

	COMPARTMENT	METABOLIC REACTIONS	E.C. #	SUBSYSTEM	P. pastoris gene locus
Reaction 1	T	12PDS + NAD+ -> 12PDS + NADH + H+	1.1.1.77		
Propan-1,2-diol:NAD+ oxidoreductase	Cytosol	12PDS + NAD+ -> 12PDS + NADH + H+	EC.1.2.1.58	Starch and sucrose Metabolism	PPAD1958
Endo-1,3-beta-Glucan Glucosylase	Cytosol	13BGlcGlc + H2O -> Glc	EC.1.2.1.58	Starch and sucrose Metabolism	PPAD1798
Endo-1,3-beta-Glucan Glucosylase	Cytosol	13BGlcGlc + H2O -> Glc			PPAD1538
Exo-1,3-beta-Glucan Glucosylase, extracellular	Extracellular	13BGlcGlc + H2O -> Glc	EC.1.2.1.58	Starch and sucrose Metabolism	PPAD2524
1,3-beta-Glucan synthase	Cytosol	UDPG -> 13BGlcGlc + H + UDP	EC.2.4.1.34	Alternate Carbon Metabolism	PPAD6099
2betaHydroxy-3ketoacyl-arabino-heptanoate-7-phosphate mitochondrial transport via diffusion		2betaHPP[+] <=> 2betaH7P[+]		Transport, Mitochondrial	
2betaHydroxyglutamate mitochondrial transport		2betaH[+] <=> 2betaP[+]		Transport, Mitochondrial	
2-METHYLCysteine mitochondrial transport via diffusion		2mC[+] <=> 2mC7P[+]		Transport, Mitochondrial	
2-Octenyl-6-hydroxyphenol nuclear transport		2oHPH_S[+] <=> 2oHPH_S[+]		Transport, Nuclear	
2-Octenyl-6-METHYlphenol mitochondrial transport		2omPH_S[+] <=> 2omPH_S[+]		Transport, Nuclear	
2-Octenyl-6-METHYlphenol nuclear transport		2omPH_S[+] <=> 2omPH_S[+]		Transport, Mitochondrial	
2-ketoadipate transport out of mitochondria via diffusion		2koadP[+] <=> 2koad7P[+]		Transport, Mitochondrial	
4-Hydroxyphenylpyruvate oxygen oxidoreductase	Cytosol	4HPH + O2 -> CO2 + H2O	EC.1.13.11.27	Tyrosine, Typtophan, and Phenylalanine Metabolism	
3-(4-Hydroxyphenyl)pyruvate mitochondrial transport via Proton symport		34HPH[+] + H[+] <=> 34HP7P[+] + H[+]		Transport, Mitochondrial	
3-(4-Hydroxyphenyl)pyruvate peroxisomal transport via Proton symport		34HPH[+] + H[+] <=> 34HP7P[+] + H[+]		Transport, Peroxisomal	
3-betahydroxyglutamate transport, diffusion, mitochondrial		3betaH[+] <=> 3betaH7[+]		Transport, Mitochondrial	
3-Carboxy-5-METHYl-2-oxopentanoate transport, diffusion, mitochondrial		3cAMP[+] <=> 3cAMP7[+]		Transport, Mitochondrial	
3-betahydroxyphenylalanine reductase	Cytosol	3betaPhgH + H+ -> NADPH + NADP + sPhgH	EC.1.1.1.102	Sphingolipid Metabolism	PPAD2095
3-hydroxyanthranilate 3-ketoglucosylase	Cytosol	3hantH + O2 -> cmaH + H2O	EC.1.13.1.16	Tyrosine, Typtophan, and Phenylalanine Metabolism	PPAD5874
3-METHYl-2-oxobutanoate transport, diffusion, mitochondrial		3MOb[+] <=> 3MOb7[+]		Transport, Mitochondrial	
3-METHYl-2-oxopentanoate transport, diffusion, mitochondrial		3MOP[+] <=> 3MOP7[+]		Transport, Mitochondrial	
3-Octenyl-4-hydroxybenzoate mitochondrial transport		3oPH_S[+] <=> 3oPH_S[+]		Transport, Mitochondrial	
3-Hydroxy-4-oxo-2-oxoglutarate aminotransferase	Cytosol	3HLA + ADG -> PPH + Glu	2.6.1.1	Citrate Metabolism	PPAD3996
4-aminobutanoate mitochondrial transport via diffusion		4abut[+] <=> 4abut7[+]		Transport, Mitochondrial	
4-aminobutanoate mitochondrial transport via diffusion		4abut[+] <=> 4abut7[+]		Transport, Mitochondrial	
4-Hydroxy-2-oxoglutarate mitochondrial transport via diffusion		4h2OG[+] <=> 4h2OG7[+]		Transport, Mitochondrial	
4-Hydroxy-2-oxoglutarate peroxisomal transport via diffusion		4h2OG[+] <=> 4h2OG7[+]		Transport, Peroxisomal	
4-Hydroxybenzoate mitochondrial transport		4hb[+] <=> 4hb7[+]		Transport, Mitochondrial	
1,4-HydroxyGlutamate semialdehyde dehydrogenase, mitochondrial	Mitochondria	4HGlu3a + H2O -> 4HGluG + 2 H+ + NADH	EC.1.5.1.12	Arginine and Proline Metabolism	PPAD0889
trans-4-Hydroxy-Proline mitochondrial transport via diffusion		4HP7[+] <=> 4HP77[+]		Transport, Mitochondrial	
4-Hydroxy-3-hydroxoisovalerate synthase	Cytosol	H2O + PHE + 4OH- -> H+		Threonine and Lysine Metabolism	PPAD2234
5-Amino-4-oxopentanoate transport, diffusion, mitochondrial		5aOP[+] <=> 5aOP7[+]		Transport, Extracellular	
5-Amino-4-oxopentanoate mitochondrial transport		5aOP[+] <=> 5aOP7[+]		Transport, Mitochondrial	
5-METHYlthioethylsuccinate mitochondrial transport via diffusion		5mtH[+] <=> 5mtH7[+]		Transport, Mitochondrial	
6-phosphoD-Glucose-1,5-bisphosphate endoplasmic reticular transport via diffusion		6pGlc[+] <=> 6pGlc7[+]		Transport, Endoplasmic Reticular	
8-Amino-7-oxononanoate decarboxylase		8aam[+] + H[+] <=> 8aam7[+] + H[+]		Transport, Extracellular	
4-oxo-2-aminobutyrate reversible reaction	Cytosol	4obut + H2O -> 4obut + AC	EC.5.5.1.63	Other Amino Acid Metabolism	
L-aminoadipate/L-semialdehyde dehydrogenase (NADH)	Cytosol	12AAP + ATP + H+ -> NADPH + 12AAP6a + AMP + NADP + PPi	EC.1.2.1.31	Threonine and Lysine Metabolism	PPAD2090
L-aminoadipate/L-semialdehyde dehydrogenase (NADH)	Cytosol	12AAP + ATP + H+ -> NADPH + 12AAP6a + AMP + NAD + PPi	EC.1.2.1.31	Threonine and Lysine Metabolism	PPAD2090
2-aminoadipate transaminase	Cytosol	2maADP + Glu -> 12AAP + NAG	EC.2.6.1.57	Threonine and Lysine Metabolism	PPAD1534
4-aminobutyrate transaminase	Cytosol	4abut + ADG -> Glu + SucAl		Glutamate Metabolism	
L-arabinose transport via passive diffusion		4ar[+] <=> 4ar7[+]		Transport, Extracellular	
Aminoadipylaldehyde dehydrogenase, mitochondrial	Mitochondria	4abut + NAD+ -> 4abut + 2 H+ + NADH	EC.1.2.1.39	Other Amino Acid Metabolism	PPAD3090
4-aminobutyrate transport in via Proton symport		4abut[+] <=> 4abut7[+] + H[+]		Transport, Extracellular	PPAD7071
acetyl-CoA C-acetyltransferase	Cytosol	2ACDA + sACDA -> ACDA	EC.2.3.1.9	Fatty Acid Biosynthesis	PPAD1702
acetyl-CoA C-acyltransferase (octanoyl-CoA), peroxisomal	Peroxisome	3oACDA + COA -> ACCDA + sCCDA	EC.2.3.1.6	Fatty Acid Degradation	PPAD1702
acetyl-CoA C-acyltransferase (octanoyl-CoA), peroxisomal	Peroxisome	3oACDA + COA -> ACCDA + sCCDA	EC.2.3.1.6	Fatty Acid Degradation	PPAD1023
acetyl-CoA C-acyltransferase (decanoyl-CoA), peroxisomal	Peroxisome	3deACDA + COA -> ACCDA + sCCDA	EC.2.3.1.6	Fatty Acid Degradation	PPAD1023
acetyl-CoA C-acyltransferase (decanoyl-CoA), peroxisomal	Peroxisome	3deACDA + COA -> ACCDA + sCCDA	EC.2.3.1.6	Fatty Acid Degradation	PPAD1023
acetylthioesterase reversible reaction	Cytosol	ACDA + ATP -> H2O3 + ADP + H+ + malCoA + Pi	EC.4.6.1.2	Fatty Acid Biosynthesis	PPAD3698
N-acetylglutamate 5-phosphatase synthase, nucleus	Cytosol	ACCA + GAMP -> nagap + CoA + H+	EC.2.3.1.41	Glutamate Metabolism	PPAD4245
phosphorylGlutamine mutase	Cytosol	nagap -> nagap3	EC.4.6.2.3	Glutamate Metabolism	PPAD0097
acetylGlutamate kinase, mitochondrial	Mitochondria	ACGU + ATP -> ACgu5P + ADP	EC.2.7.2.8	Arginine and Proline Metabolism	PPAD1733 or PPAD5144
N-acetylGlutamate synthase, mitochondrial	Mitochondria	ACCOA + Glu -> ACgu5 + CoA + H+	EC.2.3.1.1	Arginine and Proline Metabolism	PPAD1544
2-aceto-2-hydroxybutanoate synthase, mitochondrial	Mitochondria	2abut + H+ + PPR -> 2abut + CO2	EC.2.2.1.6	Valine, Leucine, and Isoleucine Metabolism	PPAD1887 and PPAD5498
acetoLactate synthase, mitochondrial	Mitochondria	H + 2 PPR -> ALACS + CO2	EC.2.2.1.6	Valine, Leucine, and Isoleucine Metabolism	PPAD1887 and PPAD5498
acetyl-CoA hydrolase	Cytosol	AC -> CoA + H+ -> ACCDA + H2O	EC.1.2.1.2	Pyruvate Metabolism	PPAD3095
acyl-CoA oxidase (decanoyl-CoA), peroxisomal	Peroxisome	C10COA + O2 -> 6CO2 + 4H2O	EC.1.3.3.6	Fatty Acid Degradation	PPAD4007
acyl-CoA oxidase (decanoyl-CoA), peroxisomal	Peroxisome	C10COA + O2 -> 6CO2 + 4H2O	EC.1.3.3.6	Fatty Acid Degradation	PPAD4007
acyl-CoA oxidase (octanoyl-CoA), peroxisomal	Peroxisome	O2 + C8COA -> H2O2 + 6CO2	EC.1.3.3.6	Fatty Acid Degradation	PPAD4007
acyl-CoA oxidase (octanoyl-CoA), peroxisomal	Peroxisome	O2 + C8COA -> H2O2 + 6CO2	EC.1.3.3.6	Fatty Acid Degradation	PPAD4007
acyl-CoA oxidase (octanoyl-CoA), peroxisomal	Peroxisome	O2 + C8COA -> H2O2 + 6CO2	EC.1.3.3.6	Fatty Acid Degradation	PPAD4007
acyl-CoA ACP transacylase	Cytosol	ACCOA + ACP -> ACCAP + CoA	EC.2.3.1.38	Fatty Acid Biosynthesis	PPAD1692
Acetyl-CoA ACP transacylase, mitochondrial	Cytosol	ACCOA + ACP -> ACCAP + CoA	EC.2.3.1.41	Fatty Acid Biosynthesis	PPAD1692
acetylase	Cytosol	CT -> CytC	EC.1.3.3.2	Citrate Cycle (TCA)	PPAD3061 or PPAD3831
Acetate hydratase, mitochondrial	Mitochondria	CT -> ICT	EC.4.2.1.3	Citrate Cycle (TCA)	PPAD2831
acetylthioesterase transaminase, irreversible, mitochondrial	Mitochondria	ACgu5 + Glu -> ACgu5N -> ACgu5	EC.2.6.1.11	Arginine and Proline Metabolism	PPAD1565
acetylphosphate, extracellular (secreted)	Extracellular	H2O + PPR -> H+ + PPR	EC.1.3.3.2	Arginine and Proline Metabolism	PPAD1565
acyl carrier Protein synthase, mitochondrial	Mitochondria	CoA + H2O -> 2 H+ + PANAP + PAP		Pantothenate and CoA Biosynthesis	
O-acetylserine transport out of peroxisome		ACN[+] + ACN[+] -> ACN[+]		Transport, Mitochondrial	
acetyl-CoA synthetase	Cytosol	AC + ATP -> CoA -> ACCDA + AMP + PPi	EC.6.2.1.1	Pyruvate Metabolism	PPAD7073
acetyl-CoA synthetase	Cytosol	AC + ATP -> CoA -> ACCDA + AMP + PPi	EC.6.2.1.1	Pyruvate Metabolism	PPAD7073
acetyl-CoA synthetase, mitochondrial	Mitochondria	AC + ATP -> CoA -> ACCDA + AMP + PPi	EC.6.2.1.1	Pyruvate Metabolism	PPAD7073
acetate reversible transport via Proton symport		AC[+] + H[+] <=> AC[+] + H[+]		Transport, Extracellular	
acetate transport, mitochondrial		AC[+] <=> AC[+]		Transport, Mitochondrial	
acetate transport, peroxisomal		AC[+] <=> AC[+]		Transport, Peroxisomal	
ADENINE deaminase	Cytosol	aden + H+ -> H2O -> im + NH4	EC.3.5.4.4	Nucleotide Salvage Pathways	PPAD6225
4-aminobutyrate synthase	Cytosol	4obut + ADG -> Glu + PPR		Folate Metabolism	PPAD2950
ADENINE deaminase	Cytosol	aden + H+ -> H2O -> im + NH4	EC.3.5.4.2	Nucleotide Salvage Pathways	PPAD2950
ADENINE transport in via Proton symport		AD[+] + H[+] <=> AD[+] + H[+]		Transport, Extracellular	PPAD1906
ADENINE reversible transport, mitochondria		AD[+] <=> AD[+]		Transport, Mitochondrial	PPAD1955
NADPH-dependent 1-acyl dihydroxyacetone phosphate reductase found in lipid particles	Cytosol	1aGDP3P + H+ -> NADPH -> 1aGDP + NADP	EC.1.1.1.101	phospholipid Biosynthesis	PPAD7090
ADENYLYL kinase	Cytosol	AMP + ATP -> sAMP + ADP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase, mitochondrial	Mitochondria	AMP + ATP -> sAMP + ADP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
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ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
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ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
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ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD3103
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.3	Nucleotide Salvage Pathways	PPAD4149
ADENYLYL kinase (GTP)	Cytosol	AMP + GTP -> sAMP + GDP	EC.2.7.4.		

