icd_P	d_Icd_P	$\text{Icd\_P} \xrightarrow{\text{ACT, GLC}} \emptyset$	
80	d_IclR	d_IclR	$\text{IclR} \longrightarrow \emptyset$	
81	d_Mdh	d_Mdh	$\text{Mdh} \xrightarrow{\text{ACT, GLC}} \emptyset$	

Produced by SBML2LaTeX

№	Id	Name	Reaction Equation	SBO
82	d_Me	d_Me	$\text{Me} \xrightarrow{\text{ACT, GLC}} \emptyset$	
83	d_PckA	d_PckA	$\text{PckA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
84	d_Pdh	d_Pdh	$\text{Pdh} \xrightarrow{\text{ACT, GLC}} \emptyset$	
85	d_PdhR	d_PdhR	$\text{PdhR} \longrightarrow \emptyset$	
86	d_PdhRPYR	d_PdhRPYR	$\text{PdhRPYR} \longrightarrow \emptyset$	
87	d_PfkA	d_PfkA	$\text{PfkA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
88	d_Ppc	d_Ppc	$\text{Ppc} \xrightarrow{\text{ACT, GLC}} \emptyset$	
89	d_PpsA	d_PpsA	$\text{PpsA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
90	d_PykF	d_PykF	$\text{PykF} \xrightarrow{\text{ACT, GLC}} \emptyset$	
91	d_EIIA	d_EIIA	$\text{EIIA} \longrightarrow \emptyset$	
92	d_EIIA_P	d_EIIA_P	$\text{EIIA\_P} \longrightarrow \emptyset$	
93	d_EIICB	d_EIICB	$\text{EIICB} \longrightarrow \emptyset$	
94	d_ACoA	d_ACoA	$\text{ACoA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
95	d_AKG	d_AKG	$\text{AKG} \xrightarrow{\text{ACT, GLC}} \emptyset$	
96	d_cAMP	d_cAMP	$\text{cAMP} \xrightarrow{\text{ACT, GLC}} \emptyset$	
97	d_FBP	d_FBP	$\text{FBP} \xrightarrow{\text{ACT, GLC}} \emptyset$	
98	d_G6P	d_G6P	$\text{G6P} \xrightarrow{\text{ACT, GLC}} \emptyset$	
99	d_GLX	d_GLX	$\text{GLX} \xrightarrow{\text{ACT, GLC}} \emptyset$	
100	d_ICT	d_ICT	$\text{ICT} \xrightarrow{\text{ACT, GLC}} \emptyset$	
101	d_MAL	d_MAL	$\text{MAL} \xrightarrow{\text{ACT, GLC}} \emptyset$	
102	d_OAA	d_OAA	$\text{OAA} \xrightarrow{\text{ACT, GLC}} \emptyset$	
103	d_PEP	d_PEP	$\text{PEP} \xrightarrow{\text{ACT, GLC}} \emptyset$	

Produced by SBML2LaTeX

№	Id	Name	Reaction Equation	SBO
104	d_PG3	d_PG3	$\mathrm{PG3} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
105	d_PYR	d_PYR	$\mathrm{PYR} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset$	
106	env_growth	env_growth	$\emptyset \xrightarrow{\mathrm{ACT,\ GLC}} \mathrm{BM}$	
107	env_GLCup	env_GLCup	$\mathrm{GLC} \xrightarrow{\mathrm{BM,\ EIIA\_P,\ EIICB}} \emptyset$	
108	env_ACTup	env_ACTup	$\mathrm{ACT} \xrightarrow{\mathrm{Acs,\ BM}} \emptyset$	
109	env_ACTex	env_ACTex	$\emptyset \xrightarrow{\mathrm{ACoA,\ Acoa2act,\ BM,\ PYR}} \mathrm{ACT}$	

Produced by SBML2LaTeX

8.1 Reaction bm_ACoA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_ACoA

Reaction equation

$$\mathrm{ACoA} \xrightarrow{\mathrm{ACT},\ \mathrm{GLC}} \emptyset \tag{21}$$

Reactant

Table 6: Properties of each reactant.

Id	Name	SBO
ACoA	ACoA	

Modifiers

Table 7: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_1 = \mathrm{k\_bm\_ACoA} \cdot \mathrm{ACoA} \tag{22}$$

8.2 Reaction bm_AKG

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_AKG

Reaction equation

$$\mathrm{AKG} \xrightarrow{\mathrm{ACT},\ \mathrm{GLC}} \emptyset \tag{23}$$

Reactant

Table 8: Properties of each reactant.

Id	Name	SBO
AKG	AKG	

Modifiers

Table 9: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_2 = \text{k\_bm\_AKG} \cdot \text{AKG} \tag{24}$$

8.3 Reaction bm_G6P

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_G6P

Reaction equation

$$\text{G6P} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{25}$$

Reactant

Table 10: Properties of each reactant.

Id	Name	SBO
G6P	G6P	

Modifiers

Table 11: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_3 = \text{k\_bm\_G6P} \cdot \text{G6P} \tag{26}$$

8.4 Reaction bm_OAA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_OAA

Reaction equation

$$\text{OAA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{27}$$

Reactant

Table 12: Properties of each reactant.

Id	Name	SBO
OAA	OAA	

Modifiers

Table 13: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_4 = \text{k\_bm\_OAA} \cdot \text{OAA} \tag{28}$$

8.5 Reaction bm_PEP

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_PEP

Reaction equation

$$\mathrm{PEP} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{29}$$

Reactant

Table 14: Properties of each reactant.

Id	Name	SBO
PEP	PEP	

Modifiers

Table 15: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_5 = \mathrm{k\_bm\_PEP} \cdot \mathrm{PEP} \tag{30}$$

8.6 Reaction bm_PG3

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_PG3

Reaction equation

$$\mathrm{PG3} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{31}$$

Reactant

Table 16: Properties of each reactant.

Id	Name	SBO
PG3	PG3	

Modifiers

Table 17: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_6 = \text{k\_bm\_PG3} \cdot \text{PG3} \tag{32}$$

8.7 Reaction bm_PYR

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name bm_PYR

Reaction equation

$$\text{PYR} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{33}$$

Reactant

Table 18: Properties of each reactant.

Id	Name	SBO
PYR	PYR	

Modifiers

Table 19: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_7 = \text{k\_bm\_PYR} \cdot \text{PYR} \tag{34}$$

8.8 Reaction pts_r1

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

Name pts_r1

Reaction equation

$$\text{PEP} + \text{EIIA} \rightleftharpoons \text{PYR} + \text{EIIA\_P} \tag{35}$$

Reactants

Table 20: Properties of each reactant.

Id	Name	SBO
PEP	PEP	
EIIA	EIIA	

Products

Table 21: Properties of each product.

Id	Name	SBO
PYR	PYR	
EIIA_P	EIIA_P	

Kinetic Law

Derived unit contains undeclared units

$$v_8 = \text{pts\_k1} \cdot \text{PEP} \cdot \text{EIIA} - \text{pts\_km1} \cdot \text{PYR} \cdot \text{EIIA\_P} \tag{36}$$

8.9 Reaction pts_r4

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

Name pts_r4

Reaction equation

$$\text{EIIA\_P} \xrightarrow{\text{EIICB, GLC}} \text{G6P} + \text{EIIA} \tag{37}$$

Reactant

Table 22: Properties of each reactant.

Id	Name	SBO
EIIA_P	EIIA_P	

Modifiers

Table 23: Properties of each modifier.

Id	Name	SBO
EIICB	EIICB	
GLC	GLC	

Products

Table 24: Properties of each product.

Id	Name	SBO
G6P	G6P	
EIIA	EIIA	

Kinetic Law

Derived unit contains undeclared units

$$v_9 = \frac{\text{pts\_k4} \cdot \text{EIICB} \cdot \text{EIIA\_P} \cdot [\text{GLC}]}{(\text{pts\_KEIIA} + \text{EIIA\_P}) \cdot (\text{pts\_Kglc} + [\text{GLC}])} \tag{38}$$

8.10 Reaction e_AceK_Ki

This is an irreversible reaction of one reactant forming one product influenced by eight modifiers.

Name e_AceK_Ki

Reaction equation

$$\text{Icd} \xrightarrow{\text{AKG, AceK, GLX, ICT, OAA, PEP, PG3, PYR}} \text{Icd\_P} \tag{39}$$

Reactant

Table 25: Properties of each reactant.

Id	Name	SBO
Icd	Icd	

Modifiers

Table 26: Properties of each modifier.

Id	Name	SBO
AKG	AKG	
AceK	AceK	
GLX	GLX	
ICT	ICT	
OAA	OAA	
PEP	PEP	
PG3	PG3	
PYR	PYR	

Product

Table 27: Properties of each product.

Id	Name	SBO
Icd_P	Icd_P	

Kinetic Law

Derived unit contains undeclared units

$$v_{10} = \frac{\frac{\text{AceK}\cdot\text{e\_AceK\_kcat\_ki}\cdot\text{Icd}}{\text{e\_AceK\_Kicd}} \cdot \left(1+\frac{\text{Icd}}{\text{e\_AceK\_Kicd}}\right)^{\text{e\_AceK\_n}-1}}{\left(1+\frac{\text{Icd}}{\text{e\_AceK\_Kicd}}\right)^{\text{e\_AceK\_n}} + \text{e\_AceK\_L}\cdot\left(1+\frac{\text{ICT}}{\text{e\_AceK\_Kict}}+\frac{\text{GLX}}{\text{e\_AceK\_Kglx}}+\frac{\text{OAA}}{\text{e\_AceK\_Koaa}}+\frac{\text{AKG}}{\text{e\_AceK\_Kakg}}+\frac{\text{PEP}}{\text{e\_AceK\_Kpep}}+\right.} \tag{40}$$

8.11 Reaction e_AceK_Ph

This is an irreversible reaction of one reactant forming one product influenced by six modifiers.

Name e_AceK_Ph

Reaction equation

$$\text{Icd\_P} \xrightarrow{\text{AKG, AceK, OAA, PEP, PG3, PYR}} \text{Icd} \tag{41}$$

Reactant

Table 28: Properties of each reactant.

Id	Name	SBO
Icd_P	Icd_P	

Modifiers

Table 29: Properties of each modifier.

Id	Name	SBO
AKG	AKG	
AceK	AceK	
OAA	OAA	
PEP	PEP	
PG3	PG3	
PYR	PYR	

Product

Table 30: Properties of each product.

Id	Name	SBO
Icd	Icd	

Kinetic Law

Derived unit contains undeclared units

$$v_{11} = \frac{\frac{\text{AceK} \cdot \text{e\_AceK\_kcat\_ph} \cdot \text{Icd\_P}}{\text{e\_AceK\_Kicd\_P}} \cdot \left(1 + \frac{\text{Icd\_P}}{\text{e\_AceK\_Kicd\_P}}\right)^{\text{e\_AceK\_n}-1}}{\left(1 + \frac{\text{Icd\_P}}{\text{e\_AceK\_Kicd\_P}}\right)^{\text{e\_AceK\_n}} + \frac{\text{e\_AceK\_L}}{\left(1 + \frac{\text{OAA}}{\text{e\_AceK\_Koaa}} + \frac{\text{AKG}}{\text{e\_AceK\_Kakg}} + \frac{\text{PEP}}{\text{e\_AceK\_Kpep}} + \frac{\text{PG3}}{\text{e\_AceK\_Kpg3}} + \frac{\text{PYR}}{\text{e\_AceK\_Kpyr}}\right)^{\text{e\_AceK\_n}}}} \tag{42}$$

8.12 Reaction `tf_Cra`

This is a reversible reaction of one reactant forming one product influenced by one modifier.

Name tf_Cra

Reaction equation

$$\text{Cra} \overset{\text{FBP}}{\rightleftharpoons} \text{CraFBP} \tag{43}$$

Reactant

Table 31: Properties of each reactant.