D-arabinose 1Dehydrogenase (NAD)	Cytosol	arabD + NAD > D-arab14HC + H + NADH	EC-1.1.1.117	Arabinose Metabolism	PPAD0745
D-arabinose 1Dehydrogenase (NADP)	Cytosol	arabD + NADP > D-arab14HC + H + NADPH	EC-1.1.1.117	Arabinose Metabolism	PPAD0745
D-arabinose reversible transport		arabD[c] <> arabD[c]		Transport, Extracellular	PPAD2620
L-arabinose extracellular transport		arabD[c] <> arabD[c]		Transport, Extracellular	PPAD2620
arabinose reductase	Cytosol	arabK + H + NADPH > abt + NADP	EC-1.1.2.1	Arabinose Metabolism	PPAD0745
Arginase	Cytosol	ARG + H2O > ORN + urea	EC-3.5.1.1	Arginine and Proline Metabolism	PPAD3793
Argininosuccinate lyase	Cytosol	ARGSUC + ADP > ARG + FUM	EC-4.3.2.1	Arginine and Proline Metabolism	PPAD3793
Argininosuccinate synthase, reversible	Cytosol	ASP + ARG + CTPS > AMP + ARG5UC + H + PPi	EC-6.3.4.5	Arginine and Proline Metabolism	PPAD3793
Arginine mitochondrial transport via Proton symport		ARG[c] + H[c] <> ARG[m] + H[m]		Transport, Mitochondrial	PPAD0044
L-Arginine reversible transport via Proton symport		ARG[c] + H[c] <> ARG[c] + H[c]		Transport, Extracellular	PPAD2787
Arginyl-tRNA synthetase, mitochondrial	Mitochondria	ARG + ATP + tRNAARG > AMP + ARGtRNA + PPi	EC-6.1.1.19	Arginine and Proline Metabolism	PPAD0189
Arginyl-tRNA synthetase, mitochondrial	Mitochondria	ARG + ATP + tRNAARG > AMP + ARGtRNA + PPi	EC-6.1.1.19	Arginine and Proline Metabolism	PPAD0189
5-Adenosyl-L-Methionine L-Histidine N-Methyltransferase	Cytosol	SAM + HIS -> mhis + AHCT5	2.1.1.	Histidine Metabolism	PPAD01291
aromatic-amino-acid transaminase	Cytosol	2kmb + GLU > MET + ARG	EC-2.6.1.57		PPAD1785
Asenite transporter	Cytosol	ase[n] <> ase[c]		Transport, Extracellular	PPAD01672
aspartate deamidase/dehydratase, irreversible	Cytosol	4PASP + H + NADPH > ASPsAs + NADP + Pi	EC-1.2.1.11	Alanine and aspartate Metabolism	PPAD3395
L-asparaginase	Cytosol	ASN + H2O > ASP + NH4	EC-3.5.1.1	Asparagine Metabolism	PPAD02890
L-asparaginase, extracellular	Extracellular	ASN + H2O > ASP + NH4	EC-3.5.1.1	Asparagine Metabolism	PPAD41055
asparagine synthase (Glutamine-hydrolyzing)	Cytosol	ASP + ATP + GLN + H2O <> AMP + ASN + GLU + H + PPi	EC-6.3.5.4	Alanine and aspartate Metabolism	PPAD27879
asparagine mitochondrial transport via Proton transport		ASN[c] + H[c] <> ASN[m] + H[m]		Transport, Mitochondrial	PPAD02807
L-asparagine reversible transport via Proton symport		ASN[c] + H[c] <> ASN[c] + H[c]		Transport, Extracellular	PPAD00044
Asparaginyl-tRNA synthetase	Cytosol	ASN + ATP + tRNAASN > AMP + ASNtRNA + PPi	EC-6.1.1.22	Asparagine Metabolism	PPAD1397
asparaginyl-tRNA synthetase, mitochondrial	Mitochondria	ASN + ATP + tRNAASN > AMP + ASNtRNA + PPi	EC-6.1.1.22	Asparagine Metabolism	PPAD1397
aspartate 1Dehydroxylase	Cytosol	ASP + H > SALA + CO2	EC-4.1.1.11	Pantoic and COA Biosynthesis	PPAD01897
aspartate carbamoyltransferase, nuclear	Nucleus	ASP + CDP > dAsp + CDP + Pi	EC-2.1.1.2	Purine and Pyrimidine Biosynthesis	PPAD01897
aspartate Glutamate peroxisomal shuttle		ASP[c] + GLU[m] <> ASP[m] + GLU[c]		Transport, Peroxisomal	
aspartate kinase, irreversible	Cytosol	ASP + ATP > 4PASP + ADP	EC-2.7.2.4	Alanine and aspartate Metabolism	PPAD08847
aspartate oxidase	Cytosol	ASP[c] + 5ad[n] > 5ad[n] + H2O[c] + H[c]		Folate Metabolism	PPAD02307
aspartate mitochondrial transport via Proton symport		ASP[c] + H[c] <> ASP[m] + H[m]		Transport, Mitochondrial	
aspartate nuclear transport via Proton symport		ASP[c] + H[c] <> ASP[c] + H[c]		Transport, Nuclear	
L-aspartate reversible transport via Proton symport		ASP[c] + H[c] <> ASP[c] + H[c]		Transport, Extracellular	PPAD00044
aspartate transaminase	Cytosol	ARG + ASP > GLU + GAA	EC-2.6.1.1	Alanine and aspartate Metabolism	PPAD2347
aspartate transaminase, mitochondrial	Mitochondria	ARG + ASP > GLU + GAA	EC-2.6.1.1	Alanine and aspartate Metabolism	PPAD3399
aspartate transaminase, peroxisomal	Peroxisome	ARG + ASP > GLU + GAA	EC-2.6.1.1	Alanine and aspartate Metabolism	PPAD3399
Aspartyl-tRNA synthetase	Cytosol	ASP + ATP + tRNAASP > AMP + ASPtRNA + PPi	EC-6.1.1.12	Alanine and aspartate Metabolism	PPAD00203
Aspartyl-tRNA synthetase, mitochondrial	Mitochondria	ASP + ATP + tRNAASP > AMP + ASPtRNA + PPi	EC-6.1.1.12	Alanine and aspartate Metabolism	PPAD04029
AMPAATP transporter, peroxisomal		AMPA[c] + ATP[c] + H[c] <> AMP[c] + ATP[c] + H[c]		Transport, Peroxisomal	PPAD0189
ATP Adenylyltransferase	Cytosol	ADP + ATP > H + aAdA + Pi	EC-2.7.7.53	Purine and Pyrimidine Biosynthesis	PPAD0189
ATP Adenylyltransferase	Cytosol	ADP + GTP + H > aAdG + Pi	EC-2.7.7.53	Purine and Pyrimidine Biosynthesis	PPAD0189
ATP Adenylyltransferase	Cytosol	GDH + GTP + H > aAdG + Pi	EC-2.7.7.53	Purine and Pyrimidine Biosynthesis	PPAD0189
ATP maintenance requirement	Cytosol	ATP + H2O > ADP + H + Pi	EC-2.4.2.17	Nucleotide Salvage Pathways	PPAD00032
ATP phosphoribosyltransferase	Cytosol	ATP + PPR > cPPi + PRaTP	EC-2.4.2.17	Histidine Metabolism	PPAD00032
ATPase, cytosolic	Cytosol	ATP[c] + H2O[c] > ADP[c] + H[c] + Pi[c]	EC-3.6.3.6	Transport, Extracellular	PPAD00292 or PPAD06354
ATP synthase, mitochondrial		ADP[m] + 3 H[c] + Pi[m] > ATP[m] + 2 H[m]	EC-3.6.3.14	Oxidative phosphorylation	PPAD02901
ADP/ATP transporter, mitochondrial		ADP[c] + ATP[m] + H[c] <> ADP[m] + ATP[c] + H[m]		Transport, Mitochondrial	PPAD2901
ADP/ATP transporter, peroxisomal		ADP[c] + ATP[p] + H[c] <> ADP[p] + ATP[c] + H[p]		Transport, Peroxisomal	PPAD0189
7,8-Diaphosphate nucleotidase	Cytosol	H2D + PMP > AMP + Pi	EC-3.1.3.17	Cytidine Metabolism	PPAD2326
Biotin uptake		bin[c] + H[c] > bin[s] + H[c]		Transport, Extracellular	
biotin synthase, mitochondrial	Mitochondria	dbt + <> dbt + 2 H+	EC-2.8.1.6	Pantoic and COA Biosynthesis	PPAD00374
C-14 sterol reductase	Cytosol	4kncr + H + NADPH > 4kncym + NADP	1.3.1.70	Sterol Biosynthesis	PPAD04863
C-2 sterol desaturase	Cytosol	erg10r + H + NADPH + O2 > erg10et + 2 H2O + NADP		Sterol Biosynthesis	PPAD11112
C-2 sterol desaturase, mitochondrial	Mitochondria	erg10r + H + NADPH + O2 > erg10et + 2 H2O + NADP		Sterol Biosynthesis	PPAD11112
C24 sterol reductase, endoplasmic reticular	ER	erg24et + H + NADPH > erg2t + NADP		Sterol Biosynthesis	PPAD04022
C-3 sterol dehydrogenase (4-METHYLMYOSTEROL)	Cytosol	4myz + NAD + NADPH > 4myz_int2 + CO2 + H + NADH	EC-1.1.1.170	Sterol Biosynthesis	PPAD05446
C-3 sterol dehydrogenase (zymosterol)	Cytosol	NAD + zym_int2 > CO2 + H + NADH + zym_int2	EC-1.1.1.170	Sterol Biosynthesis	PPAD05446
C-3 sterol keto reductase (4-METHYLMYOSTEROL)	Mitochondria	4myz_int2 + H + NADPH > 4myz + NADP	1.1.1.270	Sterol Biosynthesis	PPAD00732
C-3 sterol keto reductase (zymosterol)	Mitochondria	4myz + H + NADPH + zym_int2 > NADP + zym_int2	1.1.1.270	Sterol Biosynthesis	PPAD00732
C-4 sterol Methyl oxidase (4-METHYLMYOSTEROL)	Cytosol	4myz + 3 H + 3 NADPH + 3 O2 > 4myz_int1 + 4 H2O + 3 NADP	1.14.13.72	Sterol Biosynthesis	PPAD09465
C-4 sterol Methyl oxidase (4-METHYLMYOSTEROL)	Cytosol	4myz + 3 H + 3 NADPH + 3 O2 > 4 H2O + 3 NADP + zym_int1	1.14.13.72	Sterol Biosynthesis	PPAD09465
C-5 sterol desaturase	Cytosol	erg2r + H + NADPH + O2 > erg2et + 2 H2O + NADP		Sterol Biosynthesis	PPAD33491
C-8 sterol isomerase	Cytosol	FecD9 > aFecD		Sterol Biosynthesis	PPAD02913
catalsae	Cytosol	2 H2O2 > 2 H2O + O2			PPAD2426
catalsae A, peroxisomal	Peroxisome	2 H2O2 > 2 H2O + O2			PPAD2426
N-carbamoyl-L-aspartate transport, diffusion		(dASP[c]) <> (dASP[p])			
carbamoyl phosphate synthase (Glutamine-hydrolyzing)	Cytosol	2 ATP + GLU + H2O + HCO3- > 2 ADP + dSP + GLU + 2 H + Pi	EC-6.3.5.5	Arginine and Proline Metabolism	PPAD0183
carbamoyl phosphate synthase (Glutamine-hydrolyzing), nuclear	Nucleus	2 ATP + GLU + H2O + HCO3- > 2 ADP + dSP + GLU + 2 H + Pi	EC-6.3.5.5	Arginine and Proline Metabolism	PPAD0183
carbamoyl phosphate nuclear transport via diffusion		carP[c] <> carP[p]		Transport, Nuclear	
CDP4alpha/gamma Serine O-phosphatidyltransferase, mitochondrial	Mitochondria	CDP4a + G4C[P] <> CMP + H + P4g	EC-2.7.8.5	phospholipid Biosynthesis	PPAD10223
CDP nuclear transport		CDP[c] <> CDP[p]		Transport, Nuclear	
choline phosphatidyltransferase	Cytosol	CDPChol + CTP + H > CDPChol + PPi	EC-2.7.7.15	phospholipid Biosynthesis	PPAD0063
cholesterol delta isomerase, lumped reaction		SAM + O2 > ymH > AHCT5 + erg10et + H + 2 H2O	EC-5.3.1.5	Sterol Biosynthesis	
choline transport via Proton symport		CHO[c] + H[c] <> CHO[m] + H[m]		Transport, Extracellular	PPAD11116
choline kinase	Cytosol	ATP + CDP > CDP + CHOL + Pi	EC-2.7.1.32	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAD06409
chorismate mutase	Cytosol	CHS > chor + PPi	EC-5.4.9.5	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAD07271
chorismate synthase	Cytosol	PPSme > chor + Pi	EC-4.2.3.5	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAD07271
chorismate pyruvate lyase	Cytosol	chor > abac + PPR		Quinone Biosynthesis	PPAD05791
chitin deacetylase	Cytosol	CHT + H2O > AC + CHITDS + H	EC-3.5.1.41	Aminosugars Metabolism	PPAD05771
chitin synthase	Cytosol	UDPACGL > CHT + H + UDP			PPAD1294
citrate reversible transport via symport		CT[c] + H[c] <> CT[s] + H[s]	EC-2.4.1.16	Glutamate Metabolism	PPAD07883
citrate transport, mitochondrial		CT[c] + MAL[m] <> CT[m] + MAL[c]		Transport, Mitochondrial	PPAD1720
citrate/malate antiport into peroxisome		CT[p] + MAL[c] <> CT[s] + MAL[p]		Transport, Peroxisomal	PPAD1720
citrate transport, mitochondrial		CT[c] + PPR[m] <> CT[m] + PPR[c]		Transport, Mitochondrial	PPAD1720
citrate transport, mitochondrial		CT[c] + CIT[m] <> CT[m] + CIT[c]		Transport, Mitochondrial	PPAD1720
citrate/isocitrate antiport into peroxisome		CT[c] + CIT[p] <> CT[p] + CIT[c]		Transport, Peroxisomal	
cardiolipin synthase, mitochondrial	Mitochondria	GL3 CDP4a + GL3 Pi > GL3 dGP + CMP + H	EC-2.7.8.5	phospholipid Biosynthesis	PPAD0063
CMP nucleotidase	Cytosol	CMP + H2O > cMP + PPi	EC-3.2.10	Nucleotide Salvage Pathways	PPAD0189
CMP transport, diffusion, mitochondrial		CMP[c] <> CMP[p]		Transport, Mitochondrial	
CO2 transporter via diffusion		CO2[c] <> CO2[p]		Transport, Extracellular	
CO2 Gdp transport		CO2[c] <> CO2[p]		Transport, Gold Apparatus	
CO2 transport (diffusion), mitochondrial		CO2[c] <> CO2[m]		Transport, Mitochondrial	
CO2 nuclear transport via diffusion		CO2[c] <> CO2[c]		Transport, Nuclear	
CO2 peroxisomal transport		CO2[c] <> CO2[p]		Transport, Peroxisomal	
CO2 vacuolar transport		CO2[c] <> CO2[p]		Transport, Vacuolar	
corrinogen synthase	Cytosol	corPP8 + 2 H + O2 > 2 CO2 + 2 H2O + PPR9g	EC-1.3.3.3	Porphyrin and Chlorophyll Metabolism	PPAD04344
carbamate-acylcarbamate carrier, mitochondrial		ACRN[c] + CRN[m] <> ACRN[m] + CRN[c]		Transport, Mitochondrial	PPAD04344
carbamate-acylcarbamate carrier, peroxisomal		ACRN[c] + CRN[p] <> ACRN[p] + CRN[c]		Transport, Peroxisomal	