Id	Name	SBO
`Cra`	Cra	

Modifier

Table 32: Properties of each modifier.

Id	Name	SBO
`FBP`	FBP	

Product

Table 33: Properties of each product.

Id	Name	SBO
`CraFBP`	CraFBP	

Kinetic Law

Derived unit contains undeclared units

$$v_{12} = \text{tf\_Cra\_scale} \cdot \left(\frac{(\text{Cra} + \text{CraFBP}) \cdot \text{FBP}^{\text{tf\_Cra\_n}}}{\text{FBP}^{\text{tf\_Cra\_n}} + \text{tf\_Cra\_kfbp}^{\text{tf\_Cra\_n}}} - \text{CraFBP} \right) \tag{44}$$

8.13 Reaction tf_Crp

This is a reversible reaction of one reactant forming one product influenced by one modifier.

Name tf_Crp

Reaction equation

$$\mathrm{Crp} \overset{\mathrm{cAMP}}{\rightleftharpoons} \mathrm{CrpcAMP} \tag{45}$$

Reactant

Table 34: Properties of each reactant.

Id	Name	SBO
Crp	Crp	

Modifier

Table 35: Properties of each modifier.

Id	Name	SBO
cAMP	cAMP	

Product

Table 36: Properties of each product.

Id	Name	SBO
CrpcAMP	CrpcAMP	

Kinetic Law

Derived unit contains undeclared units

$$v_{13} = \mathrm{tf\_Crp\_scale} \cdot \left(\frac{(\mathrm{Crp} + \mathrm{CrpcAMP}) \cdot \mathrm{cAMP}^{\mathrm{tf\_Crp\_n}}}{\mathrm{cAMP}^{\mathrm{tf\_Crp\_n}} + \mathrm{tf\_Crp\_kcamp}^{\mathrm{tf\_Crp\_n}}} - \mathrm{CrpcAMP} \right) \tag{46}$$

8.14 Reaction tf_PdhR

This is a reversible reaction of one reactant forming one product influenced by one modifier.

Name tf_PdhR

Reaction equation

$$\mathrm{PdhR} \overset{\mathrm{PYR}}{\rightleftharpoons} \mathrm{PdhRPYR} \tag{47}$$

Reactant

Table 37: Properties of each reactant.

Id	Name	SBO
PdhR	PdhR	

Modifier

Table 38: Properties of each modifier.

Id	Name	SBO
PYR	PYR	

Product

Table 39: Properties of each product.

Id	Name	SBO
PdhRPYR	PdhRPYR	

Kinetic Law

Derived unit contains undeclared units

$$v_{14} = \mathrm{tf\_PdhR\_scale} \cdot \left(\frac{(\mathrm{PdhR} + \mathrm{PdhRPYR}) \cdot \mathrm{PYR}^{\mathrm{tf\_PdhR\_n}}}{\mathrm{PYR}^{\mathrm{tf\_PdhR\_n}} + \mathrm{tf\_PdhR\_kpyr}^{\mathrm{tf\_PdhR\_n}}} - \mathrm{PdhRPYR} \right) \tag{48}$$

8.15 Reaction e_AceA

This is an irreversible reaction of one reactant forming two products influenced by three modifiers.

Name e_AceA

Reaction equation

$$\mathrm{ICT} \xrightarrow{\mathrm{AceA,\ PEP,\ PG3}} \mathrm{AKG} + \mathrm{GLX} \tag{49}$$

Reactant

Table 40: Properties of each reactant.

Id	Name	SBO
ICT	ICT	

Modifiers

Table 41: Properties of each modifier.

Id	Name	SBO
AceA	AceA	
PEP	PEP	
PG3	PG3	

Products

Table 42: Properties of each product.

Id	Name	SBO
AKG	AKG	
GLX	GLX	

Kinetic Law

Derived unit contains undeclared units

$$v_{15} = \frac{\frac{\text{AceA}\cdot\text{e\_AceA\_kcat}\cdot\text{ICT}}{\text{e\_AceA\_Kict}} \cdot \left(1 + \frac{\text{ICT}}{\text{e\_AceA\_Kict}}\right)^{\text{e\_AceA\_n}-1}}{\left(1 + \frac{\text{ICT}}{\text{e\_AceA\_Kict}}\right)^{\text{e\_AceA\_n}} + \text{e\_AceA\_L} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_AceA\_Kpep}} + \frac{\text{PG3}}{\text{e\_AceA\_Kpg3}} + \frac{\text{AKG}}{\text{e\_AceA\_Kakg}}\right)^{\text{e\_AceA\_n}}} \tag{50}$$

8.16 Reaction e_AceB

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

Name e_AceB

Reaction equation

$$\text{ACoA} + \text{GLX} \xrightarrow{\text{AceB}} \text{MAL} \tag{51}$$

Reactants

Table 43: Properties of each reactant.

Id	Name	SBO
ACoA	ACoA	
GLX	GLX	

Modifier

Table 44: Properties of each modifier.

Id	Name	SBO
AceB	AceB	

Product

Table 45: Properties of each product.

Id	Name	SBO
MAL	MAL	

Kinetic Law

Derived unit contains undeclared units

$$v_{16} = \frac{\text{AceB} \cdot \text{e\_AceB\_kcat} \cdot \text{GLX} \cdot \text{ACoA}}{\text{e\_AceB\_Kglxacoa} \cdot \text{e\_AceB\_Kacoa} + \text{e\_AceB\_Kacoa} \cdot \text{GLX} + \text{e\_AceB\_Kglx} \cdot \text{ACoA} + \text{GLX} \cdot \text{ACoA}} \tag{52}$$

8.17 Reaction e_Acoa2act

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name e_Acoa2act

Reaction equation

$$\text{ACoA} \xrightarrow{\text{Acoa2act, PYR}} \emptyset \tag{53}$$

Reactant

Table 46: Properties of each reactant.

Id	Name	SBO
ACoA	ACoA	

Modifiers

Table 47: Properties of each modifier.

Id	Name	SBO
Acoa2act	Acoa2act	
PYR	PYR	

Kinetic Law

Derived unit contains undeclared units

$$v_{17} = \frac{\frac{\text{Acoa2act} \cdot \text{e\_Acoa2act\_kcat} \cdot \text{ACoA}}{\text{e\_Acoa2act\_Kacoa}} \cdot \left(1 + \frac{\text{ACoA}}{\text{e\_Acoa2act\_Kacoa}}\right)^{\text{e\_Acoa2act\_n}-1}}{\left(1 + \frac{\text{ACoA}}{\text{e\_Acoa2act\_Kacoa}}\right)^{\text{e\_Acoa2act\_n}} + \frac{\text{e\_Acoa2act\_L}}{\left(1 + \frac{\text{PYR}}{\text{e\_Acoa2act\_Kpyr}}\right)^{\text{e\_Acoa2act\_n}}}} \tag{54}$$

8.18 Reaction e_Acs

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name e_Acs

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Acs}} \text{ACoA} \tag{55}$$

Modifiers

Table 48: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Acs	Acs	

Product

Table 49: Properties of each product.

Id	Name	SBO
ACoA	ACoA	

Kinetic Law

Derived unit contains undeclared units

$$v_{18} = \frac{\text{Acs} \cdot \text{e\_Acs\_kcat} \cdot [\text{ACT}]}{[\text{ACT}] + \text{e\_Acs\_Kact}} \tag{56}$$

8.19 Reaction e_Akg2mal

This is an irreversible reaction of one reactant forming one product influenced by one modifier.

Name e_Akg2mal

Reaction equation

$$\text{AKG} \xrightarrow{\text{Akg2mal}} \text{MAL} \tag{57}$$

Reactant

Table 50: Properties of each reactant.

Id	Name	SBO
AKG	AKG	

Modifier

Table 51: Properties of each modifier.

Id	Name	SBO
Akg2mal	Akg2mal	

Product

Table 52: Properties of each product.

Id	Name	SBO
MAL	MAL	

Kinetic Law

Derived unit contains undeclared units

$$v_{19} = \frac{\text{Akg2mal} \cdot \text{e\_Akg2mal\_kcat} \cdot \text{AKG}}{\text{AKG} + \text{e\_Akg2mal\_Kakg}} \tag{58}$$

8.20 Reaction e_CAMPdegr

This is an irreversible reaction of one reactant forming no product influenced by one modifier.

Name e_CAMPdegr

Reaction equation

$$\text{cAMP} \xrightarrow{\text{CAMPdegr}} \emptyset \tag{59}$$

Reactant

Table 53: Properties of each reactant.

Id	Name	SBO
cAMP	cAMP	

Modifier

Table 54: Properties of each modifier.

Id	Name	SBO
CAMPdegr	CAMPdegr	

Kinetic Law

Derived unit contains undeclared units

$$v_{20} = \frac{\text{e\_CAMPdegr\_kcat} \cdot \text{CAMPdegr} \cdot \text{cAMP}}{\text{cAMP} + \text{e\_CAMPdegr\_KcAMP}} \tag{60}$$

8.21 Reaction e_Cya

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name e_Cya

Reaction equation

$$\emptyset \xrightarrow{\text{Cya, EIIA\_P}} \text{cAMP} \tag{61}$$

Modifiers

Table 55: Properties of each modifier.

Id	Name	SBO
Cya	Cya	
EIIA_P	EIIA_P	

Product

Table 56: Properties of each product.

Id	Name	SBO
cAMP	cAMP	

Kinetic Law

Derived unit contains undeclared units

$$v_{21} = \frac{\text{e\_Cya\_kcat} \cdot \text{Cya} \cdot \text{EIIA\_P}}{\text{EIIA\_P} + \text{e\_Cya\_KEIIA}} \tag{62}$$

8.22 Reaction e_Emp

This is a reversible reaction of one reactant forming one product influenced by one modifier.

Name e_Emp

Reaction equation

$$0{\cdot}5\,\text{FBP} \overset{\text{Emp}}{\rightleftharpoons} \text{PG3} \tag{63}$$

Reactant

Table 57: Properties of each reactant.

Id	Name	SBO
FBP	FBP	

Modifier

Table 58: Properties of each modifier.

Id	Name	SBO
Emp	Emp	

Product

Table 59: Properties of each product.

Id	Name	SBO
PG3	PG3	

Kinetic Law

Derived unit contains undeclared units

$$v_{22} = \frac{\frac{\text{Emp} \cdot \text{e\_Emp\_kcat\_f} \cdot \text{FBP}}{\text{e\_Emp\_Kfbp}} - \frac{\text{Emp} \cdot \text{e\_Emp\_kcat\_r} \cdot \text{PG3}}{\text{e\_Emp\_Kpg3}}}{1 + \frac{\text{FBP}}{\text{e\_Emp\_Kfbp}} + \frac{\text{PG3}}{\text{e\_Emp\_Kpg3}}} \tag{64}$$

8.23 Reaction e_Eno

This is a reversible reaction of one reactant forming one product influenced by one modifier.

Name e_Eno

Reaction equation

$$\text{PG3} \underset{\longleftarrow}{\overset{\text{Eno}}{\rightleftharpoons}} \text{PEP} \tag{65}$$

Reactant

Table 60: Properties of each reactant.

Id	Name	SBO
PG3	PG3	

Modifier

Table 61: Properties of each modifier.

Id	Name	SBO
Eno	Eno	

Product

Table 62: Properties of each product.