L-carnitine reversible transport		CRN[c] <> CRN[p]		Transport, Extracellular	PPAD2609
L-carnitine transport out of mitochondria via diffusion		CRN[m] <> CRN[p]		Transport, Mitochondrial	
carnitine transport into peroxisome		CRN[c] <> CRN[p]		Transport, Peroxisomal	
citrate synthase, mitochondrial	Mitochondria	ACCOA + H2O + COA > CT + COA + H	EC-2.3.3.1	Citric Cycle (TCA)	PPAD03577
carnitine O-acetyltransferase	Cytosol	ACCOA + CRN > ACRN + COA	EC-2.3.1.7	Alanine and aspartate Metabolism	PPAD02024
carnitine O-acyltransferase, forward reaction, mitochondrial	Mitochondria	ACRN + COA > ACCOA + CRN	EC-2.3.1.7	Alanine and aspartate Metabolism	PPAD02024
carnitine O-acyltransferase, reverse reaction, mitochondrial	Mitochondria	ACCOA + CRN > ACRN + COA	EC-2.3.1.7	Alanine and aspartate Metabolism	PPAD02024
Cytosine deaminase	Cytosol	cyd + H + H2O > NH4 + UBI	EC-3.5.4.1	Purine and Pyrimidine Biosynthesis	PPAD0189
cytosine transport in via Proton symport		cyd[c] + H[c] <> cyd[s] + H[s]		Transport, Extracellular	PPAD0189
CTP synthase (NH3)	Cytosol	ATP + NH4 + UTP > ADP + CTP + 2 H + Pi	EC-6.4.2	Purine and Pyrimidine Biosynthesis	PPAD0189
CTP synthase (Glutamine)	Cytosol	ATP + GLN + H2O + UTP > ADP + CTP + GLU + 2 H + Pi	EC-6.4.2	Purine and Pyrimidine Biosynthesis	PPAD0189
cytochrome c oxidase, mitochondrial		4 FOCYT[c] + 4[e]n + O2[m] > 4 FOCYT[m] + 4 H[c] + 2 H2O[m]	EC-1.3.1.1	Oxidative phosphorylation	PPAD01624
ubiquinol 6: cytochrome c reductase		2 FOCYT[c] + 1.5 H[m] + (qb2)[m] > 2 FOCYT[m] + 1.5 H[c] + qe[m]	EC-1.10.2.2	Oxidative phosphorylation	
cystine disomerase	Cytosol	CYS > dC + SALA	EC-1.1.11.20	Cystine Metabolism	PPAD03757
cystine synthase	Cytosol	ACSER + H2S > AC + CYS + H	EC-2.5.1.47	Cystine Metabolism	PPAD03757
High-affinity cystine-specific transporter with similarity to the DapTs family of transporters		CYS[c] <> CYS[p]		Transport, Extracellular	PPAD03757
L-cystine reversible transport via Proton symport		CYS[c] + H[c] <> CYS[c] + H[c]		Transport, Extracellular	PPAD00044
cystathionine glyoxylase	Cytosol	lct + H2O > 20kS + CYS + NH4	EC-4.4.1.1	Methionine Metabolism	PPAD02403
Cytosidine-5RNA synthetase	Cytosol	ATP + CYS + tRUCYS > AMP + CYS2m + PPi	EC-6.1.1.16	Cytidine Metabolism	PPAD06079
cystathionine betaSynthase	Cytosol	HCVS + SER > lct + H2O	EC-4.2.1.22	Glycine and Serine Metabolism	PPAD04214
cystathionine betaSynthase, nucleus	Nucleus	lct[s] <> lct[s]		Transport, Peroxisomal	PPAD04214
cystathionine peroxisomal transport		cyd + H + H2O > NH4 + UBI	EC-3.5.4.5	Purine and Pyrimidine Biosynthesis	PPAD04330
cytidine kinase (CTP)	Cytosol	cyd + CTP > CMP + GDP + H	EC-2.7.1.48	Nucleotide Salvage Pathways	PPAD07499
cytidine kinase (CTP), nucleus	Nucleus	cyd + CTP > CMP + GDP + H	EC-2.7.1.48	Nucleotide Salvage Pathways	PPAD07499
cytidine transport via Proton symport		cyd[c] + H[c] <> cyd[s] + H[s]		Transport, Extracellular	
cytidylate kinase (dCMP)	Cytosol	ATP + CMP > ADP + dCP	EC-2.7.4.14	Nucleotide Salvage Pathways	PPAD02744
cytidylate kinase (dMP)	Cytosol	ATP + dMP > ADP + dCP	EC-2.7.4.14	Nucleotide Salvage Pathways	PPAD02744
deoxyADENOSINE deaminase	Cytosol	dad + H + H2O > din + NH4		Nucleotide Salvage Pathways	
deoxyADENOSINE deaminase	Cytosol	ATP + dAMP > ADP + dAP	EC-2.7.4.11	Nucleotide Salvage Pathways	
deoxyADENOSINE transport in via Proton symport		dad[c] + H[c] <> dad[s] + H[s]		Transport, Extracellular	
DADP nuclear transport		dADP[c] <> dADP[p]		Transport, Nuclear	
dicycloxycholesterolphosphatransferase	Cytosol	DGR + CDPChol > CMP + Pi	EC-2.7.8.2	phospholipid Biosynthesis	PPAD07078
Dicycloxycholesterol kinase	Cytosol	DGR + ATP > PA + ADP	2.7.1.107	Glycerolipid Metabolism	PPAD05615
dicycloxycholesterol phosphatase	Cytosol	H2D + PA > DGR + Pi	EC-3.1.3.4	phospholipid Biosynthesis	PPAD05615
7,8-Diaminononanoate reversible transport via Proton symport		DANN[c] + H[c] <> DANN[m] + H[m]		Transport, Extracellular	PPAD02621
CDP4alpha/gamma Serine synthetase	Cytosol	CTP + H + PA > CDP4a + PPi	EC-2.7.7.41	phospholipid Biosynthesis	PPAD05644
CDP4alpha/gamma Serine synthetase, mitochondrial	Mitochondria	CTP + H + PA > CDP4a + PPi	EC-2.7.7.41	phospholipid Biosynthesis	PPAD05644
3,4-dihydroxy-2-butanone-4-phosphate dehydrogenase synthase	Cytosol	rUSD + H2O > dHAP + FORM + H + Pi	EC-6.3.3.3	Riboflavin Metabolism	PPAD02464
dHAP nuclear transport		dHAP[c] <> dHAP[p]		Transport, Nuclear	
dHAP deaminase	Cytosol	dCMP + H + H2O > dUMP + NH4	EC-3.5.4.12	Purine and Pyrimidine Biosynthesis	PPAD06900
dCTP deaminase	Cytosol	dCTP + H + H2O > dUTP + NH4	EC-3.5.4.13	Nucleotide Salvage Pathways	PPAD03749
deoxycytidine deaminase	Cytosol	dyt + H + H2O > dUT + NH4	EC-3.5.4.14	Nucleotide Salvage Pathways	PPAD04330
deoxycytidine deaminase	Cytosol	dyt + H + H2O > NH4 + dUT	EC-3.5.4.5	Purine and Pyrimidine Biosynthesis	PPAD04330
deoxycytidine transport in via Proton symport		dyt[c] + H[c] <> dyt[s] + H[s]		Transport, Extracellular	PPAD02053 or PPAD05722
3DeoxyD-arabino-heptulosonate 7-phosphate synthetase	Cytosol	E4P + H2O + PEP > 2d67P + Pi	2.5.1.54	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAD05722
2DeoxyD-arabino-heptulosonate 7-phosphate synthetase, mitochondrial	Mitochondria	E4P + H2O + PEP > 2d67P + Pi			
Myristoyl CoA desaturase (in C14:0CoA >= n=C18:0CoA)	Cytosol	H + NADPH + O2 > C14:0CoA > 2 H2O + NADP + C14:0CoA	EC-1.14.19.1	Fatty Acid Biosynthesis	PPAD01707
Palmitoyl CoA desaturase (in C18:0CoA >= n=C18:0CoA)	Cytosol	H + NADPH + O2 > C18:0CoA > 2 H2O + NADP + C18:0CoA	EC-1.14.19.1	Fatty Acid Biosynthesis	PPAD01707
Stearoyl CoA desaturase (in C18:0CoA >= n=C18:0CoA)	Cytosol	H + NADPH + O2 > C18:0CoA > 2 H2O + NADP + C18:0CoA	EC-1.14.19.1	Fatty Acid Biosynthesis	PPAD01707
Omeyl CoA desaturase (in C18:0CoA >= n=C18:0CoA)	Cytosol	H + NADPH + O2 > C18:0CoA > 2 H2O + NADP + C18:0CoA	EC-1.14.19.1	Fatty Acid Biosynthesis	PPAD01707
dHAP nuclear transport		dHAP[c] <> dHAP[p]		Transport, Nuclear	
deoxyguanylate kinase (dGMP-ATP)	Cytosol	ATP + dGMP > ADP + dGDP	EC-2.7.4.8	Purine and Pyrimidine Biosynthesis	PPAD0189
deoxyguanosine transport in via Proton symport		dgp[c] + H[c] <> dgp[s] + H[s]		Transport, Extracellular	
dihydroxy acid dehydratase (2,3-dihydroxy-3-methylbutanoate), mitochondrial	Mitochondria	23dHb > 3MOB + H2O	EC-4.2.10.9	Valine, Isoleucine, and Isoleucine Metabolism	PPAD04343
dihydroxy acid dehydratase (2,3-dihydroxy-3-methylpentanoate), mitochondrial	Mitochondria	23dHb > 3MOP + H2O	EC		

Lactate dehydrogenase, mitochondrial	Mitochondria	2 FICVT + DLAC -> 2 FOCTC + PIR	EC-1.1.2.4	Alternate Carbon Metabolism	PIPA03305 PIPA03817
Lactate transport, mitochondrial	Cytosol	h[c] + DLAC[c] <=> h[m] + DLAC[m]	EC-2.5.1.1	Transport, Mitochondrial	PIPA03712 PIPA01728
dMethylyltransferase	Cytosol	dmPP + PPp -> gPP + PP		Sterol Biosynthesis	PIPA03712
3-hydroxy-3-methylglutaryl 3-Methyltransferase, mitochondrial	Mitochondria	3mhEtl -> 3 hM -> hMCS + H + gEh2		Quinone Biosynthesis	PIPA03712
Dihydropyrimidin monophosphate dephosphorylase	Cytosol	dhmP + H2O -> dmP + Pi		Folate Metabolism	PIPA00005 PIPA02138 and PIPA02226] or PIPA08226 or PIPA01639
Dihydropyrimidin triphosphate pyrophosphatase	Cytosol	dmT + H2O -> dmP + H + PP	EC-2.4.1.83	Glycoprotein Metabolism	PIPA00005 PIPA02138 and PIPA02226] or PIPA08226 or PIPA01639
Dolichyl phosphate-mannose-Protein mannosyltransferase, endoplasmic reticular	ER	dolmanP -> dGP + H + mannan	EC-2.4.1.109	Glycoprotein Metabolism	PIPA05592
dolichyl phosphate endoplasmic reticular transport via Proton symport	Cytosol	dmP[c] + H[c] <=> dmP[p] + H[p]		Transport, Endoplasmic Reticular	PIPA02723
dephospho-CoA kinase	Mitochondria	ATP + dPCOA -> ADP + CoA + H	EC-2.7.1.24	Pantothenate and CoA Biosynthesis	PIPA02082
Diphosphoglyceremutase	Cytosol	13BPi <=> 23BPi + H	EC-2.7.1.24	Glycolysis/Gluconeogenesis	PIPA02167 PIPA01365 PIPA00653 PIPA05352
diphosphomevalonate decarboxylase, nucleus	Nucleus	58Pmev + ATP -> ADP + CO2 + iPPp + Pi	EC-4.1.1.33	Sterol Biosynthesis	PIPA02082
2-oxylipoyl-CoA 2-reductase	Cytosol	2oRP + H + NADPH -> NADP + PANT	EC-1.1.1.169	Pantothenate and CoA Biosynthesis	PIPA02167
2-oxylipoyl-CoA 2-reductase, mitochondrial	Mitochondria	2oRP + H + NADPH -> NADP + PANT	EC-1.1.1.169	Pantothenate and CoA Biosynthesis	PIPA02167
Deoxyribokinase	Cytosol	ATP + dRP -> 2dSP + ADP + H	EC-2.7.1.5	Pentose phosphate Cycle	PIPA00653
dTMP kinase	Cytosol	ATP + dmP -> ADP + dTMP	EC-2.7.4.9	Nucleotide Salvage Pathways	PIPA05592
dTMP reversible uniprot	Cytosol	dTMP[c] <=> dTMP[p]		Transport, Extracellular	PIPA05592
dUMP kinase	Cytosol	ATP + dUMP -> ADP + dUMP	EC-2.7.4.9	Nucleotide Salvage Pathways	PIPA05592
dUMP nuclear transport	Cytosol	dUMP[c] <=> dUMP[p]		Transport, Nuclear	PIPA05592
deoxyUridine kinase (ATP:deoxyUridine)	Cytosol	ATP + dUB -> ADP + dUMP + H		Purine and Pyrimidine Biosynthesis	PIPA02353
deoxyUridine phosphorylase	Cytosol	dUB + Pi -> 2dSP + dGA		Purine and Pyrimidine Biosynthesis	PIPA02353
deoxyUridine transport in via Proton symport	Cytosol	dUR[c] + H[c] <=> dUR[p] + H[p]		Transport, Extracellular	PIPA02353
dUTP dephosphatase	Cytosol	dUTP + H2O -> dUMP + H + PPi	EC-3.6.1.23	Purine and Pyrimidine Biosynthesis	PIPA02353
deoxyuridine synthase, cytosolic/mitochondrial	Cytosol	q[de] + dUMP[c] -> 3dUMP[p] + 4abul[c] + e[de] + e[de] + e[de]	EC-1.5.99.8	Arginine and Proline Metabolism	PIPA02353
L-erythro-4-hydroxyGlutamate mitochondrial transport via diffusion		e4HGLU[c] <=> e4HGLU[p]		Transport, Mitochondrial	PIPA02353
L-erythro-4-hydroxyGlutamate peroxisomal transport via diffusion		e4HGLU[c] <=> e4HGLU[p]		Transport, Peroxisomal	PIPA02353
D-erythrose 4-phosphate mitochondrial transport via diffusion		E4P[c] <=> E4P[p]		Transport, Mitochondrial	PIPA02353
3-hydroxyacyl CoA dehydratase (3-hydroxyhexanoyl CoA), peroxisomal	Peroxisome	H2O + 3hxCOA <=> 3hxCOA	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
3-hydroxyacyl CoA dehydratase (3-hydroxydecanoyl CoA), peroxisomal	Peroxisome	3hDCOA <=> dC2COA + H2O	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
3-hydroxyacyl CoA dehydratase (3-hydroxydodecanoyl CoA), peroxisomal	Peroxisome	3hDCCOA <=> dC2COA + H2O	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
3-hydroxyacyl CoA dehydratase (3-hydroxytetradecanoyl CoA), peroxisomal	Peroxisome	3hTCCOA <=> H2O + H2C2COA	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
3-hydroxyacyl CoA dehydratase (3-hydroxyhexadecanoyl CoA), peroxisomal	Peroxisome	3hHCCOA <=> H2O + H2C2COA	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
3-hydroxyacyl CoA dehydratase (3-hydroxyoctadecanoyl CoA), peroxisomal	Peroxisome	3hOCCOA <=> H2O + oC2COA	EC-4.2.1.17	Fatty Acid Degradation	PIPA02744
L-erythro-4-hydroxyGlutamate 2-oxoglutarate aminotransferase	Cytosol	AKG + e4HGLU -> 4H2OGlt + GLU	EC-2.6.1.1	Arginine and Proline Metabolism	PIPA03996