Id	Name	SBO
PEP	PEP	

Kinetic Law

Derived unit contains undeclared units

$$v_{23} = \frac{\frac{\text{Eno}\cdot\text{e\_Eno\_kcatf}\cdot\text{PG3}}{\text{e\_Eno\_Kpg3}} - \frac{\text{Eno}\cdot\text{e\_Eno\_kcatr}\cdot\text{PEP}}{\text{e\_Eno\_Kpep}}}{1 + \frac{\text{PG3}}{\text{e\_Eno\_Kpg3}} + \frac{\text{PEP}}{\text{e\_Eno\_Kpep}}} \tag{66}$$

8.24 Reaction e_Fdp

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_Fdp

Reaction equation

$$\text{FBP} \xrightarrow{\text{Fdp, PEP}} \text{G6P} \tag{67}$$

Reactant

Table 63: Properties of each reactant.

Id	Name	SBO
FBP	FBP	

Modifiers

Table 64: Properties of each modifier.

Id	Name	SBO
Fdp	Fdp	
PEP	PEP	

Product

Table 65: Properties of each product.

Id	Name	SBO
G6P	G6P	

Kinetic Law

Derived unit contains undeclared units

$$v_{24} = \frac{\frac{\text{Fdp}\cdot\text{e\_Fdp\_kcat}\cdot\text{FBP}}{\text{e\_Fdp\_Kfbp}} \cdot \left(1 + \frac{\text{FBP}}{\text{e\_Fdp\_Kfbp}}\right)^{\text{e\_Fdp\_n}-1}}{\left(1 + \frac{\text{FBP}}{\text{e\_Fdp\_Kfbp}}\right)^{\text{e\_Fdp\_n}} + \frac{\text{e\_Fdp\_L}}{\left(1+\frac{\text{PEP}}{\text{e\_Fdp\_Kpep}}\right)^{\text{e\_Fdp\_n}}}} \tag{68}$$

8.25 Reaction e_GltA

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

Name e_GltA

Reaction equation

$$\text{ACoA} + \text{OAA} \xrightarrow{\text{AKG, GltA}} \text{ICT} \tag{69}$$

Reactants

Table 66: Properties of each reactant.

Id	Name	SBO
ACoA	ACoA	
OAA	OAA	

Modifiers

Table 67: Properties of each modifier.

Id	Name	SBO
AKG	AKG	
GltA	GltA	

Product

Table 68: Properties of each product.

Id	Name	SBO
ICT	ICT	

Kinetic Law

Derived unit contains undeclared units

$$v_{25} = \frac{\text{GltA} \cdot \text{e\_GltA\_kcat} \cdot \text{OAA} \cdot \text{ACoA}}{\left(1 + \frac{\text{AKG}}{\text{e\_GltA\_Kakg}}\right) \cdot \text{e\_GltA\_Koaaacoa} \cdot \text{e\_GltA\_Kacoa} + \text{e\_GltA\_Kacoa} \cdot \text{OAA} + \left(1 + \frac{\text{AKG}}{\text{e\_GltA\_Kakg}}\right) \cdot \text{e\_GltA\_Koaa} \quad (70)$$

8.26 Reaction e_Icd

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_Icd

Reaction equation

$$\text{ICT} \xrightarrow{\text{Icd, PEP}} \text{AKG} \quad (71)$$

Reactant

Table 69: Properties of each reactant.

Id	Name	SBO
ICT	ICT	

Modifiers

Table 70: Properties of each modifier.

Id	Name	SBO
Icd	Icd	
PEP	PEP	

Product

Table 71: Properties of each product.

Id	Name	SBO
AKG	AKG	

Kinetic Law

Derived unit contains undeclared units

$$v_{26} = \frac{\frac{\text{Icd}\cdot \text{e\_Icd\_kcat}\cdot \text{ICT}}{\text{e\_Icd\_Kict}} \cdot \left(1 + \frac{\text{ICT}}{\text{e\_Icd\_Kict}}\right)^{\text{e\_Icd\_n}-1}}{\left(1 + \frac{\text{ICT}}{\text{e\_Icd\_Kict}}\right)^{\text{e\_Icd\_n}} + \text{e\_Icd\_L} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_Icd\_Kpep}}\right)^{\text{e\_Icd\_n}}} \tag{72}$$

8.27 Reaction e_Mdh

This is an irreversible reaction of one reactant forming one product influenced by one modifier.

Name e_Mdh

Reaction equation

$$\text{MAL} \xrightarrow{\text{Mdh}} \text{OAA} \tag{73}$$

Reactant

Table 72: Properties of each reactant.

Id	Name	SBO
MAL	MAL	

Modifier

Table 73: Properties of each modifier.

Id	Name	SBO
Mdh	Mdh	

Product

Table 74: Properties of each product.

Id	Name	SBO
OAA	OAA	

Kinetic Law

Derived unit contains undeclared units

$$v_{27} = \frac{\mathrm{Mdh} \cdot \mathrm{e\_Mdh\_kcat} \cdot \mathrm{MAL}^{\mathrm{e\_Mdh\_n}}}{\mathrm{MAL}^{\mathrm{e\_Mdh\_n}} + \mathrm{e\_Mdh\_Kmal}^{\mathrm{e\_Mdh\_n}}} \tag{74}$$

8.28 Reaction e_Me

This is an irreversible reaction of one reactant forming one product influenced by three modifiers.

Name e_Me

Reaction equation

$$\mathrm{MAL} \xrightarrow{\mathrm{ACoA,\ Me,\ cAMP}} \mathrm{PYR} \tag{75}$$

Reactant

Table 75: Properties of each reactant.

Id	Name	SBO
MAL	MAL	

Modifiers

Table 76: Properties of each modifier.

Id	Name	SBO
ACoA	ACoA	
Me	Me	
cAMP	cAMP	

Product

Table 77: Properties of each product.

Id	Name	SBO
PYR	PYR	

Kinetic Law

Derived unit contains undeclared units

$$v_{28} = \frac{\frac{\text{Me}\cdot\text{e\_Me\_kcat}\cdot\text{MAL}}{\text{e\_Me\_Kmal}} \cdot \left(1 + \frac{\text{MAL}}{\text{e\_Me\_Kmal}}\right)^{\text{e\_Me\_n}-1}}{\left(1 + \frac{\text{MAL}}{\text{e\_Me\_Kmal}}\right)^{\text{e\_Me\_n}} + \text{e\_Me\_L} \cdot \left(1 + \frac{\text{ACoA}}{\text{e\_Me\_Kacoa}} + \frac{\text{cAMP}}{\text{e\_Me\_Kcamp}}\right)^{\text{e\_Me\_n}}} \tag{76}$$

8.29 Reaction e_PckA

This is an irreversible reaction of one reactant forming one product influenced by one modifier.

Name e_PckA

Reaction equation

$$\text{OAA} \xrightarrow{\text{PckA}} \text{PEP} \tag{77}$$

Reactant

Table 78: Properties of each reactant.

Id	Name	SBO
OAA	OAA	

Modifier

Table 79: Properties of each modifier.

Id	Name	SBO
PckA	PckA	

Product

Table 80: Properties of each product.

Id	Name	SBO
PEP	PEP	

Kinetic Law

Derived unit contains undeclared units

$$v_{29} = \frac{\text{PckA} \cdot \text{e\_PckA\_kcat} \cdot \text{OAA}}{\text{OAA} + \text{e\_PckA\_Koaa} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_PckA\_Kpep}}\right)} \tag{78}$$

8.30 Reaction e_Pdh

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_Pdh

Reaction equation

$$\text{PYR} \xrightarrow{\text{GLX, Pdh}} \text{ACoA} \tag{79}$$

Reactant

Table 81: Properties of each reactant.

Id	Name	SBO
PYR	PYR	

Modifiers

Table 82: Properties of each modifier.

Id	Name	SBO
GLX	GLX	
Pdh	Pdh	

Product

Table 83: Properties of each product.

Id	Name	SBO
ACoA	ACoA	

Kinetic Law

Derived unit contains undeclared units

$$v_{30} = \frac{\frac{\text{Pdh} \cdot \text{e\_Pdh\_kcat} \cdot \text{PYR}}{\text{e\_Pdh\_Kpyr}} \cdot \left(1 + \frac{\text{PYR}}{\text{e\_Pdh\_Kpyr}}\right)^{\text{e\_Pdh\_n}-1}}{\left(1 + \frac{\text{PYR}}{\text{e\_Pdh\_Kpyr}}\right)^{\text{e\_Pdh\_n}} + \text{e\_Pdh\_L} \cdot \left(1 + \frac{\text{GLX}}{\text{e\_Pdh\_Kglx}} + \frac{\text{PYR}}{\text{e\_Pdh\_KpyrI}}\right)^{\text{e\_Pdh\_n}}} \tag{80}$$

8.31 Reaction e_PfkA

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_PfkA

Reaction equation

$$\text{G6P} \xrightarrow{\text{PEP, PfkA}} \text{FBP} \tag{81}$$

Reactant

Table 84: Properties of each reactant.

Id	Name	SBO
G6P	G6P	

Modifiers

Table 85: Properties of each modifier.

Id	Name	SBO
PEP	PEP	
PfkA	PfkA	

Product

Table 86: Properties of each product.

Id	Name	SBO
FBP	FBP	

Kinetic Law

Derived unit contains undeclared units

$$v_{31} = \frac{\frac{\text{PfkA} \cdot \text{e\_PfkA\_kcat} \cdot \text{G6P}}{\text{e\_PfkA\_Kg6p}} \cdot \left(1 + \frac{\text{G6P}}{\text{e\_PfkA\_Kg6p}}\right)^{\text{e\_PfkA\_n}-1}}{\left(1 + \frac{\text{G6P}}{\text{e\_PfkA\_Kg6p}}\right)^{\text{e\_PfkA\_n}} + \text{e\_PfkA\_L} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_PfkA\_Kpep}}\right)^{\text{e\_PfkA\_n}}} \tag{82}$$

8.32 Reaction e_Ppc

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_Ppc

Reaction equation

$$\text{PEP} \xrightarrow{\text{FBP, Ppc}} \text{OAA} \tag{83}$$

Reactant

Table 87: Properties of each reactant.

Id	Name	SBO
PEP	PEP	

Modifiers

Table 88: Properties of each modifier.

Id	Name	SBO
FBP	FBP	
Ppc	Ppc	

Product

Table 89: Properties of each product.

Id	Name	SBO
OAA	OAA	

Kinetic Law

Derived unit contains undeclared units

$$v_{32} = \frac{\frac{\text{Ppc}\cdot\text{e\_Ppc\_kcat}\cdot\text{PEP}}{\text{e\_Ppc\_Kpep}} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_Ppc\_Kpep}}\right)^{\text{e\_Ppc\_n}-1}}{\left(1 + \frac{\text{PEP}}{\text{e\_Ppc\_Kpep}}\right)^{\text{e\_Ppc\_n}} + \frac{\text{e\_Ppc\_L}}{\left(1+\frac{\text{FBP}}{\text{e\_Ppc\_Kfbp}}\right)^{\text{e\_Ppc\_n}}}} \tag{84}$$

8.33 Reaction e_PpsA

This is an irreversible reaction of one reactant forming one product influenced by one modifier.

Name e_PpsA

Reaction equation

$$\text{PYR} \xrightarrow{\text{PpsA}} \text{PEP} \tag{85}$$

Reactant

Table 90: Properties of each reactant.

Id	Name	SBO
PYR	PYR	

Modifier

Table 91: Properties of each modifier.

Id	Name	SBO
PpsA	PpsA	

Product

Table 92: Properties of each product.

Id	Name	SBO
PEP	PEP	

Kinetic Law

Derived unit contains undeclared units

$$v_{33} = \frac{\frac{\text{PpsA}\cdot\text{e\_PpsA\_kcat}\cdot\text{PYR}}{\text{e\_PpsA\_Kpyr}} \cdot \left(1 + \frac{\text{PYR}}{\text{e\_PpsA\_Kpyr}}\right)^{\text{e\_PpsA\_n}-1}}{\left(1 + \frac{\text{PYR}}{\text{e\_PpsA\_Kpyr}}\right)^{\text{e\_PpsA\_n}} + \text{e\_PpsA\_L} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_PpsA\_Kpep}}\right)^{\text{e\_PpsA\_n}}} \tag{86}$$

8.34 Reaction e_PykF

This is an irreversible reaction of one reactant forming one product influenced by two modifiers.