L-erythro-4-hydroxyGlutamate 2-oxoglutarate aminotransferase, mitochondrial	Mitochondria	AKG + e4HGLU -> 4H2OGlt + GLU	EC-2.6.1.1	Arginine and Proline Metabolism	PIPA03996
L-erythro-4-hydroxyGlutamate 2-oxoglutarate aminotransferase, peroxisomal	Peroxisome	AKG + e4HGLU -> 4H2OGlt + GLU	EC-2.6.1.1	Arginine and Proline Metabolism	PIPA03996
enolase	Cytosol	2Pp <=> H2O + PpP	EC-4.2.1.11	Glycolysis/Gluconeogenesis	PIPA00398
ergosterol oxidase transport		erg[c] <=> erg[p]		Transport, Extracellular	PIPA00398
ergosterol-endoplasmic reticular transport		erg[c] <=> erg[p]		Transport, Endoplasmic Reticular	PIPA00398
Erigoster 5,6,22,24 (28) tetraen-3beta-ol endoplasmic reticular transport		erigster[c] <=> erigster[p]		Transport, Endoplasmic Reticular	PIPA00398
Ethandamine kinase	Cytosol	ATP + etha -> ADP + e[etha] + H	EC-2.7.1.82	phospholipid Biosynthesis	PIPA07076
Ethandaminephosphotransferase	Cytosol	DGR + CDPea <=> CMP + H + e[etha]	EC-2.7.8.1	phospholipid Biosynthesis	PIPA07076
ethanol reversible transport		etoh[c] <=> etoh[p]		Transport, Extracellular	PIPA07076
ethanol transport to mitochondria (diffusion)		etoh[c] <=> etoh[m]		Transport, Mitochondrial	PIPA07076
fatty acid peroxisomal transport		C100[c] <=> C100[p]		Transport, Peroxisomal	PIPA01904 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c12OACP + H2O <=> ACP + H + c12O	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA01904 PIPA03692
fatty acyl-ACP mitochondrial transport		C12OACP[c] <=> C12OACP[p]		Transport, Mitochondrial	PIPA01904 PIPA03692
fatty acid peroxisomal transport		C120[c] <=> C120[p]		Transport, Peroxisomal	PIPA01904 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c14OACP + H2O <=> ACP + H + c14O	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		C14OACP[c] <=> C14OACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport via ABC system		ATP[p] + C140COA[c] -> ADP[p] + Pi[p] + C140COA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport		C140[c] <=> C140[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c141ACP + H2O <=> ACP + H + c141	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		C141ACP[c] <=> C141ACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport via ABC system		ATP[p] + C141COA[c] -> ADP[p] + Pi[p] + C141COA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport		C141[c] <=> C141[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c16OACP + H2O <=> ACP + H + c16O	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		P16aACP[c] <=> P16aACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acyl-CoA peroxisomal transport via ABC system		ATP[p] + C160COA[c] -> ADP[p] + Pi[p] + C160COA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport		hdc[a] <=> hdc[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c161ACP + H2O <=> ACP + H + c161	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		C161ACP[c] <=> C161ACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acyl CoA peroxisomal transport via ABC system		ATP[p] + H8COA[c] -> ADP[p] + Pi[p] + H8COA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport		hdc[a] <=> hdc[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c18OACP + H2O <=> ACP + H + c18O	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		C18OACP[c] <=> C18OACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acyl CoA transport via ABC system		ATP[p] + C180COA[c] -> ADP[p] + Pi[p] + C180COA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c181ACP + H2O <=> ACP + H + c181	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		octaACP[c] <=> octaACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acyl CoA peroxisomal transport via ABC system		ATP[p] + odcCOA[c] -> ADP[p] + Pi[p] + odcCOA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP hydrolase	Cytosol	c182ACP + H2O <=> ACP + H + c182	EC-3.1.12.14	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acyl-ACP mitochondrial transport		C182ACP[c] <=> C182ACP[p]		Transport, Mitochondrial	PIPA02717 PIPA01145 PIPA03692
fatty acyl CoA peroxisomal transport via ABC system		ATP[p] + odcyACOA[c] -> ADP[p] + Pi[p] + odcyACOA[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid peroxisomal transport		oc[c] <=> oc[p]		Transport, Peroxisomal	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (decanoyl), nucleus	Nucleus	c10D + ATP -> CoA -> AMP + PPi + c10DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (dodecanoyl), nucleus	Nucleus	c12D + ATP -> CoA -> AMP + PPi + c12DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tetradecanoyl), nucleus	Nucleus	c14D + ATP -> CoA -> AMP + PPi + c14DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (hexadecanoyl), nucleus	Nucleus	c16D + ATP -> CoA -> AMP + PPi + c16DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (octadecanoyl), nucleus	Nucleus	c18D + ATP -> CoA -> AMP + PPi + c18DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (tridecanoyl), nucleus	Nucleus	c13D + ATP -> CoA -> AMP + PPi + c13DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (pentadecanoyl), nucleus	Nucleus	c15D + ATP -> CoA -> AMP + PPi + c15DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (heptadecanoyl), nucleus	Nucleus	c17D + ATP -> CoA -> AMP + PPi + c17DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (nonadecanoyl), nucleus	Nucleus	c19D + ATP -> CoA -> AMP + PPi + c19DCOA	EC-6.2.1.3	Fatty Acid Biosynthesis	PIPA02717 PIPA01145 PIPA03692
fatty acid-CoA ligase (undecanoyl), nucleus	Nucleus	c11D + ATP -> CoA -> AMP + PPi + c11DCOA	EC-6.2.1.3		

						PPAD5824 and PPAD3698 and PPAD3692 and PPAD3041 PPAD2354 PPAD1920
fatty-acyl CoA synthase (n-C16:0CoA)	Cytosol	3 H + malCoA + 2 NADPH + c18CoDA -> CO2 + CoA + H2O + 2 NADP + c18CoDA	EC 2.3.1.86	Fatty Acid Biosynthesis		
fatty-acyl-ACP synthase (n-C16:1ACPs), mitochondrial	Mitochondria	4 H + malACP + c18oAcF + 3 NADPH + O2 -> ACP + CO2 + 3 H2O + c181ACF + 3 NADP		Fatty Acid Biosynthesis		
						PPAD5824 and PPAD3698 and (PPAD3692 and PPAD3041) PPAD2354 PPAD1920
fatty acid synthase (n-C18:0)	Cytosol	3 H + c18o + malCoA + 2 NADPH -> CO2 + CoA + H2O + 2 NADP + c18o	EC 2.3.1.85	Fatty Acid Biosynthesis		
fatty-acyl-ACP synthase (n-C18:0ACPs), mitochondrial	Mitochondria	3 H + malACP + 2 NADPH + c18oAcF -> ACP + CO2 + H2O + 2 NADP + c18oACFP		Fatty Acid Biosynthesis		
						PPAD5824 and PPAD3698 and (PPAD3692 and PPAD3041) PPAD2354 PPAD1920
fatty-acyl CoA synthase (n-C18:0CoA)	Cytosol	3 H + malCoA + 2 NADPH + c18CoDA -> CO2 + CoA + H2O + 2 NADP + c18CoDA	EC 2.3.1.86	Fatty Acid Biosynthesis		
fatty-acyl-ACP synthase (n-C18:1ACPs), mitochondrial	Mitochondria	4 H + malACP + 3 NADPH + CO2 + c18oAcF -> ACP + CO2 + 3 H2O + 3 NADP + c181ACF		Fatty Acid Biosynthesis		
fatty-acyl-ACP synthase (n-C18:2ACPs), mitochondrial	Mitochondria	5 H + malACP + 4 NADPH + 2 O2 + c18oAcF -> ACP + CO2 + 5 H2O + 4 NADP + c182ACP		Fatty Acid Biosynthesis		
						PPAD5824 and PPAD3698 and (PPAD3692 and PPAD3041) PPAD2354 PPAD1920
fatty acid synthase (n-C8:0), lumped reaction	Cytosol	ACCDA + 8 H + 3 malCoA + 6 NADPH -> 3 CO2 + 4 CoA + 2 H2O + 6 NADP + c8Bo	EC 2.3.1.85	Fatty Acid Biosynthesis		
fatty-acyl-ACP synthase (n-C8:0ACP), mitochondrial, lumped reaction	Mitochondria	ACAPF + 9 H + 3 malACP + 6 NADPH -> 3 ACP + 3 CO2 + H2O + 6 NADP + c8BoACP		Fatty Acid Biosynthesis		
						PPAD5824 and PPAD3698 and (PPAD3692 and PPAD3041) PPAD2354 PPAD1920
						PPAD5824 and PPAD3698 and (PPAD3692 and PPAD3041) PPAD2354 PPAD1920
fructose acyl CoA synthase (n-C8:0CoA), lumped reaction	Cytosol	ACCDA + 9 H + 3 malCoA + 6 NADPH -> 3 CO2 + 3 CoA + 3 H2O + 6 NADP + ccCoA	EC 2.3.1.86	Fatty Acid Biosynthesis		
Fructose bisphosphatase aldolase	Cytosol	FDP -> DHAP + G3P	EC 4.1.2.13	Glycolysis/GLUconeogenesis		PPAD0092
D-Fructose 1-phosphate D-glyceratealdehyde 3-phosphatetase	Cytosol	FDP -> DHAP + GLYAL	EC 4.1.2.13	Glycolysis/GLUconeogenesis		PPAD0092
Fructose bisphosphatase	Cytosol	FDP -> HDG -> FDP + Pi	EC 4.1.3.11	Anaplerotic reactions		PPAD2635
Fructose 2,6-bisphosphate 1-phosphatase	Cytosol	DHAP + H2O -> FDP + Pi	EC 4.1.3.46	Purine and Nonsense Metabolism		PPAD4890
Ferrioxalates, mitochondrial	Mitochondria	Fe2 + PPPP -> 2 H + PHEME	EC 4.99.1.1	Porphyrin and Chlorophyll Metabolism		PPAD3109
formate dehydrogenase	Cytosol	FORM + NAD + CO2 + NADH	EC 1.2.1.2	Methane Metabolism		PPAD3425
formate dehydrogenase, cytosolic/mitochondrial	Cytosol	FORM[S] + H[+] <-> [cpj]O[-] <-> CO2[S] (+ qbz)[S]	EC 1.2.2.1	Oxidative phosphorylation		
High affinity iron permease involved in the transport of iron across the plasma membrane						
METhionyl-tRNA formyltransferase, mitochondrial	Mitochondria	FMt[c] -> FMt[c]		Transport, Extracellular		PPAD2525
FMN Adenylfuranferase	Cytosol	ATP + fms + H+ -> fad + PPi	EC 1.2.2.9	Folate Metabolism		PPAD5948
FMN Adenylfuranferase, mitochondrial	Cytosol	ATP + fms + H+ -> fad + PPi	EC 1.2.7.2	Riboflavin Metabolism		PPAD4726
fold, mitochondrial	Mitochondria	Zahhd + Abz -> dBP + PPi	EC 1.7.7.2	Riboflavin Metabolism		
formate transport via effluxon				Transport, Extracellular		PPAD5878
formate mitochondrial transport	Mitochondria	FORM[m] -> FORM[c]		Transport, Mitochondrial		
formate reductase, cytosolic/mitochondrial	Mitochondria	fmh2[m] -> FUM[c] -> fmh2[m] + SUCC[c]	EC 1.3.99.1	Formate Metabolism		PPAD3069
formate reductase, mitochondrial	Mitochondria	fmh2 + FUM -> fad + SUCC	EC 1.3.99.1	Formate Metabolism		
D-Fructose transport in via Proton symport	Mitochondria	FRU[c] + H[+] -> FRU[c] + H+	EC 4.3.3.2	Formate Metabolism		PPAD0236
S-formyl-Thyretetrahydrofolate cycloligase	Cytosol	STHF + ATP -> ADP + METHF + Pi	EC 4.3.3.2	Folate Metabolism		PPAD6649
S-formyl-Thyretetrahydrofolate cycloligase	Cytosol	STHF + ATP -> ADP + METHF + Pi	EC 4.3.3.2	Folate Metabolism		
S-formyl-Tetrahydrofolate-L-glutamate isomerase	Cytosol	STHF + ATP -> HDG -> STHF + ADP + Pi	EC 4.3.4.3	Folate Metabolism		
formate tetrahydrofolate ligase	Cytosol	ATP + FORM + THF -> STHF + ADP + Pi	EC 4.3.4.3	Folate Metabolism		PPAD5767
formate tetrahydrofolate ligase, mitochondrial	Mitochondria	ATP + FORM + THF -> STHF + ADP + Pi	EC 4.3.4.3	Folate Metabolism		PPAD6623
fumarsae	Cytosol	FUM + H2O -> MAL	EC 4.2.1.2	Oxidative phosphorylation		PPAD2844
fumarate, mitochondrial	Mitochondria	FUM + H2O -> MAL	EC 4.2.1.2	Oxidative phosphorylation		PPAD2844
fumarate reversible transport via symport		FUM[m] + H[+] <-> FUM[c] + H[+]		Transport, Extracellular		
						PPAD7880 PPAD0281 PPAD6049 PPAD5619 PPAD5039 PPAD0281 PPAD7880 PPAD0281 PPAD6049 PPAD5619 PPAD5039 PPAD0281 PPAD5071 PPAD0071 PPAD0930 PPAD6084 PPAD6084 PPAD2627
Glycylpid 1,2 alphaD-mannosyltransferase, Golgi apparatus	Golgi	GDHmann + m2maCOHTPPsd -> GDP + H + m3maACHTPPsd	EC 2.4.1.131	Glycoprotein Metabolism		
Glycylpid 1,2 alphaD-mannosyltransferase, Mitochondria	Mitochondria	GDHmann + m2maCOHTPPsd -> GDP + H + m3maACHTPPsd	EC 2.4.1.131	Glycoprotein Metabolism		
						PPAD0281 PPAD6049 PPAD5619 PPAD5039 PPAD0

glycine reversible transport via Proton symport	Cytosol	GLYT ⁺ + H ⁺ ↔ GLY ⁰ + H ⁺	Transport, Extracellular	PPAD20044
Glycyl-tRNA synthetase	Mitochondrion	ATP + GLY + tRNA ^{Gly} → AMP + GLYtma + PPi	EC-6.1.1.14	PPAD20701
GMP synthase	Cytosol	ATP + GLN + H ₂ O + NAD ⁺ → AMP + GLU + GMP + 2 H ⁺ + PPi	EC-6.1.1.14	PPAD2995
phosphogluconate dehydrogenase	Cytosol	6PG + NADP → CO ₂ + NADPH + r5pD	EC-6.1.1.42	PPAD2995
gmcs	Cytosol	gm + H ₂ O → GUA + NH ₃	EC-6.1.1.42	PPAD3121
geranyltransferase	Cytosol	gerP + r5p → gerP + PPi	EC-2.5.1.10	PPAD3172
guanine kinase	Cytosol	ATP + gpn → ADP + GMP + H ⁺		
guanine transport in via Proton symport	Cytosol	gpn ⁺ + H ⁺ ↔ gpn ⁰ + H ⁺		
guanine mitochondrial transport via Proton symport	Cytosol	gpn ⁺ + H ⁺ ↔ gpn ⁰ + H ⁺		
glutathione oxidoreductase	Cytosol	gthox + H ⁺ + NADPH → 2 GTHRD + NADP	EC-1.8.1.7	PPAD22399
Glutathione oxidoreductase, mitochondrial	Mitochondrion	gthox + H ⁺ + NADPH → 2 GTHRD + NADP	EC-1.8.1.7	PPAD22399
oxidized Glutathione irreversible unport	Cytosol	gthox ^{ox} → gthox ^{red}	EC-1.1.1.19	PPAD20048
Glutathione peroxidase	Cytosol	2 GTHRD + H ₂ O ₂ ↔ gthox + 2 H ₂ O	EC-1.1.1.19	PPAD20048
Glutathione synthetase	Cytosol	ATP + GLUCYS + GLY → ADP + GTHRD + H ⁺ + Pi	EC-6.3.2.3	PPAD2397
g glutamyltransferase	Cytosol	ALA + GTHRD → GLY + GLU/ALA	EC-2.3.2.2	PPAD6784
GTP cyclohydrolase I	Cytosol	GTP + H ₂ O → xIMP + FORM	EC-3.5.4.16	PPAD0046
GTP cyclohydrolase II	Cytosol	GTP + H ₂ O → 25dIPP + FORM + 2 H ⁺ + PPi	EC-3.5.4.25	PPAD0785
guanine deaminase	Cytosol	GUA + H ₂ O → xAM + NH ₃	EC-3.5.4.3	PPAD2406
guanine phosphoribosyltransferase	Cytosol	GUA + PRP → GMP + PPi		PPAD3308
guanine reversible transport via Proton symport	Cytosol	GUA ⁺ + H ⁺ ↔ GUA ⁰ + H ⁺		PPAD1906
guanine mitochondrial transport via diffusion	Cytosol	GUA ⁰ ↔ GUA ⁰		
H ₂ O transport via diffusion	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
H ₂ O endoplasmic reticulum transport	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
H ₂ O transport, mitochondrial	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
H ₂ O transport, nuclear	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
water transport by diffusion, peroxisomal	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
H ₂ O transport, vacuolar	Cytosol	H ₂ O ⁰ ↔ H ₂ O ⁰		PPAD26257
3-hydroxyacyl-CoA dehydrogenase (3-oxoacyl-CoA), peroxisomal	Peroxisome	3hcCOA + NAD ↔ 3hcCOA + H ⁺ + NADH	EC-1.1.1.35	PPAD0744
3-hydroxyacyl-CoA dehydrogenase (3-oxoacyl-CoA), peroxisomal	Peroxisome	3hcCOA + H ⁺ + NADH ↔ 3hcCOA + NAD	EC-1.1.1.35	PPAD0744
3-hydroxyacyl-CoA dehydrogenase (3-oxoacyl-CoA), peroxisomal	Peroxisome	3hcCOA + H ⁺ + NADH ↔ 3hcCOA + NAD	EC-1.1.1.35	PPAD0744
3-hydroxyacyl-CoA dehydrogenase (3-oxoacyl-CoA), peroxisomal	Peroxisome	3hcCOA + H ⁺ + NADH ↔ 3hcCOA + NAD	EC-1.1.1.35	PPAD0744
3-hydroxyacyl-CoA dehydrogenase (3-oxoacyl-CoA), peroxisomal	Peroxisome	3hcCOA + H ⁺ + NADH ↔ 3hcCOA + NAD	EC-1.1.1.35	PPAD0744
3-hydroxyacyl-CoA dehydrogenase, peroxisomal	Peroxisome	3hcCOA + NAD ↔ 3hcCOA + H ⁺ + NADH	EC-1.1.1.35	PPAD0744
homeocarnitine hydratase, mitochondrial	Mitochondrion	b24Hc + H ₂ O ↔ HCIT	EC-4.2.1.36	PPAD1619
hydroxybenzoate octaprenyltransferase	Cytosol	4Hc + cCTOP_5 → 3cHb_5 + PPi		PPAD7346
Hydroxybenzoate octaprenyltransferase, mitochondrial	Mitochondrion	4Hc + cCTOP_5 → 3cHb_5 + PPi		PPAD4318
homocitrinate synthase, mitochondrial	Cytosol	ACCOA + ARG + H ₂ O → COA + H ⁺ + HCIT	EC-4.1.3.21	PPAD1095
homocysteine 3-METHytransferase	Mitochondrion	ACCOA + ARG + H ₂ O → COA + H ⁺ + HCIT	EC-4.1.3.21	PPAD1705
Homocysteine peroxisomal transport via Proton symport	Cytosol	CO ₂ + H ₂ O ↔ H ⁺ + HCO ₃		
HexAdecanate (n C16:0) transport in via unport	Nucleus	CO ₂ + H ₂ O ↔ H ⁺ + HCO ₃		
hexAdecanate (n C16:1) transport in via unport	Nucleus	CO ₂ + H ₂ O ↔ H ⁺ + HCO ₃		
hydroxyethylthiazole kinase	Cytosol	4hmthz + ATP → 4mthz + ADP + H ⁺	EC-2.7.1.50	PPAD2662
hexokinase (D-Glucose/ATP)	Cytosol	ATP + GLC ↔ ADP + GGP + H ⁺	EC-2.7.1.1	PPAD5524
hexokinase (D-Fructose/ATP)	Cytosol	ATP + fma → ADP + F + H ⁺	EC-2.7.1.1	PPAD5821
homomiscroate dehydrogenase, mitochondrial	Mitochondrion	ATP + FRU → ADP + FRP + H ⁺	EC-2.7.1.1	PPAD5524
histidine mitochondrial transport via Proton symport	Cytosol	HCT + H ⁺ ↔ H ⁺ + NADH + NADP	EC-1.1.1.87	PPAD4242
histidine reversible transport via Proton symport	Cytosol	H ⁺ + H ⁺ ↔ H ⁺ + H ⁺		PPAD2307
histidinol dehydrogenase	Cytosol	NH ₂ + H ₂ O → H ⁺ + H ₂ O		PPAD0044
histidinol phosphate	Cytosol	H ₂ O + H ₂ O → H ₂ O + H ₂ O		PPAD20283
Histidyl-tRNA synthetase	Cytosol	ATP + H ⁺ + tRNA ^{His} → AMP + H ₂ ma + PPi	EC-6.1.1.21	PPAD1390
histidyl-tRNA synthetase, mitochondrial	Mitochondrion	ATP + H ⁺ + tRNA ^{His} → AMP + H ₂ ma + PPi	EC-6.1.1.21	PPAD7235
hydroxy-lysinine hydratase	Cytosol	H ₂ O + H ₂ O → 3hant + ALA	EC-4.1.1.21	PPAD7336
hydroxyMETHylthylane synthase	Cytosol	H ₂ O + 4PPing → Hmbil + 4 NH ₃	EC-4.1.1.8	PPAD5855
HydroxyMETHylglutaryl CoA reductase	Cytosol	2 H + hmgCOA ↔ 2 NADPH + COA + MEV + 2 NADP	EC-1.1.1.34	PPAD4716
HydroxyMETHylglutaryl CoA synthase	Cytosol	COA + H + hmgCOA ↔ aACOA + ACCOA + H ₂ O	EC-4.1.1.5	PPAD5179
HydroxyMETHylglutaryl CoA synthase, mitochondrial	Mitochondrion	COA + H + hmgCOA ↔ aACOA + ACCOA + H ₂ O	EC-4.1.1.5	PPAD5179
HydroxyMETHylglutaryl-CoA reversible mitochondrial transport	Cytosol	hmgCOA ⁰ ↔ hmgCOA ⁰		PPAD2603
hydroxyMETHylglymidine kinase (ATP)	Cytosol	4hmmp + ATP → 4AMPh + ADP + H ⁺	EC-2.7.1.49	PPAD2107
2-amino-4-hydroxy-6-hydroxymethylThiophosphorindine diphosphokinase, mitochondrial	Mitochondrion	2ahmp + ATP → 2ahmp + AMP + H ⁺	EC-2.7.6.3	PPAD2878
L-hydroxyproline reductase (NAD)	Cytosol	1P3Hc + 2 H ⁺ + NADH → 4hP3D ⁺ + NAD	EC-1.5.1.2	PPAD2182
L-hydroxyproline reductase (NADP)	Cytosol	1P3Hc + 2 H ⁺ + NADH → 4hP3D ⁺ + NADP	EC-1.5.1.2	PPAD2182
L-hydroxyproline dehydrogenase (NAD), mitochondrial	Mitochondrion	4hP3D ⁺ + NAD → 1P3Hc + 2 H ⁺ + NADH	EC-1.5.1.2	PPAD0869
L-hydroxyproline dehydrogenase (NADP), mitochondrial	Mitochondrion	4hP3D ⁺ + NADP → 1P3Hc + 2 H ⁺ + NADH	EC-1.5.1.2	PPAD0869
homoserine dehydrogenase (NADP), irreversible	Cytosol	ASP ₃ + H ⁺ + NADH → Homs + NADP	EC-1.1.1.3	PPAD2083
homoserine dehydrogenase (NADP), irreversible	Cytosol	ASP ₃ + H ⁺ + NADH → Homs + NADP	EC-1.1.1.3	PPAD2083
homoserine D-trans-acylase, nucleos	Cytosol	ACCOA + Homs → ACCSER + COA	EC-2.3.1.13	PPAD4443
homoserine kinase	Cytosol	ATP + Homs → ADP + H ⁺ + PPNGER	EC-2.7.1.39	PPAD1932
histidinol phosphate transaminase	Cytosol	GLU + hmbil → ARG + H ₂ O	EC-2.6.1.9	PPAD0673
hypoxanthine reversible transport via Proton symport	Cytosol	NH ₂ + H ₂ ma ↔ H ⁺ + H ₂ ma		
hexokinase (D-Glucose/ATP)	Cytosol	GAM + ATP ↔ GAMP + ADP + H ⁺	EC-2.7.1.1	PPAD5524
hypoxanthine phosphoribosyltransferase (Hypoxanthine)	Cytosol	HSAH + PRP → AMP + PPi	EC-2.4.2.8	PPAD3308
hypothetical enzyme	Cytosol	H ₂ O + PyanSP → Pi + Pydam		
isocitrate dehydrogenase (NAD ⁺), mitochondrial	Mitochondrion	ICT + NAD ⁺ → ARG + CO ₂ + NADH	EC-1.1.1.41	PPAD1814
isocitrate dehydrogenase (NADP)	Cytosol	ICT + NADP ⁺ → ARG + CO ₂ + NADPH	EC-1.1.1.42	PPAD1886
isocitrate dehydrogenase (NADP), mitochondrial	Mitochondrion	ICT + NADP ⁺ → ARG + CO ₂ + NADPH	EC-1.1.1.42	PPAD2575
isocitrate lyase	Cytosol	ICT → GLA + SUCC	EC-4.1.1.1	PPAD3379
indole 3-acetylserine mitochondrial transport via diffusion	Cytosol	iSAC ⁰ ↔ iSAC ⁰		
indoleacetyl-glycyl-5-phosphate synthase	Cytosol	GLA + PRP → ACAR + cGSP + GLU + H ⁺	EC-2.3.1.13	PPAD5103
indoleacetylserine dehydrogenase	Cytosol	2cSP + H ₂ O → iNaCP	EC-4.2.1.19	PPAD2683
indole 3-glycerol-phosphate synthase	Cytosol	iNaCP + H ₂ O → 3cGP + CO ₂ + H ₂ O	EC-4.1.1.8	PPAD2453
L-isoleucine reversible transport via Proton symport	Cytosol	NH ₂ + LEU ↔ H ⁺ + LEU		
isoleucine transaminase	Cytosol	ARG + LEU → 3MEP + GLU	EC-2.6.1.42	PPAD6648
isoleucine transaminase, mitochondrial	Mitochondrion	ARG + LEU → 3MEP + GLU	EC-2.6.1.42	PPAD6648
isoleucyl-tRNA synthetase	Cytosol	ATP + LEU + tRNA ^{Ile} → AMP + ILEtma + PPi	EC-6.1.1.5	PPAD1499
isoleucyl-tRNA synthetase, mitochondrial	Mitochondrion	ATP + LEU + tRNA ^{Ile} → AMP + ILEtma + PPi	EC-6.1.1.5	PPAD1499
IMP cyclohydrolase	Cytosol	H ₂ O + IMP → NACAR	EC-3.1.1.3	PPAD0700
IMP dehydrogenase	Cytosol	H ₂ O + IMP + NAD ⁺ → H ⁺ + NADH + NMP	EC-1.1.1.205	PPAD1619
indole 3-acetylserine mitochondrial transport via diffusion	Cytosol	iSAC ⁰ ↔ iSAC ⁰		
indole 3-pyruvate carboxylase	Cytosol	H + iNaCP ↔ CO ₂ + iSACAL	EC-4.1.1.74	PPAD0951
indole 3-pyruvate carboxylase	Nucleus	H + iNaCP ↔ CO ₂ + iSACAL	EC-4.1.1.74	PPAD0951
isoinosine kinase	Cytosol	ATP + iio → ADP + iMP	EC-2.7.1.73	PPAD26257
inosine transport in via Proton symport	Cytosol	H ⁺ + iio ↔ H ⁺ + iio		
inosine transport in via Proton symport	Cytosol	H ⁺ + iio ↔ H ⁺ + iio		
isopentenylpyrophosphate 2 isomerase, nucleus	Nucleus	IPP ↔ iPPP	EC-5.3.3.2	PPAD3690
3-isopropylmalate dehydrogenase	Cytosol	3cIPm + NAD ⁺ → 3cAMP + H ⁺ + NADH	EC-1.1.1.85	PPAD1173
3-isopropylmalate dehydrogenase	Cytosol	3cIPm + NAD ⁺ → 3cAMP + H ⁺ + NADH	EC-1.1.1.85	PPAD1173
2-isopropylmalate hydratase	Cytosol	2IPm + H ₂ O → 3cIPm	EC-4.2.1.33	PPAD4056
2-isopropylmalate synthase	Cytosol	3MOR + ACCOA + H ₂ O → 3cIPm + COA + H ⁺	EC-2.3.1.13	PPAD2487
2-isopropylmalate synthase, mitochondrial	Mitochondrion	3MOR + ACCOA + H ₂ O → 3cIPm + COA + H ⁺	EC-2.3.1.13	PPAD2487
Itaconate-CoA ligase (ADP-forming), mitochondrial	Mitochondrion	ATP + COA + iACoN ↔ ADP + iACoA + Pi	EC-6.2.1.5	PPAD2391
acetylhydrazine acyl isomerase, mitochondrial	Mitochondrion	ALACS + H ⁺ + NADPH ↔ 23dHm + NADP	EC-1.1.1.86	PPAD0868
ketol-acid reductoisomerase (2-Aceto-L-hydroxybutyrate), mitochondrial	Mitochondrion	Zahb1 + H ⁺ + NADPH ↔ 23dHm + NADP	EC-1.1.1.86	PPAD1365
3-ketacyl-CoA thiolase, peroxisomal	Peroxisome	3kACOa + COA → ACCOA + ACCOA	EC-2.3.1.16	PPAD1063
potassium reversible transport via Proton symport	Cytosol	NH ₂ + H ₂ ma ↔ H ⁺ + H ₂ ma		
Putative K/H ⁺ antiporter with a Probable role in intracellular cation homeostasis	Cytosol	K ⁺ + H ₂ ma ↔ H ⁺ + H ₂ ma		
kyurenaminase	Cytosol	LYNer + H ₂ O → ALA + anth + H ⁺	EC-3.7.1.3	PPAD2626
kyurenamine 3-monooxygenase	Cytosol	LYNer + H ⁺ + NADPH + O ₂ → H ₂ O + H ₂ Yer + NADP	EC-1.14.13.9	PPAD1128
lactaldolase dehydrogenase, mitochondrial	Mitochondrion	H ₂ O + LAULd + NAD ⁺ → 2 H ⁺ + H ₂ + NADH	EC-1.1.2.12	PPAD1584
Leucine reversible transport via Proton symport	Cytosol	NH ₂ + LEU ↔ H ⁺ + LEU		
leucine transaminase	Cytosol	ARG + LEU → AMP + GLU	EC-2.6.1.42	PPAD6648
leucine transaminase, mitochondrial	Mitochondrion	ARG + LEU → AMP + GLU	EC-2.6.1.42	PPAD6648