Name e_PykF

Reaction equation

$$\text{PEP} \xrightarrow{\text{FBP, PykF}} \text{PYR} \tag{87}$$

Reactant

Table 93: Properties of each reactant.

Id	Name	SBO
PEP	PEP	

Modifiers

Table 94: Properties of each modifier.

Id	Name	SBO
FBP	FBP	
PykF	PykF	

Product

Table 95: Properties of each product.

Id	Name	SBO
PYR	PYR	

Kinetic Law

Derived unit contains undeclared units

$$v_{34} = \frac{\frac{\text{PykF}\cdot\text{e\_PykF\_kcat}\cdot\text{PEP}}{\text{e\_PykF\_Kpep}} \cdot \left(1 + \frac{\text{PEP}}{\text{e\_PykF\_Kpep}}\right)^{\text{e\_PykF\_n}-1}}{\left(1 + \frac{\text{PEP}}{\text{e\_PykF\_Kpep}}\right)^{\text{e\_PykF\_n}} + \frac{\text{e\_PykF\_L}}{\left(1+\frac{\text{FBP}}{\text{e\_PykF\_Kfbp}}\right)^{\text{e\_PykF\_n}}}} \tag{88}$$

8.35 Reaction g_aceA

This is an irreversible reaction of no reactant forming one product influenced by seven modifiers.

Name g_aceA

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC, GLX, IclR, PYR}} \text{AceA} \tag{89}$$

Modifiers

Table 96: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
CrpcAMP	CrpcAMP	
GLC	GLC	
GLX	GLX	
IclR	IclR	
PYR	PYR	

Product

Table 97: Properties of each product.

Id	Name	SBO
AceA	AceA	

Kinetic Law

Derived unit contains undeclared units

$$v_{35} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}}\right) \cdot \text{g\_aceBAK\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}} \cdot \text{g\_aceBAK\_vcra\_bound} + \left(1 - \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}}\right) \cdot \text{g\_aceBAK\_vcrp\_unbound} + \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}} \cdot \text{g\_aceBAK\_vcrp\_bound} + \text{g\_aceBAK\_kcat\_iclr} \cdot \text{IclR} \cdot \left(1 - \frac{\frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} \cdot \left(1 + \frac{\text{PYR}}{\text{g\_aceBAK\_KPprime}}\right)}{1 + \frac{\frac{\text{GLX}}{\text{g\_aceBAK\_KG}} \cdot \left(1 + \frac{\text{GLX}}{\text{g\_aceBAK\_KG}}\right)}{\text{g\_aceBAK\_L}} + \frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} + \frac{\text{PYR}}{\text{g\_aceBAK\_KP}} + \frac{\frac{\text{g\_aceBAK\_DNA} \cdot \text{PYR}}{\text{g\_aceBAK\_KDNA}}}{\text{g\_aceBAK\_KPprime}}}\right)\right)\right) \tag{90}$$

8.36 Reaction g_aceB

This is an irreversible reaction of no reactant forming one product influenced by seven modifiers.

Name g_aceB

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC, GLX, IclR, PYR}} \text{AceB} \tag{91}$$

Modifiers

Table 98: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
CrpcAMP	CrpcAMP	
GLC	GLC	
GLX	GLX	
IclR	IclR	
PYR	PYR	

Product

Table 99: Properties of each product.

Id	Name	SBO
AceB	AceB	

Kinetic Law

Derived unit contains undeclared units

$$v_{36} = \text{g\_aceBAK\_aceBfactor} \cdot \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}} \right) \cdot \text{g\_aceBAK\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}} \cdot \text{g\_aceBAK\_vcra\_bound} + \left(1 - \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}} \right) \cdot \text{g\_aceBAK\_vcrp\_unbound} + \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}} \cdot \text{g\_aceBAK\_vcrp\_bound} + \text{g\_aceBAK\_kcat\_iclr} \cdot \text{IclR} \cdot \left(1 - \frac{\frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} \cdot \left(1 + \frac{\text{PYR}}{\text{g\_aceBAK\_KPprime}} \right)}{1 + \frac{\frac{\text{GLX}}{\text{g\_aceBAK\_KG}} \cdot \left(1 + \frac{\text{GLX}}{\text{g\_aceBAK\_KG}} \right)}{\text{g\_aceBAK\_L}} + \frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} + \frac{\text{PYR}}{\text{g\_aceBAK\_KP}} + \frac{\frac{\text{g\_aceBAK\_DNA} \cdot \text{PYR}}{\text{g\_aceBAK\_KDNA}}}{\text{g\_aceBAK\_KPprime}}} \right) \right) \right) \tag{92}$$

8.37 Reaction g_aceK

This is an irreversible reaction of no reactant forming one product influenced by seven modifiers.

Name g_aceK

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC, GLX, IclR, PYR}} \text{AceK} \tag{93}$$

Modifiers

Table 100: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
CrpcAMP	CrpcAMP	
GLC	GLC	
GLX	GLX	
IclR	IclR	
PYR	PYR	

Product

Table 101: Properties of each product.

Id	Name	SBO
AceK	AceK	

Kinetic Law

Derived unit contains undeclared units

$$v_{37} = \text{g\_aceBAK\_aceKfactor} \cdot \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}} \right) \cdot \text{g\_aceBAK\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_aceBAK\_Kcra}} \cdot \text{g\_aceBAK\_vcra\_bound} + \left(1 - \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}} \right) \cdot \text{g\_aceBAK\_vcrp\_unbound} + \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_aceBAK\_Kcrp}} \cdot \text{g\_aceBAK\_vcrp\_bound} + \text{g\_aceBAK\_kcat\_iclr} \cdot \text{IclR} \cdot \left(1 - \frac{\frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} \cdot \left(1 + \frac{\text{PYR}}{\text{g\_aceBAK\_KPprime}} \right)}{1 + \frac{\frac{\text{GLX}}{\text{g\_aceBAK\_KG}} \cdot \left(1 + \frac{\text{GLX}}{\text{g\_aceBAK\_KG}} \right)}{\text{g\_aceBAK\_L}} + \frac{\text{g\_aceBAK\_DNA}}{\text{g\_aceBAK\_KDNA}} + \frac{\text{PYR}}{\text{g\_aceBAK\_KP}} + \frac{\frac{\text{g\_aceBAK\_DNA} \cdot \text{PYR}}{\text{g\_aceBAK\_KDNA}}}{\text{g\_aceBAK\_KPprime}}} \right) \right) \right) \tag{94}$$

8.38 Reaction g_acoa2act

This is an irreversible reaction of no reactant forming one product.

Name g_acoa2act

Reaction equation

$$\emptyset \longrightarrow \text{Acoa2act} \tag{95}$$

Product

Table 102: Properties of each product.

Id	Name	SBO
Acoa2act	Acoa2act	

Kinetic Law

Derived unit not available

$$v_{38} = 0 \tag{96}$$

8.39 Reaction g_acs

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_acs

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Acs} \tag{97}$$

Modifiers

Table 103: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
CrpcAMP	CrpcAMP	
GLC	GLC	

Product

Table 104: Properties of each product.

Id	Name	SBO
Acs	Acs	

Kinetic Law

Derived unit contains undeclared units

$$v_{39} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{CrpcAMP}^{\text{g\_acs\_n}}}{\text{CrpcAMP}^{\text{g\_acs\_n}} + \text{g\_acs\_Kcrp}^{\text{g\_acs\_n}}} \right) \cdot \text{g\_acs\_vcrp\_unbound} + \frac{\text{CrpcAMP}^{\text{g\_acs\_n}}}{\text{CrpcAMP}^{\text{g\_acs\_n}} + \text{g\_acs\_Kcrp}^{\text{g\_acs\_n}}} \cdot \text{g\_acs\_vcrp\_bound} \right) \tag{98}$$

8.40 Reaction g_akg2mal

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_akg2mal

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Akg2mal} \tag{99}$$

Modifiers

Table 105: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
CrpcAMP	CrpcAMP	
GLC	GLC	

Product

Table 106: Properties of each product.

Id	Name	SBO
Akg2mal	Akg2mal	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{40} = {} & \text{bm\_k\_expr} \cdot \text{mu} \\ & \cdot \left(\left(1 - \frac{\text{CrpcAMP}^{\text{g\_akg2mal\_n}}}{\text{CrpcAMP}^{\text{g\_akg2mal\_n}} + \text{g\_akg2mal\_Kcrp}^{\text{g\_akg2mal\_n}}} \right) \cdot \text{g\_akg2mal\_vcrp\_unbound} \right. \\ & \left. + \frac{\text{CrpcAMP}^{\text{g\_akg2mal\_n}}}{\text{CrpcAMP}^{\text{g\_akg2mal\_n}} + \text{g\_akg2mal\_Kcrp}^{\text{g\_akg2mal\_n}}} \cdot \text{g\_akg2mal\_vcrp\_bound} \right) \end{aligned} \tag{100}$$

8.41 Reaction g_cAMPdegr

This is an irreversible reaction of no reactant forming one product.

Name g_cAMPdegr

Reaction equation

$$\emptyset \longrightarrow \text{CAMPdegr} \tag{101}$$

Product

Table 107: Properties of each product.

Id	Name	SBO
CAMPdegr	CAMPdegr	

Kinetic Law

Derived unit not available

$$v_{41} = 0 \tag{102}$$

8.42 Reaction g_cra

This is an irreversible reaction of no reactant forming one product.

Name g_cra

Reaction equation

$$\emptyset \longrightarrow \text{Cra} \tag{103}$$

Product

Table 108: Properties of each product.

Id	Name	SBO
Cra	Cra	

Kinetic Law

Derived unit not available

$$v_{42} = 0 \tag{104}$$

8.43 Reaction g_crp

This is an irreversible reaction of no reactant forming one product.

Name g_crp

Reaction equation

$$\emptyset \longrightarrow \mathrm{Crp} \tag{105}$$

Product

Table 109: Properties of each product.

Id	Name	SBO
Crp	Crp	

Kinetic Law

Derived unit not available

$$v_{43} = 0 \tag{106}$$

8.44 Reaction g_cya

This is an irreversible reaction of no reactant forming one product.

Name g_cya

Reaction equation

$$\emptyset \longrightarrow \mathrm{Cya} \tag{107}$$

Product

Table 110: Properties of each product.

Id	Name	SBO
Cya	Cya	

Kinetic Law

Derived unit not available

$$v_{44} = 0 \tag{108}$$

8.45 Reaction g_emp

This is an irreversible reaction of no reactant forming one product influenced by four modifiers.

Name g_emp

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, CrpcAMP, GLC}} \text{Emp} \tag{109}$$

Modifiers

Table 111: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
CrpcAMP	CrpcAMP	
GLC	GLC	

Product

Table 112: Properties of each product.

Id	Name	SBO
Emp	Emp	

Kinetic Law

Derived unit contains undeclared units

$$\begin{aligned} v_{45} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \Bigg(\Bigg(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_emp\_Kcra}} \Bigg) \cdot \text{g\_emp\_vcra\_unbound} \\ + \frac{\text{Cra}}{\text{Cra} + \text{g\_emp\_Kcra}} \cdot \text{g\_emp\_vcra\_bound} + \Bigg(1 - \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_emp\_Kcrp}} \Bigg) \\ \cdot \text{g\_emp\_vcrp\_unbound} + \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_emp\_Kcrp}} \cdot \text{g\_emp\_vcrp\_bound} \Bigg) \end{aligned} \tag{110}$$

8.46 Reaction g_eno

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_eno

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Eno} \tag{111}$$

Modifiers

Table 113: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 114: Properties of each product.