leucyl-tRNA synthetase	Cytosol	ATP + LEU + tRNA ^{Leu} → AMP + LEUtma + PPi	EC-6.1.1.4	PPAD6030
leucyl-tRNA synthetase, mitochondrial	Mitochondrion	ATP + LEU + tRNA ^{Leu} → AMP + LEUtma + PPi	EC-6.1.1.4	PPAD6030
lactate/Glutathione lyase	Cytosol	GTHRD + METHGls → LGT	EC-4.4.1.5	PPAD5752
lactate dehydrogenase, mitochondrial	Mitochondrion	2 FCYTC + iLCL → 2 FCYTC + PR	EC-1.1.2.3	PPAD5538
Lactate reversible transport via Proton symport	Cytosol	NH ₂ + iLCL ↔ H ⁺ + iLCL		
cystathionine b-lase	Cytosol	lct + H ₂ O → HCS + NH ₄ + PR	EC-4.4.1.8	PPAD4067
cytochrome P-450 isomerase	Peroxisome	lct + H ₂ O → HCS + NH ₄ + PR	EC-4.4.1.8	PPAD4067
lanoster synthase	Cytosol	2 H + lanOS + 3 H ₂ AMP + 3 O ₂ → 44dncr + FORM + 4 H ₂ O + 3 NADP	EC-5.4.99.7	PPAD6577
lipid phosphate phosphatase	Cytosol	dagP + H ₂ O → H ⁺ + PA + Pi		PPAD2615
Lysine mitochondrial transport via Proton symport	Cytosol	H ⁺ + LYS ⁰ ↔ H ⁺ + LYS ⁰		PPAD2307
Lysine reversible transport via Proton symport	Cytosol	H ⁺ + LYS ⁰ ↔ H ⁺ + LYS ⁰		PPAD0712
lysl-tRNA synthetase	Cytosol	ATP + LYS + tRNA ^{Lys} → AMP + LYSma + PPi	EC-6.1.1.6	PPAD0044
lysyl-tRNA synthetase, mitochondrial	Mitochondrion	ATP + LYS + tRNA ^{Lys} → AMP + LYSma + PPi	EC-6.1.1.6	PPAD3440
malate/oxaloacetate shuttle	Cytosol	MAL ⁰ + OMA ⁰ ↔ MAL ⁰ + OMA ⁰		
malate synthase	Cytosol	ACCOA + GLA + H ₂ O → COA + H ⁺ + MAL	EC-2.3.1.9	PPAD1789
L-malate reversible transport via Proton symport	Cytosol	NH ₂ + MAL ⁰ ↔ H ⁺ + MAL ⁰		
malate transport, mitochondrial	Cytosol	MAL ⁰ + H ₂ ma ↔ H ⁺ + MAL ⁰		PPAD1441
malate transport in via Proton symport	Cytosol	NH ₂ + mal ⁰ ↔ H ⁺ + mal ⁰		
mannose 1-phosphate guanylyltransferase	Cytosol	GTP + H ⁺ + man1P → GDPman + PPi	EC-2.7.7.13	PPAD2637
mannose 6-phosphate isomerase	Cytosol	GTP ↔ GDP	EC-5.3.1.8	PPAD2352
mannan endoplasmic reticulum transport via diffusion	Cytosol	manan ⁰ ↔ manan ⁰		
D-Mannitol NAD ⁺ 2-oxidoreductase	Cytosol	manol + NAD ⁺ ↔ FRU + NADH + H ⁺	1.1.1.67	PPAD0378
D-mannose transport in via Proton symport	Cytosol	NH ₂ + man ⁰ ↔ H ⁺ + man ⁰		PPAD0236
2-Methylcitrate dehydratase, mitochondrial	Mitochondrion	HCIT ↔ b24Hc + H ₂ O	EC-4.2.1.36	PPAD1619
Malonyl-CoA ACP transacylase	Cytosol	ACP + malCOA ↔ COA + malACP	EC-2.3.1.39	PPAD2394
Malonyl-CoA ACP transacylase, mitochondrial	Mitochondrion	ACP + malCOA ↔ COA + malACP	EC-2.3.1.39	PPAD3605
malate dehydrogenase	Cytosol	MAL + NAD ⁺ ↔ H ⁺ + NADH + OAA	EC-1.1.1.37	PPAD2539
malate dehydrogenase, mitochondrial	Mitochondrion	MAL + NAD ⁺ ↔ H ⁺ + NADH + OAA	EC-1.1.1.37	PPAD2539
malate dehydrogenase, peroxisomal	Peroxisome	MAL + NAD ⁺ ↔ H ⁺ + NADH + OAA	EC-1.1.1.37	PPAD2539
malic enzyme (NAD), mitochondrial	Mitochondrion	MAL + NAD ⁺ ↔ CO ₂ + NADH + PR	EC-1.1.1.38	PPAD5751
malic enzyme (NADP), mitochondrial	Mitochondrion	MAL + NADP ⁺ ↔ CO ₂ + NADPH + PR	EC-1.1.1.38	PPAD5751
malic acid transport in via symport	Cytosol	NH ₂ + mal ⁰ ↔ H ⁺ + mal ⁰		PPAD4997
METHionine transport	Cytosol	met ⁰ ↔ met ⁰		
METHionine ADEnosyltransferase	Cytosol	ADP + MET → MET + SAM + Pi	EC-2.5.1.6	PPAD0230
MTA	Cytosol	ADCSER + CYS + iCet + H ⁺	EC-2.5.1.48	PPAD0789
OKSuccinyl-homoserine hydrogen sulfide	Cytosol	SUChm + H ₂ S → HCS + SUCC	EC-2.5.1.48	PPAD0789
METHionine synthase	Cytosol	SuTHr + HCS → MET + THF	EC-2.1.1.13	PPAD3396
METHionine synthase, mitochondrial	Mitochondrion	SuTHr + HCS → MET + THF	EC-2.1.1.13	PPAD3396
METHionine mitochondrial transport via Proton symport	Cytosol	NH ₂ + MET ⁰ ↔ H ⁺ + MET ⁰		PPAD0304
L-METHionine reversible transport via Proton symport	Cytosol	NH ₂ + MET ⁰ ↔ H ⁺ + MET ⁰		PPAD4071
METHionyl-tRNA synthetase	Cytosol	ATP + MET + tRNA ^{Met} → AMP + METtma + PPi	EC-6.1.1.10	PPAD2621
METHionyl-tRNA synthetase, mitochondrial	Mitochondrion	ATP + MET + tRNA ^{Met} → AMP + METtma + PPi	EC-6.1.1.10	PPAD4071
mevalonate kinase (ap)	Cytosol	ATP + MEV → SPMev + ADP + H ⁺	EC-2.7.1.36	

myo-inositol 1-phosphate synthase	Cytosol	GGP → mIPO	EC-5.5.1.4	phospholipid Biosynthesis	PPAP02488
5,10-METHylenetetrahydrofolate transport, diffusion, mitochondrial		MLTHF[c] ↔ MLTHF[m]		Transport, Mitochondrial	
5-methylthioinosine permease		NHc] + mMTEf[a] → Hc] + mMTEf[c]		Transport, Extracellular	
Divalent METal ion transporter involved in manganese homeostasis, low affinity manganese transporter (gbln8)		mIn[c] ↔ mIn[c]		Transport, Extracellular	PPAP01019
3-METHylo succinate dehydrogenase/MTF-transferase	Cytosol	3MDH + H2O + MLTHF → 2dHP + THF	EC-2.1.2.11	Pantothenate and CoA Biosynthesis	PPAP03300
METhylenetetrahydrofolate cyclohydrolase	Cytosol	H2O + MLTHF ↔ 10THF	EC-3.5.4.9	Folate Metabolism	PPAP09767
METhylenetetrahydrofolate cyclohydrolase, mitochondrial	Mitochondria	H2O + MLTHF ↔ 10THF	EC-3.5.4.9	Folate Metabolism	PPAP06231
METhylenetetrahydrofolate dehydrogenase (NADP)	Cytosol	MLTHF + NADP → H + METHF + NADPH	EC-1.5.1.5	Folate Metabolism	PPAP07972
METhylenetetrahydrofolate dehydrogenase (NADH)	Cytosol	MLTHF + NADH → H + METHF + NADH	EC-1.5.1.15	Folate Metabolism	PPAP01003
METhylenetetrahydrofolate dehydrogenase (NADP), mitochondrial	Mitochondria	MLTHF + NADP ↔ H + METHF + NADPH	EC-1.5.1.5	Folate Metabolism	PPAP06232
5,3,1-METHylenetetrahydrofolate reductase (NADph)	Cytosol	H + MLTHF + NADPH → 5mTHF + NADP	EC-1.5.1.20	Folate Metabolism	PPAP04221
N-Acetylaminobiotin:NAD+ oxidoreductase	Cytosol	H2O + NADH + biotin → NAD + acbiotin + 2 H+ + NADH	EC-1.2.1.3	Other Amino Acid Metabolism	PPAP05164
NADH dehydrogenase, cytosolic/mitochondrial	Mitochondria	Nc] + NADH[c] + q[ein] → NAD[c] + q[ein2]n	EC-1.6.99.3	Oxidative phosphorylation	PPAP03697
NADH dehydrogenase, mitochondrial	Mitochondria	H + NADH + q[e] → NAD + q[e]2	EC-1.6.99.3	Oxidative phosphorylation	PPAP02354
NAD kinase	Cytosol	ATP + NAD → ADP + H + NADP	EC-2.7.1.23	NAD Biosynthesis	PPAP01684
NAD kinase, mitochondrial	Mitochondria	ATP + NAD → ADP + H + NADP	EC-2.7.1.23	NAD Biosynthesis	PPAP08918
NAD kinase, nucleus	Nucleus	ATP + NAD → ADP + H + NADP	EC-2.7.1.23	NAD Biosynthesis	PPAP08918
NAD nucleosidase	Cytosol	H2O + NAD → ADPRib + H + ncam	EC-3.2.2.5	NAD Biosynthesis	PPAP04579
NAD nucleosidase, mitochondrial	Mitochondria	H2O + NAD → ADPRib + H + ncam	EC-3.2.2.5	NAD Biosynthesis	PPAP04567
NADP phosphatase	Cytosol	H2O + NADP → NAD + Pi	EC-3.2.2.5	NAD Biosynthesis	
NADP phosphatase	Mitochondria	H2O + NADP → NAD + Pi	EC-3.2.2.5	NAD Biosynthesis	
NAD synthase (n83)	Cytosol	ATP + dNAD + NH4 → AMP + H + NAD + PPi	EC-6.3.1.5	NAD Biosynthesis	PPAP02871
NAD synthase (n83), mitochondrial	Mitochondria	ATP + dNAD + NH4 → AMP + H + NAD + PPi	EC-6.3.1.5	NAD Biosynthesis	PPAP02871
NAPRTase	Cytosol	H + nAc + PRPP → nCERN + PPi	EC-2.4.2.11	NAD Biosynthesis	PPAP02128
NAPRTase, mitochondrial	Mitochondria	H + nAc + PRPP → nCERN + PPi	EC-2.4.2.11	NAD Biosynthesis	PPAP02128
sodium Proton antiporter (pNNA 1.1)	Cytosol	NHc] + na1S[c] ↔ Hc] + na1S[m]	EC-6.3.1.6	Transport, Extracellular	PPAP02547
nucleoside(diphosphate) (GDP)	Cytosol	GDP + H2O → GMP + H + Pi	EC-3.6.1.6	Nucleotide Salvage Pathways	
nucleoside(diphosphate) (GDP), Golgi apparatus	Golgi	GDP + H2O → GMP + H + Pi	EC-3.6.1.6	Nucleotide Salvage Pathways	
nucleoside(diphosphate) (GDP)	Cytosol	dGDP + H2O → dGMP + H + Pi	EC-3.6.1.6	Nucleotide Salvage Pathways	
nucleoside(diphosphate) kinase (ATP:GDP)	Cytosol	ATP + GDP → ADP + GTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:dGDP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:UTP)	Cytosol	ATP + UTP ↔ ADP + UTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:UTP)	Cytosol	ATP + UTP ↔ ADP + UTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:CTP)	Cytosol	ATP + CTP ↔ ADP + CTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:CTP)	Cytosol	ATP + CTP ↔ ADP + CTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:ATP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:ATP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:ATP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:ATP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
nucleoside(diphosphate) kinase (ATP:ATP)	Cytosol	ATP + dGDP ↔ ADP + dGTP	EC-2.7.4.6	Nucleotide Salvage Pathways	PPAP00550
ammonia reversible transport		NH4[c] ↔ NH4[m]		Transport, Extracellular	PPAP00855
NH3 mitochondrial transport		NH4[c] ↔ NH4[m]		Transport, Mitochondrial	PPAP00634
ammonia peroxisomal transport		NH4[c] ↔ NH4[m]		Transport, Peroxisomal	
nicotinamide nucleotide Adenyltransferase, mitochondrial	Mitochondria	ATP + H + ncam + NAD → PPi	EC-2.7.1.1	NAD Biosynthesis	PPAP02263
NMN mitochondrial transport via Proton symport		Nc] + nmIn[c] ↔ Hc] + nmIn[m]		Transport, Mitochondrial	
NMN peroxisomal transport via Proton symport		Nc] + nmIn[c] ↔ Hc] + nmIn[m]		Transport, Peroxisomal	
nemr		NHc] + nmIn[c] ↔ Hc] + nmIn[m]		Transport, Extracellular	
nicotinamide, reversible	Cytosol	H2O + ncam ↔ nAc + NH4	EC-3.5.1.19	NAD Biosynthesis	PPAP03003
nicotinamide, reversible, mitochondrial	Mitochondria	H2O + ncam ↔ nAc + NH4	EC-3.5.1.19	NAD Biosynthesis	PPAP03003
nicotinate-nucleotide Adenyltransferase	Cytosol	ATP + H + nCERN → dNAD + PPi	EC-2.7.7.18	NAD Biosynthesis	PPAP02063
nicotinate-nucleotide Adenyltransferase, mitochondrial	Mitochondria	ATP + H + nCERN → dNAD + PPi	EC-2.7.7.18	NAD Biosynthesis	PPAP02063
nicotinate-nucleotide diphosphorylase (Carboxylating)	Cytosol	2 H + PRPP + q[ein] → CDD + nCERN + PPi	EC-2.4.2.19	NAD Biosynthesis	PPAP03406
nicotinate-nucleotide diphosphorylase (Carboxylating), mitochondrial	Mitochondria	2 H + PRPP + q[ein] → CDD + nCERN + PPi	EC-2.4.2.19	NAD Biosynthesis	PPAP03406
5' nucleotidase (dAMP)	Cytosol	dUMP + H2O → dUMP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (dMP)	Cytosol	H2O + dUMP → Pi + dUMP	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (UMP)	Cytosol	H2O + dUMP → Pi + dUMP	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (UMP)	Cytosol	H2O + dUMP → Pi + dUMP	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (dCMP)	Cytosol	dCMP + H2O → dUMP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (CMP)	Cytosol	CMP + H2O → dUMP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (dTMP)	Cytosol	dTMP + H2O → dUMP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (dAMP)	Cytosol	dAMP + H2O → dADP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (AMP)	Cytosol	AMP + H2O → dADP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (dGMP)	Cytosol	dGMP + H2O → dGDP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
5' nucleotidase (GMP)	Cytosol	GMP + H2O → dGDP + Pi	EC-3.1.3.5	Nucleotide Salvage Pathways	
Inosine 5' triphosphate pyrophosphohydrolase	Cytosol	ITP + H2O → dUMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	
Guanosine 5' triphosphate pyrophosphohydrolase	Cytosol	UTP + H2O → dUMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	
Uridine triphosphate pyrophosphohydrolase	Cytosol	UTP + H2O → dUMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	
2'Deoxyguanosine 5' triphosphate diphosphohydrolase	Cytosol	dGTP + H2O → dGMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	PPAP03380
dUTP nucleosidylylase	Cytosol	dUTP + H2O → dUMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	PPAP03380
dTTP pyrophosphohydrolase	Cytosol	dTTP + H2O → dUMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	
2'Deoxyinosine 5' triphosphate pyrophosphohydrolase	Cytosol	dITP + H2O → dIMP + PPi	EC-3.6.1.19	Nucleotide Salvage Pathways	
nucleoside triphosphatase (CTP)	Cytosol	CTP + H2O → GDP + H + Pi	EC-3.6.1.15	Nucleotide Salvage Pathways	
nucleoside triphosphatase (GCTP)	Cytosol	dGTP + H2O → dGDP + H + Pi	EC-3.6.1.15	Nucleotide Salvage Pathways	
nitrilase	Cytosol	2 H2O + ind3AcH → ind3AC + NH4	EC-3.5.5.1	Nitrogen Metabolism	PPAP01914
nitrilase	Cytosol	nPROD + 2 H2O → ALA + NH4	EC-3.5.5.1	Other Amino Acid Metabolism	PPAP03038
nitrilase	Cytosol	AcHyb + 2 H2O → GLU + NH4	EC-3.5.5.1	Other Amino Acid Metabolism	PPAP01914
O2 transport (diffusion)		O2[m] ↔ O2[c]		Transport, Extracellular	PPAP01914
O2 endoplasmic reticulum transport		O2[c] ↔ O2[e]		Transport, Endoplasmic Reticulum	
O2 transport (diffusion)		O2[c] ↔ O2[m]		Transport, Mitochondrial	
oxalacetate transport, mitochondrial	Mitochondria	Nc] + dNADc] ↔ Hc] + dNAD[m]	EC-2.1.3.3	Arginine and Proline Metabolism	PPAP01002
ornithine carbamoyltransferase, irreversible, mitochondrial	Mitochondria	dCP + ORN → CTRH + H + Pi	EC-2.1.3.3	Arginine and Proline Metabolism	PPAP05996
Oxalacetate (in C18:2) transport in via uniport		C18[2]c] ↔ C18[2]		Transport, Extracellular	
Oxalacetate (in C18:2) transport in via uniport		C18[2]c] ↔ C18[2]		Transport, Extracellular	
all-trans-Octaprenyl diphosphate		octDP_3S[c] ↔ octDP_5[m]		Transport, Mitochondrial	
Diphospho-6-hydroxy-2-nitroacetyl-L-2-oxidoacetate aminotransferase	Cytosol	GLU + dOPS ↔ nAc + PRHr	EC-2.6.1.52	Pyridoxine Metabolism	PPAP02592
2-oxaprenyl-6-hydroxyphenol Methylase, nuclear	Nucleus	2dHPH_5 + SAM → 2dmPH_5 + AHCVS + H	EC-2.6.1.52	Quinone Biosynthesis	PPAP04608
2-Oxaprenyl-6-METHoxybenzoyl Methylase, mitochondrial	Mitochondria	2dmbl_5 + SAM → 2dmbl_5 + AHCVS + H	EC-2.6.1.52	Quinone Biosynthesis	PPAP04608
2-Oxo-4-METHylo-3-carboxybenzoate decarboxylation	Cytosol	3-CMBOP → H + AMOP + CO2		Valine, Isoleucine, and Isoleucine Metabolism	PPAP06448
2-Oxo-4-METHylo-3-carboxybenzoate decarboxylation, mitochondrial	Mitochondria	3-CMBOP → H + AMOP + CO2		Valine, Isoleucine, and Isoleucine Metabolism	PPAP06448
2-Oxaprenyl-3-METHylo-6-METHoxy-L-4-benzoyl hydroxylase mitochondrial	Mitochondria	2dmbl_5 + 0.5 O2 → 2dmbl_5_5	EC-1.1.2.3	Quinone Biosynthesis	PPAP03775
ORNT1:5' phosphate decarboxylase	Mitochondria	H + ORNTP → CDD + GMP	EC-4.1.1.23	Purine and Pyrimidine Biosynthesis	PPAP09709
2-oxaprenyl-6-METHoxyphenol hydroxylase, mitochondrial	Mitochondria	2dmPH_5 + 0.5 O2 → 2dmbl_5	EC-1.1.2.3	Quinone Biosynthesis	PPAP03775
Octaprenyl hydroxylase/oxalate decarboxylase	Cytosol	3dPHL_5 + H → 2dPHL_5 + CO2	EC-1.1.2.3	Quinone Biosynthesis	PPAP03775
2-Oxaprenylphenol hydroxylase	Cytosol	2dPHL_5 + 0.5 O2 → 2dPHL_5	EC-1.1.2.3	Quinone Biosynthesis	PPAP03775
Ornithine Decarboxylase	Cytosol	H + ORN → CO2 + Pnc	EC-4.1.1.17	Arginine and Proline Metabolism	PPAP02292
Ornithine Decarboxylase, nucleus	Nucleus	H + ORN → CO2 + Pnc	EC-4.1.1.17	Arginine and Proline Metabolism	PPAP02292
ornithine reversible transport in via Proton symport		NHc] + ORN[c] ↔ Hc] + ORN[m]		Transport, Extracellular	PPAP02292
ornithine mitochondrial transport via Proton antiport		NHc] + ORN[c] ↔ Hc] + ORN[m]		Transport, Mitochondrial	PPAP02292
ornithine transaminase		ARG + ORN → GLU + GLUSAc		Transport, Extracellular	PPAP02292
ornithine transacylase, irreversible, mitochondrial	Mitochondria	ARG + ORN → ACGLU + ORN	EC-2.1.3.3	Arginine and Proline Metabolism	PPAP02292
ORNT1:5' phosphobutyryltransferase	Cytosol	ORNT1P + PR ↔ ORNT + PRP	EC-2.1.3.3	Arginine and Proline Metabolism	PPAP02292
non-enzymatic reaction, mitochondrial	Mitochondria	H + oaq ↔ 2naADP + CO2	1.1.87	Threonine and Lysine Metabolism	PPAP04242
2-oxocarboxylate transporter, mitochondrial		ARG(m) + naMSG[c] ↔ ARG(m) + naMSG[m]		Transport, Mitochondrial	PPAP04242
1-pyrene-5-carboxylate dehydrogenase, mitochondrial	Mitochondria	1PR5C + 2 H2O → GLU + H + NADH	1.1.12	Glutamate Metabolism	PPAP08069
pyruvate 5-carboxylate reductase		1PR5C + 2 H+ + NADPH ↔ NADP + Pnc	EC-1.5.1.2	Arginine and Proline Metabolism	PPAP02182
phosphatidate kinase	Cytosol	ATP + d1D 1A → ADP + d1D 1dP		phospholipid Biosynthesis	
panthetheine 4'-phosphate reversible mitochondrial transport		PANP[c] ↔ PANP[m]		Transport, Mitochondrial	
panthetheine synthase		3dLA + ATP + PANT → AMP + H + PNTD + Pi	EC-6.3.2.1	Pantothenate and CoA Biosynthesis	PPAP02467
panthetheine mitochondrial transport		PANT[c] ↔ PANT[m]		Transport, Mitochondrial	
phosphoAdenylSulfate reductase (Thioredoxin)	Cytosol	PAPS + TRDSD → 2 H+ + PAP + SDS + TRDOX	EC-1.8.4.8	Cysteine Metabolism	PPAP04082
PAP reversible unport		PAP[c] ↔ PAP[m]		Transport, Extracellular	
Adenosine 3',5'-bisphosphate mitochondrial transport		PAP[c] ↔ PAP[m]		Transport, Mitochondrial	
pyruvate carboxylase	Cytosol	ATP + HCO3- + PR → ADP + H + OAA + Pi	EC-6.4.1.1	Anaplerotic reactions	PPAP00584
Acetyltransferase that catalyzes diacylglycerol esterification	Cytosol	dGR + PC → 1dGPc + 1GLGTC	2.3.1.58	phospholipid Biosynthesis	PPAP00663
glyoxylate decarboxylase	Cytosol	crma + H → amba + CO2	EC-4.1.1.45	Tyrosine, Tryptophan, and Phenylalanine Metabolism	
3',5'-cyclic-nucleotide phosphodiesterase	Cytosol	cAMP + H2O → AMP + H	EC-3.1.3.19	Purine and Pyrimidine Biosynthesis	
3',5'-cyclic-nucleotide phosphodiesterase	Cytosol	3SdGMP + H2O → dGMP + H	EC-3.1.4.17	Purine and Pyrimidine Biosynthesis	
3',5'-cyclic-nucleotide phosphodiesterase	Cytosol	3SdGMP + H2O → dGMP + H	EC-3.1.4.17	Purine and Pyrimidine Biosynthesis	
3',5'-cyclic-nucleotide phosphodiesterase	Cytosol	3SdGMP + H2O → dGMP + H	EC-3.1.4.17	Purine and Pyrimidine Biosynthesis	
3',5'-cyclic-nucleotide phosphodiesterase	Cytosol	3SdGMP + H2O → dGMP + H	EC-3.1.4.17	Purine and Pyrimidine Biosynthesis	
pyruvate dehydrogenase (dihydrolipoamide dehydrogenase), mitochondrial	Mitochondria	dltam + NAD → H + PRam + NADH	EC-1.8.4	Glycolysis/Gluconeogenesis	PPAP01391
pyruvate dehydrogenase, mitochondrial	Mitochondria	COA + NAD + PYR → ACCOA + CO2 + NADH	EC-1.8.4	Glycolysis/Gluconeogenesis	PPAP04729
pyridoxine 5'-phosphate oxidase	Cytosol	O2 + P5cP ↔ H2O2 + PydGP	EC-1.4.3.5	Pyridoxine Metabolism	PPAP04680
peptide alpha-N-acetyltransferase	Cytosol	ACCOA + PnPD → nPP + COA + H	EC-2.3.1.88	Other Amino Acid Metabolism	PPAP01163
peptide transport in via Proton symport		NHc] + PnPE[c] ↔ Hc] + PnPE[m]		Transport, Extracellular	
phosphatidylethanolamine Golgi transport		PE[c] ↔ PE[g]		Transport, Golgi Apparatus	
phosphatidylethanolamine cytosol transport	Cytosol	CTP + dEAMP + H → CDPn + PPi	EC-2.7.1.4	phospholipid Biosynthesis	PPAP02126
phosphatidylethanolamine mitochondrial transport	Cytosol	PE[c] ↔ PE[m]	EC-2.7.1.4	phospholipid Biosynthesis	PPAP02126
phosphatidylethanolamine N-Methyltransferase	Cytosol	SAM + PE → AHCVS + H + Pdmtrae	EC-2.7.1.17	phospholipid Biosynthesis	PPAP02006
phosphatidylethanolamine vesicular transport		PE[c] ↔ PE[v]		Transport, Vacuolar	
phosphofructokinase	Cytosol	ATP + FRP → ADP + FDP + H	EC-2.7.1.11	Glycolysis/Gluconeogenesis	PPAP02477
phosphofructokinase	Cytosol	ATP + taGSP → ADP + H + taGDP	EC-2.7.1.11	Glycolysis/Gluconeogenesis	PPAP02477
6-phosphofructo-2-kinase	Cytosol	ATP + FRP → ADP + F2dSP + H	EC-2.7.1.105	FRUCTOSE and mannose Metabolism	PPAP02084
Beta subunit of heteroecotamer phosphofructokinase involved in glycolysis	Nucleus	ATP + FRP → ADP + FDP + H	EC-2.7.1.105	FRUCTOSE and mannose Metabolism	PPAP02084
phosphoGluconate mutase	Cytosol	GAM1P ↔ GAMPP	EC-5.4.2.30	Glutamate Metabolism	PPAP00079
phosphoglycerate dehydrogenase	Cytosol	3PG + NAD → 3PMP + H + NADH	EC-1.1.1.95	Glycine and Serine Metabolism	PPAP03083
Glucose 6-phosphate isomerase	Cytosol	GSP ↔ FRP	EC-5.3.1.9	Glycolysis/Gluconeogenesis	PPAP03250
phosphoglycerate kinase	Cytosol	3PG + ATP ↔ 13dPG + ADP	EC-2.7.2.3	Glycolysis/Gluconeogenesis	PPAP03679
6-phosphoGluconolactonase	Cytosol	6PG + H2O → 6PGc + H	EC-3.1.1.31	Pentose phosphate Cycle	PPAP02763
phosphoglycerate mutase	Cytosol	2PG ↔ 3PG	EC-5.4.2.1	Glycolysis/Gluconeogenesis	PPAP03658
phosphoGluconate	Cytosol	G1P ↔ G6P	EC-5.4.2.2	Pentose phosphate Cycle	PPAP04602
phosphoGluconate, nucleus	Nucleus	G1P ↔ G6P	EC-5.4.2.2	Pentose phosphate Cycle	PPAP04602
phosphoglycerol phosphate phosphatase A, mitochondrial	Mitochondria	CO2 + PGP → Pp + Pi	EC-3.1.3.27	phospholipid Biosynthesis	
L-5-pyrene-3-hydroxy-5-carboxylate dehydrogenase, mitochondrial	Mitochondria	1PR5C + 2 H2O + NAD → nHGLU + H + NADH	EC-1.5.1.12	Arginine and Proline Metabolism	PPAP00889
L-5-pyrene-3-hydroxy-5-carboxylate spontaneous conversion to L-4-HydroxyGlutamate semialdehyde, mitochondrial	Mitochondria	1PR5C + H + H2O ↔ nHGLUa		Arginine and Proline Metabolism	
phenylalanine mitochondrial transport via Proton symport		NHc] + PnE[c] ↔ Hc] + PnE[m]		Transport, Mitochondrial	
L-phenylalanine reversible transport via Proton symport		NHc] + PnE[c] ↔ Hc] + PnE[m]		Transport, Extracellular	
phenylalanine transaminase	Cytosol	ARG + Pnc ↔ GLU + PnPRr	EC-2.6.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAP02044
phenylalanine transaminase, nucleus	Nucleus	ARG + Pnc ↔ GLU + PnPRr	EC-2.6.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAP02044
phenylalanyl-tRNA synthetase	Cytosol	ATP + Pnc + tRNApHe → AMP + Pncmet + PPi	EC-6.1.1.20	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAP02094
phenylalanyl-tRNA synthetase, mitochondrial	Mitochondria	ATP + Pnc + tRNApHe → AMP + Pncmet + PPi	EC-6.1.1.20	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PPAP02094
phosphatidylinositol 3-phosphate 4-kinase	Cytosol	ATP + 0.01 PRbino → ADP + H + 0.01 PRt13dBP	EC-2.7.1.68	phospholipid Biosynthesis	PPAP01353 or
1-phosphatidylinositol 4,5-bisphosphate phospholipidase	Cytosol	H2O + PRt13dBP → dGR + H + mLRSDP	EC-2.7.1.68	phospholipid Biosynthesis	PPAP0243

phosphate vacuolar transport via Proton symport		$H_2C + H_2C \leftrightarrow H_2C + P(i)$	Transport, Vacuolar	
phosphate transport via hydroxide ion symport, mitochondrial		$OH(i)in + P(i) \leftrightarrow OH(i) + P(in)$	Transport, Mitochondrial	PPAD3138
phosphomannutase	Cytosol	$man1P \leftrightarrow manDP$	FRUCTOSE and mannose Metabolism	PPAD0555
phosphomannomutase, nucleus	Nucleus	$man1P \leftrightarrow manDP$	FRUCTOSE and mannose Metabolism	PPAD0555
pyrimidine phosphatase	Cytosol	$SAM + H_2O \rightarrow 4dSu + P_i$	Riboflavin Metabolism	PPAD0761