Id	Name	SBO
Eno	Eno	

Kinetic Law

Derived unit contains undeclared units

$$v_{46} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_eno\_Kcra}} \right) \cdot \text{g\_eno\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_eno\_Kcra}} \cdot \text{g\_eno\_vcra\_bound} \right) \tag{112}$$

8.47 Reaction g_fdp

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_fdp

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Fdp} \tag{113}$$

Modifiers

Table 115: Properties of each modifier.

Id	Name	SBO
ACT	ACT	

Id	Name	SBO
Cra	Cra	
GLC	GLC	

Product

Table 116: Properties of each product.

Id	Name	SBO
Fdp	Fdp	

Kinetic Law

Derived unit contains undeclared units

$$v_{47} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_fdp\_Kcra}} \right) \cdot \text{g\_fdp\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_fdp\_Kcra}} \cdot \text{g\_fdp\_vcra\_bound} \right) \tag{114}$$

8.48 Reaction g_gltA

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_gltA

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{GltA} \tag{115}$$

Modifiers

Table 117: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
CrpcAMP	CrpcAMP	
GLC	GLC	

Product

Table 118: Properties of each product.

Id	Name	SBO
GltA	GltA	

Kinetic Law

Derived unit contains undeclared units

$$v_{48} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{CrpcAMP}^{\text{g\_gltA\_n}}}{\text{CrpcAMP}^{\text{g\_gltA\_n}} + \text{g\_gltA\_Kcrp}^{\text{g\_gltA\_n}}} \right) \cdot \text{g\_gltA\_vcrp\_unbound} + \frac{\text{CrpcAMP}^{\text{g\_gltA\_n}}}{\text{CrpcAMP}^{\text{g\_gltA\_n}} + \text{g\_gltA\_Kcrp}^{\text{g\_gltA\_n}}} \cdot \text{g\_gltA\_vcrp\_bound} \right) \tag{116}$$

8.49 Reaction g_icd

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_icd

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{Icd} \tag{117}$$

Modifiers

Table 119: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 120: Properties of each product.

Id	Name	SBO
Icd	Icd	

Kinetic Law

Derived unit contains undeclared units

$$v_{49} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_icd\_Kcra}} \right) \cdot \text{g\_icd\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_icd\_Kcra}} \cdot \text{g\_icd\_vcra\_bound} \right) \tag{118}$$

8.50 Reaction g_iclr

This is an irreversible reaction of no reactant forming one product.

Name g_iclr

Reaction equation

$$\emptyset \longrightarrow \text{IclR} \tag{119}$$

Product

Table 121: Properties of each product.

Id	Name	SBO
IclR	IclR	

Kinetic Law

Derived unit not available

$$v_{50} = 0 \tag{120}$$

8.51 Reaction g_mdh

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_mdh

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, CrpcAMP, GLC}} \text{Mdh} \tag{121}$$

Modifiers

Table 122: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
CrpcAMP	CrpcAMP	
GLC	GLC	

Product

Table 123: Properties of each product.

Id	Name	SBO
Mdh	Mdh	

Kinetic Law

Derived unit contains undeclared units

$$v_{51} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_mdh\_Kcrp}} \right) \cdot \text{g\_mdh\_vcrp\_unbound} + \frac{\text{CrpcAMP}}{\text{CrpcAMP} + \text{g\_mdh\_Kcrp}} \cdot \text{g\_mdh\_vcrp\_bound} \right) \tag{122}$$

8.52 Reaction g_me

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name g_me

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, GLC}} \text{Me} \tag{123}$$

Modifiers

Table 124: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Product

Table 125: Properties of each product.

Id	Name	SBO
Me	Me	

Kinetic Law

Derived unit not available

$$v_{52} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{SS\_Me} \tag{124}$$

8.53 Reaction g_pckA

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_pckA

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PckA} \tag{125}$$

Modifiers

Table 126: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 127: Properties of each product.

Id	Name	SBO
PckA	PckA	

Kinetic Law

Derived unit contains undeclared units

$$v_{53} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_pckA\_Kcra}} \right) \cdot \text{g\_pckA\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_pckA\_Kcra}} \cdot \text{g\_pckA\_vcra\_bound} \right) \tag{126}$$

8.54 Reaction g_pdh

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_pdh

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, GLC, PdhR}} \text{Pdh} \tag{127}$$

Modifiers

Table 128: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	
PdhR	PdhR	

Product

Table 129: Properties of each product.

Id	Name	SBO
Pdh	Pdh	

Kinetic Law

Derived unit contains undeclared units

$$v_{54} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{PdhR}}{\text{PdhR} + \text{g\_pdh\_Kpdhr}} \right) \cdot \text{g\_pdh\_vpdhr\_unbound} + \frac{\text{PdhR}}{\text{PdhR} + \text{g\_pdh\_Kpdhr}} \cdot \text{g\_pdh\_vpdhr\_bound} \right) \tag{128}$$

8.55 Reaction g_pdhr

This is an irreversible reaction of no reactant forming one product.

Name g_pdhr

Reaction equation

$$\emptyset \longrightarrow \text{PdhR} \tag{129}$$

Product

Table 130: Properties of each product.

Id	Name	SBO
PdhR	PdhR	

Kinetic Law

Derived unit not available

$$v_{55} = 0 \tag{130}$$

8.56 Reaction g_pfkA

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_pfkA

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PfkA} \tag{131}$$

Modifiers

Table 131: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 132: Properties of each product.

Id	Name	SBO
PfkA	PfkA	

Kinetic Law

Derived unit contains undeclared units

$$v_{56} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_pfkA\_Kcra}} \right) \cdot \text{g\_pfkA\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_pfkA\_Kcra}} \cdot \text{g\_pfkA\_vcra\_bound} \right) \tag{132}$$

8.57 Reaction g_ppc

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name g_ppc

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, GLC}} \text{Ppc} \tag{133}$$

Modifiers

Table 133: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Product

Table 134: Properties of each product.

Id	Name	SBO
Ppc	Ppc	

Kinetic Law

Derived unit not available

$$v_{57} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{SS\_Ppc} \tag{134}$$

8.58 Reaction g_ppsA

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_ppsA

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PpsA} \tag{135}$$

Modifiers

Table 135: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 136: Properties of each product.

Id	Name	SBO
PpsA	PpsA	

Kinetic Law

Derived unit contains undeclared units

$$v_{58} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_ppsA\_Kcra}} \right) \cdot \text{g\_ppsA\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_ppsA\_Kcra}} \cdot \text{g\_ppsA\_vcra\_bound} \right) \tag{136}$$

8.59 Reaction g_pykF

This is an irreversible reaction of no reactant forming one product influenced by three modifiers.

Name g_pykF

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, Cra, GLC}} \text{PykF} \tag{137}$$

Modifiers

Table 137: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
Cra	Cra	
GLC	GLC	

Product

Table 138: Properties of each product.

Id	Name	SBO
PykF	PykF	

Kinetic Law

Derived unit contains undeclared units

$$v_{59} = \text{bm\_k\_expr} \cdot \text{mu} \cdot \left(\left(1 - \frac{\text{Cra}}{\text{Cra} + \text{g\_pykF\_Kcra}} \right) \cdot \text{g\_pykF\_vcra\_unbound} + \frac{\text{Cra}}{\text{Cra} + \text{g\_pykF\_Kcra}} \cdot \text{g\_pykF\_vcra\_bound} \right) \tag{138}$$

8.60 Reaction g_EIIA

This is an irreversible reaction of no reactant forming one product.

Name g_EIIA

Reaction equation

$$\emptyset \longrightarrow \text{EIIA} \tag{139}$$

Product

Table 139: Properties of each product.

Id	Name	SBO
EIIA	EIIA	

Kinetic Law

Derived unit not available

$$v_{60} = 0 \tag{140}$$

8.61 Reaction g_EIICB

This is an irreversible reaction of no reactant forming one product.

Name g_EIICB

Reaction equation

$$\emptyset \longrightarrow \text{EIICB} \tag{141}$$

Product

Table 140: Properties of each product.

Id	Name	SBO
EIICB	EIICB	

Kinetic Law

Derived unit not available

$$v_{61} = 0 \tag{142}$$

8.62 Reaction d_AceA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_AceA

Reaction equation

$$\text{AceA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{143}$$

Reactant

Table 141: Properties of each reactant.

Id	Name	SBO
AceA	AceA	

Modifiers

Table 142: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{62} = (\mathrm{mu} + \mathrm{d\_k\_degr}) \cdot \mathrm{AceA} \tag{144}$$

8.63 Reaction d_AceB

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_AceB

Reaction equation

$$\mathrm{AceB} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{145}$$

Reactant

Table 143: Properties of each reactant.

Id	Name	SBO
AceB	AceB	

Modifiers

Table 144: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{63} = (\mathrm{mu} + \mathrm{d\_k\_degr}) \cdot \mathrm{AceB} \tag{146}$$

8.64 Reaction d_AceK

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_AceK

Reaction equation

$$\mathrm{AceK} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{147}$$

Reactant

Table 145: Properties of each reactant.

Id	Name	SBO
AceK	AceK	

Modifiers

Table 146: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{64} = (\mathrm{mu} + \mathrm{d\_k\_degr}) \cdot \mathrm{AceK} \tag{148}$$

8.65 Reaction d_Acoa2act

This is an irreversible reaction of one reactant forming no product.

Name d_Acoa2act

Reaction equation

$$\text{Acoa2act} \longrightarrow \emptyset \tag{149}$$

Reactant

Table 147: Properties of each reactant.

Id	Name	SBO
Acoa2act	Acoa2act	

Kinetic Law

Derived unit not available

$$v_{65} = 0 \tag{150}$$

8.66 Reaction d_Acs

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Acs

Reaction equation

$$\text{Acs} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{151}$$

Reactant

Table 148: Properties of each reactant.

Id	Name	SBO
Acs	Acs	

Modifiers

Table 149: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{66} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Acs} \tag{152}$$

8.67 Reaction d_Akg2mal

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Akg2mal

Reaction equation

$$\text{Akg2mal} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{153}$$

Reactant

Table 150: Properties of each reactant.

Id	Name	SBO
Akg2mal	Akg2mal	

Modifiers

Table 151: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{67} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Akg2mal} \tag{154}$$

8.68 Reaction d_CAMPdegr

This is an irreversible reaction of one reactant forming no product.

Name d_CAMPdegr

Reaction equation

$$\text{CAMPdegr} \longrightarrow \emptyset \tag{155}$$

Reactant

Table 152: Properties of each reactant.

Id	Name	SBO
CAMPdegr	CAMPdegr	

Kinetic Law

Derived unit not available

$$v_{68} = 0 \tag{156}$$

8.69 Reaction d_Cra

This is an irreversible reaction of one reactant forming no product.

Name d_Cra

Reaction equation

$$\text{Cra} \longrightarrow \emptyset \tag{157}$$

Reactant

Table 153: Properties of each reactant.

Id	Name	SBO
Cra	Cra	

Kinetic Law

Derived unit not available

$$v_{69} = 0 \tag{158}$$

8.70 Reaction d_CraFBP

This is an irreversible reaction of one reactant forming no product.

Name d_CraFBP

Reaction equation

$$\text{CraFBP} \longrightarrow \emptyset \tag{159}$$

Reactant

Table 154: Properties of each reactant.

Id	Name	SBO
CraFBP	CraFBP	

Kinetic Law

Derived unit not available

$$v_{70} = 0 \tag{160}$$

8.71 Reaction d_Crp

This is an irreversible reaction of one reactant forming no product.

Name d_Crp

Reaction equation

$$\text{Crp} \longrightarrow \emptyset \tag{161}$$

Reactant

Table 155: Properties of each reactant.

Id	Name	SBO
Crp	Crp	

Kinetic Law

Derived unit not available

$$v_{71} = 0 \tag{162}$$

8.72 Reaction d_CrpcAMP

This is an irreversible reaction of one reactant forming no product.

Name d_CrpcAMP

Reaction equation

$$\text{CrpcAMP} \longrightarrow \emptyset \tag{163}$$

Reactant

Table 156: Properties of each reactant.

Id	Name	SBO
CrpcAMP	CrpcAMP	

Kinetic Law

Derived unit not available

$$v_{72} = 0 \tag{164}$$

8.73 Reaction d_Cya

This is an irreversible reaction of one reactant forming no product.

Name d_Cya

Reaction equation

$$\text{Cya} \longrightarrow \emptyset \tag{165}$$

Reactant

Table 157: Properties of each reactant.

Id	Name	SBO
Cya	Cya	

Kinetic Law

Derived unit not available

$$v_{73} = 0 \tag{166}$$

8.74 Reaction d_Emp

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Emp

Reaction equation

$$\text{Emp} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{167}$$

Reactant

Table 158: Properties of each reactant.

Id	Name	SBO
Emp	Emp	

Modifiers

Table 159: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{74} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Emp} \tag{168}$$

8.75 Reaction d_Eno

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Eno

Reaction equation

$$\text{Eno} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{169}$$

Reactant

Table 160: Properties of each reactant.

Id	Name	SBO
Eno	Eno	

Modifiers

Table 161: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{75} = (\mathrm{mu} + \mathrm{d\_k\_degr}) \cdot \mathrm{Eno} \tag{170}$$

8.76 Reaction d_Fdp

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Fdp

Reaction equation

$$\mathrm{Fdp} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{171}$$

Reactant

Table 162: Properties of each reactant.

Id	Name	SBO
Fdp	Fdp	

Modifiers

Table 163: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{76} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Fdp} \tag{172}$$

8.77 Reaction d_GltA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_GltA

Reaction equation

$$\text{GltA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{173}$$

Reactant

Table 164: Properties of each reactant.

Id	Name	SBO
GltA	GltA	

Modifiers

Table 165: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{77} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{GltA} \tag{174}$$

8.78 Reaction d_Icd

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Icd

Reaction equation

$$\text{Icd} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{175}$$

Reactant

Table 166: Properties of each reactant.

Id	Name	SBO
Icd	Icd	

Modifiers

Table 167: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{78} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Icd} \tag{176}$$

8.79 Reaction d_Icd_P

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Icd_P

Reaction equation

$$\text{Icd\_P} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{177}$$

Reactant

Table 168: Properties of each reactant.

Id	Name	SBO
Icd_P	Icd_P	

Modifiers

Table 169: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{79} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Icd\_P} \tag{178}$$

8.80 Reaction d_IclR

This is an irreversible reaction of one reactant forming no product.

Name d_IclR

Reaction equation

$$\text{IclR} \longrightarrow \emptyset \tag{179}$$

Reactant

Table 170: Properties of each reactant.

Id	Name	SBO
IclR	IclR	

Kinetic Law

Derived unit not available

$$v_{80} = 0 \tag{180}$$

8.81 Reaction d_Mdh

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Mdh

Reaction equation

$$\text{Mdh} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{181}$$

Reactant

Table 171: Properties of each reactant.

Id	Name	SBO
Mdh	Mdh	

Modifiers

Table 172: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{81} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Mdh} \tag{182}$$

8.82 Reaction d_Me

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Me

Reaction equation

$$\text{Me} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{183}$$

Reactant

Table 173: Properties of each reactant.

Id	Name	SBO
Me	Me	

Modifiers

Table 174: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{82} = (\mathrm{mu} + \mathrm{d\_k\_degr}) \cdot \mathrm{Me} \tag{184}$$

8.83 Reaction d_PckA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PckA

Reaction equation

$$\mathrm{PckA} \xrightarrow{\mathrm{ACT},\ \mathrm{GLC}} \emptyset \tag{185}$$

Reactant

Table 175: Properties of each reactant.

Id	Name	SBO
PckA	PckA	

Modifiers

Table 176: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{83} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{PckA} \tag{186}$$

8.84 Reaction d_Pdh

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Pdh

Reaction equation

$$\text{Pdh} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{187}$$

Reactant

Table 177: Properties of each reactant.

Id	Name	SBO
Pdh	Pdh	

Modifiers

Table 178: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{84} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Pdh} \tag{188}$$

8.85 Reaction d_PdhR

This is an irreversible reaction of one reactant forming no product.

Name d_PdhR

Reaction equation

$$\text{PdhR} \longrightarrow \emptyset \tag{189}$$

Reactant

Table 179: Properties of each reactant.

Id	Name	SBO
PdhR	PdhR	

Kinetic Law

Derived unit not available

$$v_{85} = 0 \tag{190}$$

8.86 Reaction d_PdhRPYR

This is an irreversible reaction of one reactant forming no product.

Name d_PdhRPYR

Reaction equation

$$\text{PdhRPYR} \longrightarrow \emptyset \tag{191}$$

Reactant

Table 180: Properties of each reactant.

Id	Name	SBO
PdhRPYR	PdhRPYR	

Kinetic Law

Derived unit not available

$$v_{86} = 0 \tag{192}$$

8.87 Reaction d_PfkA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PfkA

Reaction equation

$$\text{PfkA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{193}$$

Reactant

Table 181: Properties of each reactant.

Id	Name	SBO
PfkA	PfkA	

Modifiers

Table 182: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{87} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{PfkA} \tag{194}$$

8.88 Reaction d_Ppc

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_Ppc

Reaction equation

$$\text{Ppc} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{195}$$

Reactant

Table 183: Properties of each reactant.

Id	Name	SBO
Ppc	Ppc	

Modifiers

Table 184: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{88} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{Ppc} \tag{196}$$

8.89 Reaction d_PpsA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PpsA

Reaction equation

$$\text{PpsA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{197}$$

Reactant

Table 185: Properties of each reactant.

Id	Name	SBO
PpsA	PpsA	

Modifiers

Table 186: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{89} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{PpsA} \tag{198}$$

8.90 Reaction d_PykF

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PykF

Reaction equation

$$\text{PykF} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{199}$$

Reactant

Table 187: Properties of each reactant.

Id	Name	SBO
PykF	PykF	

Modifiers

Table 188: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{90} = (\text{mu} + \text{d\_k\_degr}) \cdot \text{PykF} \tag{200}$$

8.91 Reaction d_EIIA

This is an irreversible reaction of one reactant forming no product.

Name d_EIIA

Reaction equation

$$\text{EIIA} \longrightarrow \emptyset \tag{201}$$

Reactant

Table 189: Properties of each reactant.

Id	Name	SBO
EIIA	EIIA	

Kinetic Law

Derived unit not available

$$v_{91} = 0 \tag{202}$$

8.92 Reaction d_EIIA_P

This is an irreversible reaction of one reactant forming no product.

Name d_EIIA_P

Reaction equation

$$\text{EIIA\_P} \longrightarrow \emptyset \tag{203}$$

Reactant

Table 190: Properties of each reactant.

Id	Name	SBO
EIIA_P	EIIA_P	

Kinetic Law

Derived unit not available

$$v_{92} = 0 \tag{204}$$

8.93 Reaction d_EIICB

This is an irreversible reaction of one reactant forming no product.

Name d_EIICB

Reaction equation

$$\text{EIICB} \longrightarrow \emptyset \tag{205}$$

Reactant

Table 191: Properties of each reactant.

Id	Name	SBO
EIICB	EIICB	

Kinetic Law

Derived unit not available

$$v_{93} = 0 \tag{206}$$

8.94 Reaction d_ACoA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_ACoA

Reaction equation

$$\text{ACoA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{207}$$

Reactant

Table 192: Properties of each reactant.

Id	Name	SBO
ACoA	ACoA	

Modifiers

Table 193: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{94} = \text{mu} \cdot \text{ACoA} \tag{208}$$

8.95 Reaction d_AKG

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_AKG

Reaction equation

$$\text{AKG} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{209}$$

Reactant

Table 194: Properties of each reactant.

Id	Name	SBO
AKG	AKG	

Modifiers

Table 195: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{95} = \text{mu} \cdot \text{AKG} \tag{210}$$

8.96 Reaction d_cAMP

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_cAMP

Reaction equation

$$\text{cAMP} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{211}$$

Reactant

Table 196: Properties of each reactant.

Id	Name	SBO
cAMP	cAMP	

Modifiers

Table 197: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{96} = \text{mu} \cdot \text{cAMP} \tag{212}$$

8.97 Reaction d_FBP

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_FBP

Reaction equation

$$\text{FBP} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{213}$$

Reactant

Table 198: Properties of each reactant.

Id	Name	SBO
FBP	FBP	

Modifiers

Table 199: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{97} = \text{mu} \cdot \text{FBP} \tag{214}$$

8.98 Reaction d_G6P

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_G6P

Reaction equation

$$\text{G6P} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{215}$$

Reactant

Table 200: Properties of each reactant.

Id	Name	SBO
G6P	G6P	

Modifiers

Table 201: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{98} = \text{mu} \cdot \text{G6P} \tag{216}$$

8.99 Reaction d_GLX

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_GLX

Reaction equation

$$\text{GLX} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{217}$$

Reactant

Table 202: Properties of each reactant.

Id	Name	SBO
GLX	GLX	

Modifiers

Table 203: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{99} = \text{mu} \cdot \text{GLX} \tag{218}$$

8.100 Reaction d_ICT

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_ICT

Reaction equation

$$\mathrm{ICT} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{219}$$

Reactant

Table 204: Properties of each reactant.

Id	Name	SBO
ICT	ICT	

Modifiers

Table 205: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{100} = \mathrm{mu} \cdot \mathrm{ICT} \tag{220}$$

8.101 Reaction d_MAL

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_MAL

Reaction equation

$$\mathrm{MAL} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{221}$$

Reactant

Table 206: Properties of each reactant.

Id	Name	SBO
MAL	MAL	

Modifiers

Table 207: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{101} = \text{mu} \cdot \text{MAL} \tag{222}$$

8.102 Reaction d_OAA

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_OAA

Reaction equation

$$\text{OAA} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{223}$$

Reactant

Table 208: Properties of each reactant.

Id	Name	SBO
OAA	OAA	

Modifiers

Table 209: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{102} = \text{mu} \cdot \text{OAA} \tag{224}$$

8.103 Reaction d_PEP

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PEP

Reaction equation

$$\text{PEP} \xrightarrow{\text{ACT, GLC}} \emptyset \tag{225}$$

Reactant

Table 210: Properties of each reactant.

Id	Name	SBO
PEP	PEP	

Modifiers

Table 211: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{103} = \text{mu} \cdot \text{PEP} \tag{226}$$

8.104 Reaction d_PG3

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PG3

Reaction equation

$$\mathrm{PG3} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{227}$$

Reactant

Table 212: Properties of each reactant.

Id	Name	SBO
PG3	PG3	

Modifiers

Table 213: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{104} = \mathrm{mu} \cdot \mathrm{PG3} \tag{228}$$

8.105 Reaction d_PYR

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name d_PYR

Reaction equation

$$\mathrm{PYR} \xrightarrow{\mathrm{ACT,\ GLC}} \emptyset \tag{229}$$

Reactant

Table 214: Properties of each reactant.

Id	Name	SBO
PYR	PYR	

Modifiers

Table 215: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Kinetic Law

Derived unit contains undeclared units

$$v_{105} = \text{mu} \cdot \text{PYR} \tag{230}$$

8.106 Reaction env_growth

This is an irreversible reaction of no reactant forming one product influenced by two modifiers.

Name env_growth

Reaction equation

$$\emptyset \xrightarrow{\text{ACT, GLC}} \text{BM} \tag{231}$$

Modifiers

Table 216: Properties of each modifier.

Id	Name	SBO
ACT	ACT	
GLC	GLC	

Product

Table 217: Properties of each product.

Id	Name	SBO
BM	BM	

Kinetic Law

Derived unit contains undeclared units

$$v_{106} = \mathrm{BM} \cdot \mathrm{mu} \tag{232}$$

8.107 Reaction env_GLCup

This is an irreversible reaction of one reactant forming no product influenced by three modifiers.

Name env_GLCup

Reaction equation

$$\mathrm{GLC} \xrightarrow{\mathrm{BM,\ EIIA\_P,\ EIICB}} \emptyset \tag{233}$$

Reactant

Table 218: Properties of each reactant.

Id	Name	SBO
GLC	GLC	

Modifiers

Table 219: Properties of each modifier.

Id	Name	SBO
BM	BM	
EIIA_P	EIIA_P	
EIICB	EIICB	

Kinetic Law

Derived unit contains undeclared units

$$v_{107} = \frac{\mathrm{env\_uc} \cdot \mathrm{env\_M\_GLC} \cdot \mathrm{BM} \cdot \mathrm{pts\_k4} \cdot \mathrm{EIICB} \cdot \mathrm{EIIA\_P} \cdot [\mathrm{GLC}]}{(\mathrm{pts\_KEIIA} + \mathrm{EIIA\_P}) \cdot (\mathrm{pts\_Kglc} + [\mathrm{GLC}])} \tag{234}$$

8.108 Reaction env_ACTup

This is an irreversible reaction of one reactant forming no product influenced by two modifiers.

Name env_ACTup

Reaction equation

$$\mathrm{ACT} \xrightarrow{\mathrm{Acs,\ BM}} \emptyset \tag{235}$$

Reactant

Table 220: Properties of each reactant.

Id	Name	SBO
ACT	ACT	

Modifiers

Table 221: Properties of each modifier.

Id	Name	SBO
Acs	Acs	
BM	BM	

Kinetic Law

Derived unit contains undeclared units

$$v_{108} = \frac{\mathrm{env\_uc} \cdot \mathrm{env\_M\_ACT} \cdot \mathrm{BM} \cdot \mathrm{Acs} \cdot \mathrm{e\_Acs\_kcat} \cdot [\mathrm{ACT}]}{[\mathrm{ACT}] + \mathrm{e\_Acs\_Kact}} \tag{236}$$

8.109 Reaction env_ACTex

This is an irreversible reaction of no reactant forming one product influenced by four modifiers.

Name env_ACTex

Reaction equation

$$\emptyset \xrightarrow{\mathrm{ACoA,\ Acoa2act,\ BM,\ PYR}} \mathrm{ACT} \tag{237}$$

Modifiers

Table 222: Properties of each modifier.

Id	Name	SBO
ACoA	ACoA	
Acoa2act	Acoa2act	
BM	BM	
PYR	PYR	

Product

Table 223: Properties of each product.

Id	Name	SBO
ACT	ACT	

Kinetic Law

Derived unit contains undeclared units

$$v_{109} = \frac{\frac{\text{env\_uc} \cdot \text{env\_M\_ACT} \cdot \text{BM} \cdot \text{Acoa2act} \cdot \text{e\_Acoa2act\_kcat} \cdot \text{ACoA}}{\text{e\_Acoa2act\_Kacoa}} \cdot \left(1 + \frac{\text{ACoA}}{\text{e\_Acoa2act\_Kacoa}}\right)^{\text{e\_Acoa2act\_n}-1}}{\left(1 + \frac{\text{ACoA}}{\text{e\_Acoa2act\_Kacoa}}\right)^{\text{e\_Acoa2act\_n}} + \frac{\text{e\_Acoa2act\_L}}{\left(1+\frac{\text{PYR}}{\text{e\_Acoa2act\_Kpyr}}\right)^{\text{e\_Acoa2act\_n}}}} \tag{238}$$

9 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.

Identifiers for kinetic laws highlighted in gray cannot be verified to evaluate to units of SBML `substance` per `time`. As a result, some SBML interpreters may not be able to verify the consistency of the units on quantities in the model. Please check if

- parameters without an unit definition are involved or
- volume correction is necessary because the `hasOnlySubstanceUnits` flag may be set to `false` and `spacialDimensions`> 0 for certain species.

9.1 Species BM

Name BM

Initial amount 0.03 *Unknownunitod*

Involved in events event_0, event_1

This species takes part in four reactions (as a product in env_growth and as a modifier in env_GLCup, env_ACTup, env_ACTex).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{BM} = v_{106} \tag{239}$$

Furthermore, two events influence this species' rate of change.

9.2 Species ACT

Name ACT

SBO:0000247 simple chemical

Initial amount 0 g

Involved in events event_0, event_1

This species takes part in 60 reactions (as a reactant in env_ACTup and as a product in env_ACTex and as a modifier in bm_ACoA, bm_AKG, bm_G6P, bm_OAA, bm_PEP, bm_PG3, bm_PYR, e_Acs, g_aceA, g_aceB, g_aceK, g_acs, g_akg2mal, g_emp, g_eno, g_fdp, g_gltA, g_icd, g_mdh, g_me, g_pckA, g_pdh, g_pfkA, g_ppc, g_ppsA, g_pykF, d_AceA, d_AceB, d_AceK, d_Acs, d_Akg2mal, d_Emp, d_Eno, d_Fdp, d_GltA, d_Icd, d_Icd_P, d_Mdh, d_Me, d_PckA, d_Pdh, d_PfkA, d_Ppc, d_PpsA, d_PykF, d_ACoA, d_AKG, d_cAMP, d_FBP, d_G6P, d_GLX, d_ICT, d_MAL, d_OAA, d_PEP, d_PG3, d_PYR, env_growth).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ACT} = v_{109} - v_{108} \tag{240}$$

Furthermore, two events influence this species' rate of change.

9.3 Species GLC

Name GLC

SBO:0000247 simple chemical

Initial amount 4.8 g

Involved in events event_0, event_1

This species takes part in 59 reactions (as a reactant in env_GLCup and as a modifier in bm_ACoA, bm_AKG, bm_G6P, bm_OAA, bm_PEP, bm_PG3, bm_PYR, pts_r4, g_aceA, g_aceB, g_aceK, g_acs, g_akg2mal, g_emp, g_eno, g_fdp, g_gltA, g_icd, g_mdh, g_me, g_pckA, g_pdh, g_pfkA, g_ppc, g_ppsA, g_pykF, d_AceA, d_AceB, d_AceK, d_Acs, d_Akg2mal, d_Emp, d_Eno, d_Fdp, d_GltA, d_Icd, d_Icd_P, d_Mdh, d_Me, d_PckA, d_Pdh, d_PfkA, d_Ppc, d_PpsA, d_PykF, d_ACoA, d_AKG, d_cAMP, d_FBP, d_G6P, d_GLX, d_ICT, d_MAL, d_OAA, d_PEP, d_PG3, d_PYR, env_growth).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{GLC} = -v_{107} \tag{241}$$

Furthermore, two events influence this species' rate of change.

9.4 Species ACoA

Name ACoA

SBO:0000247 simple chemical

Initial amount 0.351972298 µmol

This species takes part in nine reactions (as a reactant in bm_ACoA, e_AceB, e_Acoa2act, e_GltA, d_ACoA and as a product in e_Acs, e_Pdh and as a modifier in e_Me, env_ACTex).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ACoA} = v_{18} + v_{30} - v_{1} - v_{16} - v_{17} - v_{25} - v_{94} \tag{242}$$

9.5 Species AKG

Name AKG

SBO:0000247 simple chemical

Initial amount 0.191190619 µmol

This species takes part in eight reactions (as a reactant in bm_AKG, e_Akg2mal, d_AKG and as a product in e_AceA, e_Icd and as a modifier in e_AceK_Ki, e_AceK_Ph, e_GltA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AKG} = v_{15} + v_{26} - v_{2} - v_{19} - v_{95} \tag{243}$$

9.6 Species cAMP

Name cAMP

SBO:0000247 simple chemical

Initial amount 0.202804098 µmol

This species takes part in five reactions (as a reactant in e_CAMPdegr, d_cAMP and as a product in e_Cya and as a modifier in tf_Crp, e_Me).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{cAMP} = v_{21} - v_{20} - v_{96} \tag{244}$$

9.7 Species FBP

Name FBP

SBO:0000247 simple chemical

Initial amount 6.57504207 µmol

This species takes part in seven reactions (as a reactant in e_Emp, e_Fdp, d_FBP and as a product in e_PfkA and as a modifier in tf_Cra, e_Ppc, e_PykF).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{FBP} = v_{31} - 0.5\, v_{22} - v_{24} - v_{97} \tag{245}$$

9.8 Species G6P

Name G6P

SBO:0000247 simple chemical

Initial amount 1.908140784 µmol

This species takes part in five reactions (as a reactant in bm_G6P, e_PfkA, d_G6P and as a product in pts_r4, e_Fdp).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{G6P} = v_9 + v_{24} - v_3 - v_{31} - v_{98} \tag{246}$$

9.9 Species GLX

Name GLX

SBO:0000247 simple chemical

Initial amount $5.70593 \cdot 10^{-9}$ µmol

This species takes part in eight reactions (as a reactant in e_AceB, d_GLX and as a product in e_AceA and as a modifier in e_AceK_Ki, e_Pdh, g_aceA, g_aceB, g_aceK).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{GLX} = v_{15} - v_{16} - v_{99} \tag{247}$$

9.10 Species ICT

Name ICT

SBO:0000247 simple chemical

Initial amount 0.001408116 µmol

This species takes part in five reactions (as a reactant in e_AceA, e_Icd, d_ICT and as a product in e_GltA and as a modifier in e_AceK_Ki).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{ICT} = v_{25} - v_{15} - v_{26} - v_{100} \tag{248}$$

9.11 Species MAL

Name MAL

SBO:0000247 simple chemical

Initial amount 3.278779135 µmol

This species takes part in five reactions (as a reactant in e_Mdh, e_Me, d_MAL and as a product in e_AceB, e_Akg2mal).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{MAL} = v_{16} + v_{19} - v_{27} - v_{28} - v_{101} \tag{249}$$

9.12 Species OAA

Name OAA

SBO:0000247 simple chemical

Initial amount 0.050535354 µmol

This species takes part in eight reactions (as a reactant in bm_OAA, e_GltA, e_PckA, d_OAA and as a product in e_Mdh, e_Ppc and as a modifier in e_AceK_Ki, e_AceK_Ph).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{OAA} = v_{27} + v_{32} - v_4 - v_{25} - v_{29} - v_{102} \tag{250}$$

9.13 Species PEP

Name PEP

SBO:0000247 simple chemical

Initial amount 0.210455879 µmol

This species takes part in 14 reactions (as a reactant in bm_PEP, pts_r1, e_Ppc, e_PykF, d_PEP and as a product in e_Eno, e_PckA, e_PpsA and as a modifier in e_AceK_Ki, e_AceK_Ph, e_AceA, e_Fdp, e_Icd, e_PfkA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PEP} = v_{23} + v_{29} + v_{33} - v_5 - v_8 - v_{32} - v_{34} - v_{103} \tag{251}$$

9.14 Species PG3

Name PG3

SBO:0000247 simple chemical

Initial amount 5.720977255 µmol

This species takes part in seven reactions (as a reactant in bm_PG3, e_Eno, d_PG3 and as a product in e_Emp and as a modifier in e_AceK_Ki, e_AceK_Ph, e_AceA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PG3} = v_{22} - v_6 - v_{23} - v_{104} \tag{252}$$

9.15 Species PYR

Name PYR

SBO:0000247 simple chemical

Initial amount 0.863278018 µmol

This species takes part in 15 reactions (as a reactant in bm_PYR, e_Pdh, e_PpsA, d_PYR and as a product in pts_r1, e_Me, e_PykF and as a modifier in e_AceK_Ki, e_AceK_Ph, tf_PdhR, e_Acoa2act, g_aceA, g_aceB, g_aceK, env_ACTex).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PYR} = v_8 + v_{28} + v_{34} - v_7 - v_{30} - v_{33} - v_{105} \tag{253}$$

9.16 Species AceA

Name AceA

SBO:0000014 enzyme

Initial amount 0.00472323 µmol

This species takes part in three reactions (as a reactant in d_AceA and as a product in g_aceA and as a modifier in e_AceA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AceA} = v_{35} - v_{62} \tag{254}$$

9.17 Species AceB

Name AceB

SBO:0000014 enzyme

Initial amount 0.001416969 µmol

This species takes part in three reactions (as a reactant in d_AceB and as a product in g_aceB and as a modifier in e_AceB).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AceB} = v_{36} - v_{63} \tag{255}$$

9.18 Species AceK

Name AceK

SBO:0000014 enzyme

Initial amount $1.41697 \cdot 10^{-4}$ µmol

This species takes part in four reactions (as a reactant in d_AceK and as a product in g_aceK and as a modifier in e_AceK_Ki, e_AceK_Ph).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{AceK} = v_{37} - v_{64} \tag{256}$$

9.19 Species Acoa2act

Name Acoa2act

SBO:0000014 enzyme

Initial amount 0.0010 µmol

This species takes part in four reactions (as a reactant in d_Acoa2act and as a product in g_acoa2act and as a modifier in e_Acoa2act, env_ACTex).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Acoa2act} = v_{38} - v_{65} \tag{257}$$

9.20 Species Acs

Name Acs

SBO:0000014 enzyme

Initial amount 0.001096222 µmol

This species takes part in four reactions (as a reactant in d_Acs and as a product in g_acs and as a modifier in e_Acs, env_ACTup).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Acs} = v_{39} - v_{66} \tag{258}$$

9.21 Species Akg2mal

Name Akg2mal

SBO:0000014 enzyme

Initial amount 0.001026848 µmol

This species takes part in three reactions (as a reactant in d_Akg2mal and as a product in g_akg2mal and as a modifier in e_Akg2mal).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Akg2mal} = v_{40} - v_{67} \tag{259}$$

9.22 Species CAMPdegr

Name CAMPdegr

Initial amount 0.0010 µmol

This species takes part in three reactions (as a reactant in d_CAMPdegr and as a product in g_cAMPdegr and as a modifier in e_CAMPdegr).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{CAMPdegr} = v_{41} - v_{68} \tag{260}$$

9.23 Species Cya

Name Cya

SBO:0000014 enzyme

Initial amount 0.0010 µmol

This species takes part in three reactions (as a reactant in d_Cya and as a product in g_cya and as a modifier in e_Cya).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Cya} = v_{44} - v_{73} \tag{261}$$

9.24 Species Emp

Name Emp

SBO:0000014 enzyme

Initial amount 0.011515593 µmol

This species takes part in three reactions (as a reactant in d_Emp and as a product in g_emp and as a modifier in e_Emp).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Emp} = v_{45} - v_{74} \tag{262}$$

9.25 Species Eno

Name Eno

SBO:0000014 enzyme

Initial amount 0.011552813 µmol

This species takes part in three reactions (as a reactant in d_Eno and as a product in g_eno and as a modifier in e_Eno).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Eno} = v_{46} - v_{75} \tag{263}$$

9.26 Species Fdp

Name Fdp

SBO:0000014 enzyme

Initial amount $1.57492 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in d_Fdp and as a product in g_fdp and as a modifier in e_Fdp).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Fdp} = v_{47} - v_{76} \tag{264}$$

9.27 Species GltA

Name GltA

SBO:0000014 enzyme

Initial amount 0.001029612 µmol

This species takes part in three reactions (as a reactant in d_GltA and as a product in g_gltA and as a modifier in e_GltA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{GltA} = v_{48} - v_{77} \tag{265}$$

9.28 Species Icd

Name Icd

SBO:0000014 enzyme

Initial amount 0.004290789 µmol

This species takes part in five reactions (as a reactant in e_AceK_Ki, d_Icd and as a product in e_AceK_Ph, g_icd and as a modifier in e_Icd).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Icd} = v_{11} + v_{49} - v_{10} - v_{78} \tag{266}$$

9.29 Species Icd_P

Name Icd_P

SBO:0000014 enzyme

Initial amount $2.20477 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in e_AceK_Ph, d_Icd_P and as a product in e_AceK_Ki).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Icd\_P} = v_{10} - v_{11} - v_{79} \tag{267}$$

9.30 Species Mdh

Name Mdh

SBO:0000014 enzyme

Initial amount 0.00345727 µmol

This species takes part in three reactions (as a reactant in d_Mdh and as a product in g_mdh and as a modifier in e_Mdh).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Mdh} = v_{51} - v_{81} \tag{268}$$

9.31 Species Me

Name Me

SBO:0000014 enzyme

Initial amount $9.99714 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in d_Me and as a product in g_me and as a modifier in e_Me).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Me} = v_{52} - v_{82} \tag{269}$$

9.32 Species PckA

Name PckA

SBO:0000014 enzyme

Initial amount 0.002290892 µmol

This species takes part in three reactions (as a reactant in d_PckA and as a product in g_pckA and as a modifier in e_PckA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PckA} = v_{53} - v_{83} \tag{270}$$

9.33 Species Pdh

Name Pdh

SBO:0000014 enzyme

Initial amount 0.004647401 µmol

This species takes part in three reactions (as a reactant in d_Pdh and as a product in g_pdh and as a modifier in e_Pdh).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Pdh} = v_{54} - v_{84} \tag{271}$$

9.34 Species PfkA

Name PfkA

SBO:0000014 enzyme

Initial amount $1.43816 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in d_PfkA and as a product in g_pfkA and as a modifier in e_PfkA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PfkA} = v_{56} - v_{87} \tag{272}$$

9.35 Species Ppc

Name Ppc

SBO:0000014 enzyme

Initial amount $9.99714 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in d_Ppc and as a product in g_ppc and as a modifier in e_Ppc).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Ppc} = v_{57} - v_{88} \tag{273}$$

9.36 Species PpsA

Name PpsA

SBO:0000014 enzyme

Initial amount $9.87493 \cdot 10^{-4}$ µmol

This species takes part in three reactions (as a reactant in d_PpsA and as a product in g_ppsA and as a modifier in e_PpsA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PpsA} = v_{58} - v_{89} \tag{274}$$

9.37 Species PykF

Name PykF

SBO:0000014 enzyme

Initial amount 0.005977168 µmol

This species takes part in three reactions (as a reactant in d_PykF and as a product in g_pykF and as a modifier in e_PykF).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PykF} = v_{59} - v_{90} \tag{275}$$

9.38 Species Cra

Name Cra

SBO:0000245 macromolecule

Initial amount $2.99098 \cdot 10^{-4}$ µmol

This species takes part in 14 reactions (as a reactant in tf_Cra, d_Cra and as a product in g_cra and as a modifier in g_aceA, g_aceB, g_aceK, g_emp, g_eno, g_fdp, g_icd, g_pckA, g_pfkA, g_ppsA, g_pykF).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Cra} = v_{42} - v_{12} - v_{69} \tag{276}$$

9.39 Species CraFBP

Name CraFBP

SBO:0000253 non-covalent complex

Initial amount 0.006990902 µmol

This species takes part in two reactions (as a reactant in d_CraFBP and as a product in tf_Cra).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{CraFBP} = v_{12} - v_{70} \tag{277}$$

9.40 Species Crp

Name Crp

SBO:0000245 macromolecule

Initial amount 0.005943273 µmol

This species takes part in three reactions (as a reactant in tf_Crp, d_Crp and as a product in g_crp).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{Crp} = v_{43} - v_{13} - v_{71} \tag{278}$$

9.41 Species CrpcAMP

Name CrpcAMP

SBO:0000253 non-covalent complex

Initial amount 0.001346727 µmol

This species takes part in ten reactions (as a reactant in d_CrpcAMP and as a product in tf_Crp and as a modifier in g_aceA, g_aceB, g_aceK, g_acs, g_akg2mal, g_emp, g_gltA, g_mdh).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{CrpcAMP} = v_{13} - v_{72} \tag{279}$$

9.42 Species IclR

Name IclR

SBO:0000245 macromolecule

Initial amount 0.00729 µmol

This species takes part in five reactions (as a reactant in d_IclR and as a product in g_iclr and as a modifier in g_aceA, g_aceB, g_aceK).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{IclR} = v_{50} - v_{80} \tag{280}$$

9.43 Species PdhR

Name PdhR

SBO:0000245 macromolecule

Initial amount 0.001163813 µmol

This species takes part in four reactions (as a reactant in tf_PdhR, d_PdhR and as a product in g_pdhr and as a modifier in g_pdh).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PdhR} = v_{55} - v_{14} - v_{85} \tag{281}$$

9.44 Species PdhRPYR

Name PdhRPYR

SBO:0000253 non-covalent complex

Initial amount 0.006126187 µmol

This species takes part in two reactions (as a reactant in d_PdhRPYR and as a product in tf_PdhR).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{PdhRPYR} = v_{14} - v_{86} \tag{282}$$

9.45 Species EIIA

Name EIIA

SBO:0000014 enzyme

Initial amount 0.09647707 µmol

This species takes part in four reactions (as a reactant in pts_r1, d_EIIA and as a product in pts_r4, g_EIIA).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EIIA} = v_{9} + v_{60} - v_{8} - v_{91} \tag{283}$$

9.46 Species EIIA_P

Name EIIA_P

SBO:0000014 enzyme

Initial amount 0.00352292 µmol

This species takes part in five reactions (as a reactant in pts_r4, d_EIIA_P and as a product in pts_r1 and as a modifier in e_Cya, env_GLCup).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EIIA\_P} = v_8 - v_9 - v_{92} \tag{284}$$

9.47 Species EIICB

Name EIICB

SBO:0000014 enzyme

Initial amount 0.0030 µmol

This species takes part in four reactions (as a reactant in d_EIICB and as a product in g_EIICB and as a modifier in pts_r4, env_GLCup).

$$\frac{\mathrm{d}}{\mathrm{d}t}\mathrm{EIICB} = v_{61} - v_{93} \tag{285}$$

A Glossary of Systems Biology Ontology Terms

SBO:0000014 enzyme: A protein that catalyzes a chemical reaction. The word comes from en “a” or“i”) and simo “leave” or“yeas”)

SBO:0000245 macromolecule: Molecular entity mainly built-up by the repetition of pseudo-identical units. CHEBI:3383

SBO:0000247 simple chemical: Simple, non-repetitive chemical entity

SBO:0000253 non-covalent complex: Entity composed of several independant components that are not linked by covalent bonds

SBML2LaTeX was developed by Andreas Dräger[a], Hannes Planatscher[a], Dieudonné M Wouamba[a], Adrian Schröder[a], Michael Hucka[b], Lukas Endler[c], Martin Golebiewski[d] and Andreas Zell[a]. Please see http://www.ra.cs.uni-tuebingen.de/software/SBML2LaTeX for more information.

[a]Center for Bioinformatics Tübingen (ZBIT), Germany
[b]California Institute of Technology, Beckman Institute BNMC, Pasadena, United States
[c]European Bioinformatics Institute, Wellcome Trust Genome Campus, Hinxton, United Kingdom
[d]EML Research gGmbH, Heidelberg, Germany