phosphatidyl-N-Methylmethanlanine-N-Methyltransferase	Cytosol	$SAM + P2dmet + ANCY5 + H + PC$	phospholipid Biosynthesis	PPAD0588
phosphomonoate kinase	Cytosol	$5Pmet + ATP \rightarrow 5Pmet + ADP$	Sterol Biosynthesis	PPAD2603
phosphoMethylpyrimidine kinase	Cytosol	$4AMP + ATP \rightarrow 2amhp + ADP$	Thiamine Metabolism	PPAD2027
panthothenate kinase	Cytosol	$ATP + PNTD \rightarrow 4PPAN + ADP + H$	Pantothenate and CoA Biosynthesis	PPAD0200
panthothenate kinase, nucleus	Nucleus	$ATP + PNTD \rightarrow 4PPAN + ADP + H$	Pantothenate and CoA Biosynthesis	PPAD0200
Pantothenate reversible transport via Proton symport		$NH + PNTD(in) \leftrightarrow H_2C + PNTD(i)$	Transport, Extracellular	
polysamine oxidase	Cytosol	$NIASm + H_2O \rightarrow 4dSu + aPud + H_2O2$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-1.5.1.31
polysamine oxidase	Cytosol	$NIASPM + H_2O \rightarrow 4dSu + NIASm + aPud + H_2O2$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-1.5.1.31
inorganic diphosphatase	Mitochondria	$H_2O + PP_i \rightarrow H + 2 P_i$	Oxidative phosphorylation	EC-3.6.1.1
porphobilinogen synthase	Mitochondria	$2 SaeH + H + 2 H_2O \rightarrow PPBG$	Porphyrin and Chlorophyll Metabolism	EC-4.2.1.24
phosphoguanthionoxylcystine decarboxylase	Cytosol	$4PPCYS + H \leftrightarrow H_2O + PNASP$	Pantothenate and CoA Biosynthesis	EC-4.1.1.36
phosphoenolpyruvate carboxylase	Cytosol	$ATP + OAA \leftrightarrow ADP + CO2 + PEP$	Anaplerotic reactions	EC-4.1.1.49
phosphopentomutase	Cytosol	$iSP \leftrightarrow iSP$	Pentose phosphate Cycle	EC-5.4.2.7
phosphopentomutase, nucleus	Nucleus	$iSP \leftrightarrow iSP$	Pentose phosphate Cycle	EC-5.4.2.7
phosphopantothenate-cysteine lyase	Cytosol	$4PPAN + CTP + CYS \leftrightarrow 4PPCYS + CMP + H + PP_i$	Pantothenate and CoA Biosynthesis	EC-6.3.2.5
phosphatate dehydrogenase, nad/nadh	Cytosol	$NAD + PPAN \rightarrow 3aPP + CO2 + NADH$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-1.3.1.12
phosphatate dehydrogenase (NADP)	Cytosol	$NADP + PPAN \rightarrow 3aPP + CO2 + NADPH$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-1.3.1.13
phosphatate dehydrogenase	Cytosol	$H + PPAN \leftrightarrow CO2 + H_2O + PPANP$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-4.2.1.53
Protoporphyrinogen IX mitochondrial transport	Mitochondria	$PPRG(i) \leftrightarrow PPRP(i)$	Transport, Mitochondrial	
Protoporphyrinogen oxidase, mitochondrial		$3 O2 + 2 PPRP + 6 H_2O \rightarrow 2 PPRP$	Porphyrin and Chlorophyll Metabolism	EC-1.3.3.4
phosphoribosylglycinamide synthase	Cytosol	$ATP + GLY + PRAM \leftrightarrow ADP + GAR + H + P_i$	Purine and Pyrimidine Biosynthesis	EC-6.3.4.13
phosphoribosylanthranilate isomerase (Irreversible)	Cytosol	$Pan + 2PSP$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-5.3.1.24
phosphoribosylanthranilate isomerase (Irreversible), nucleus	Nucleus	$Pan + 2PSP$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-5.3.1.24
phosphoribosylaminoimidazole synthase	Cytosol	$ATP + RGA + ADP \rightarrow ar + 2 H + P_i$	Purine and Pyrimidine Biosynthesis	EC-6.3.3.1
phosphoribosyl AMP cyclohydrolase	Cytosol	$H_2O + PRAmp \rightarrow PIP$	Histidine Metabolism	EC-3.5.4.19
phosphoribosylaminoimidazolesuccinocarboxamide synthase	Cytosol	$CAR + ADP + ATP \leftrightarrow SACAR + ADP + H + P_i$	Purine and Pyrimidine Biosynthesis	EC-6.3.2.6
phosphoribosyl ATP pyrophosphatase	Cytosol	$H_2O + PRAAT \rightarrow H + PP_i + PRAADP$	Histidine Metabolism	EC-3.6.1.31
phosphoribosylformylglycinamide synthase	Cytosol	$ATP + RGA + GLU + H_2O \rightarrow ADP + RGA + GLU + H + P_i$	Purine and Pyrimidine Biosynthesis	EC-6.3.1.3
phosphoribosylformylglycinamide synthase, nucleus	Nucleus	$ATP + RGA + GLU + H_2O \rightarrow ADP + RGA + GLU + H + P_i$	Purine and Pyrimidine Biosynthesis	EC-6.3.1.3
1-6-phosphoribosyl-5-[S]-phosphoribosylaminoMethylidenaminoimidazole-4-carboxamide isomerase (Irreversible)	Cytosol	$PIP \rightarrow PIP$	Histidine Metabolism	EC-5.3.1.16
1-6-phosphoribosyl-5-[S]-phosphoribosylaminoMethylidenaminoimidazole-4-carboxamide isomerase (Irreversible, nucleus)	Nucleus	$PIP \rightarrow PIP$	Histidine Metabolism	EC-5.3.1.16
Proline oxidase (NAD), mitochondrial	Mitochondria	$NAD + PRO \rightarrow 1PHEC + 2 H + NADH$	Histidine Metabolism	EC-5.3.1.16
L-Proline reversible transport via Proton symport		$NH + PRO(in) \leftrightarrow H_2C + PRO(i)$	Transport, Extracellular	
L-Proline transport, effluxion, Mitochondrial		$PRO(i) \leftrightarrow PRO(in)$	Transport, Mitochondrial	
Prolyl tRNA synthetase	Cytosol	$ATP + PRO + tRNAuPRO \rightarrow AMP + PP_i + PROtRNA$	Arginine and Proline Metabolism	EC-6.1.1.15
phosphoribosylpyrophosphate synthetase	Cytosol	$ATP + iSP \leftrightarrow AMP + H + PPP$	Histidine Metabolism	EC-2.7.6.1
PPPP reversible transport, mitochondrial		$PPPP(i) \leftrightarrow PPRP(in)$	Transport, Mitochondrial	
3-phosphoglycerate-1-carboxyvinyltransferase, irreversible	Cytosol	$PP + aMDP \rightarrow 3Pse + P_i$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-2.3.1.19
phosphatidylserine decarboxylase, Golgi apparatus	Golgi	$H + PS \leftrightarrow CO2 + Pse$	phospholipid Biosynthesis	EC-4.1.1.65
phosphatidylserine decarboxylase, mitochondrial	Mitochondria	$H + PS \leftrightarrow CO2 + Pse$	phospholipid Biosynthesis	EC-4.1.1.65
phosphatidylserine decarboxylase, vacuolar	Vacuole	$H + PS \leftrightarrow CO2 + Pse$	phospholipid Biosynthesis	EC-4.1.1.65
phosphatidylserine synthase	Cytosol	$CDPaa + SER \leftrightarrow CMP + H + PS$	phospholipid Biosynthesis	EC-2.7.8.8
phosphatidylserine synthase, mitochondrial	Mitochondria	$CDPaa + SER \leftrightarrow CMP + H + PS$	phospholipid Biosynthesis	EC-2.7.8.8
phosphoserine transaminase	Cytosol	$3PSP + GLU \rightarrow aGSP + PESP$	Glycine and Serine Metabolism	EC-2.6.1.12
phosphoserine phosphatase (L-serine)	Cytosol	$H_2O + PSEB + P_i \rightarrow SER$	Glycine and Serine Metabolism	EC-3.1.3.3
phosphoserine phosphatase lyase	Cytosol	$PPSP \rightarrow 2Hsd + aPASP$	Sphingolipid Metabolism	PPAD0979
phosphoserine synthase	Cytosol	$H + NADPH + O2 + aPga \rightarrow H_2O + NADP + PSPHings$	Sphingolipid Metabolism	PPAD0921
phosphatidylserine Golgi transport		$PSE(i) \leftrightarrow PSE(g)$	Transport, Golgi Apparatus	
phosphatidylserine mitochondrial transport		$PSE(i) \leftrightarrow PSE(m)$	Transport, Mitochondrial	
phosphatidylserine vacuolar transport		$PSE(i) \leftrightarrow PSE(v)$	Transport, Vacuolar	
phosphatidyl 1D-myo-inositol nuclear transport		$PSE(inu) \leftrightarrow PSE(inu)$	Transport, Nuclear	
phosphatidyl 1D-myo-4-methyl nuclear transport		$PSE(met) \leftrightarrow PSE(met)$	Transport, Nuclear	
Mitochondrial phosphate carrier		$P(i) \leftrightarrow P(m)$	Transport, Mitochondrial	
panthothenate phosphatase ADENylyltransferase	Cytosol	$ATP + H + PANAP \rightarrow aPCCA + PP_i$	Pantothenate and CoA Biosynthesis	EC-2.7.7.3
panthothenate phosphatase ADENylyltransferase	Mitochondria	$ATP + H + PANAP \rightarrow aPCCA + PP_i$	Pantothenate and CoA Biosynthesis	EC-2.7.7.3
putrescine transport in via Proton symport		$NH + PRC(i) \leftrightarrow H_2C + PRC(i)$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Adenosine)	Cytosol	$adn + P_i \leftrightarrow ADE + iSP$	NAD Biosynthesis	EC-2.4.2.1
putrescine nucleoside phosphorylation (Adenosine), mitochondrial	Mitochondria	$adn + P_i \leftrightarrow ADE + iSP$	NAD Biosynthesis	EC-2.4.2.1
putrescine nucleoside phosphorylation (Deoxyadenosine)	Cytosol	$daa + P_i \leftrightarrow 2aPSP + ADE$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Guanosine)	Cytosol	$gua + P_i \leftrightarrow GUA + iSP$	NAD Biosynthesis	EC-2.4.2.1
putrescine nucleoside phosphorylation (Guanosine), mitochondrial	Mitochondria	$gua + P_i \leftrightarrow GUA + iSP$	NAD Biosynthesis	EC-2.4.2.1
putrescine nucleoside phosphorylation (Deoxyguanosine)	Cytosol	$gon + P_i \leftrightarrow 2aPSP + GUA$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Inosine)	Cytosol	$ins + P_i \leftrightarrow iKMAN + iSP$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Deoxyinosine)	Cytosol	$din + P_i \leftrightarrow 2aPSP + iMAN$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Danthosine)	Cytosol	$P_i + kin \leftrightarrow iSP + XAN$	Nucleotide Salvage Pathways	EC-2.4.2.1
putrescine nucleoside phosphorylation (Deoxythidine)	Cytosol	$duri + P_i \leftrightarrow URA + 2aPSP$	Nucleotide Salvage Pathways	EC-2.4.2.1
D-1-pyrimidine-5-carboxylate:ADP-oxidoreductase	Cytosol	$1PBC + NADP + H_2O \rightarrow GLL + NADH + H$	GLUTAMATE Metabolism	EC-1.5.1.12
(S)-1-pyrimidine-5-carboxylate:NADP-oxidoreductase	Cytosol	$1PBCS + NADP + 2 H_2O \rightarrow GLL + NADH + H$	GLUTAMATE Metabolism	EC-1.5.1.12
pyridoxamine 5'-phosphate oxidase	Cytosol	$H_2O + O2 + PyaMDP \rightarrow H_2O2 + Hsd + PydSP$	Pyridoxine Metabolism	EC-1.4.3.5
pyridoxamine kinase	Cytosol	$ATP + Pyda \rightarrow ADP + H + PydSP$	Pyridoxine Metabolism	EC-2.7.1.35
pyridoxal kinase	Cytosol	$ATP + Pyda \rightarrow ADP + H + PydSP$	Pyridoxine Metabolism	EC-2.7.1.35
pyridoxine kinase	Cytosol	$O2 + Pydin \rightarrow H_2O2 + Pyd$	Pyridoxine Metabolism	EC-1.4.3.5
pyridoxal oxidase	Cytosol	$2 H_2O + NHA + 5 O2 + Pyda \leftrightarrow 2 H_2O2 + Pydam$	Pyridoxine Metabolism	EC-1.4.3.5
pyruvate kinase	Cytosol	$ADP + H + PEP \rightarrow ATP + PHE$	Glycolysis/GLYCOGENESIS	EC-2.7.1.40
pyrimidine-nucleoside phosphorylase (Uracil)	Cytosol	$P_i + URI \leftrightarrow iSP + URA$	Nucleotide Salvage Pathways	EC-2.4.2.2
D1-pyrimidine-5-carboxylate dehydrogenase, mitochondrial	Mitochondria	$GLUSa + H_2O + NADP \leftrightarrow GLL + 2 H + NADPH$	GLUTAMATE Metabolism	EC-1.5.1.12
pyruvate decarboxylase	Cytosol	$H + PPR \rightarrow ACAL + CO2$	Pyruvate Metabolism	EC-4.1.1.1
pyruvate transport in via Proton symport		$NH + PPR(i) \leftrightarrow H_2C + PPR(i)$	Transport, Extracellular	
pyruvate mitochondrial transport via Proton symport		$NH + PPR(i) \leftrightarrow H_2C + PPR(in)$	Transport, Mitochondrial	
pyruvate peroxisomal transport via Proton symport		$NH + PPR(i) \leftrightarrow H_2C + PPR(v)$	Transport, Peroxisomal	
quinolate synthase	Cytosol	$DMAP + ADP \rightarrow H + 2 H_2O + P_i + quin$	Folate Metabolism	EC-4.1.1.9
Quinolinate reversible mitochondrial transport		$quin(i) \leftrightarrow quin(m)$	Transport, Mitochondrial	
riboflavin kinase	Cytosol	$ATP + RIBfl + ADP \rightarrow Fm + H + P_i$	Riboflavin Metabolism	EC-2.7.1.26
riboflavin kinase, mitochondrial	Mitochondria	$ATP + RIBfl + ADP \rightarrow Fm + H + P_i$	Riboflavin Metabolism	EC-2.7.1.26
riboflavin synthase	Cytosol	$4dSu + aMDP \rightarrow dmt + 2 H_2O + P_i$	Riboflavin Metabolism	EC-2.5.1.9
riboflavin synthase	Cytosol	$2 dmt + 4dSu + RIBfl$	Riboflavin Metabolism	EC-2.5.1.9
riboflavinase	Cytosol	$ATP + RIBB \rightarrow ADP + H + iSP$	Pentose phosphate Cycle	EC-2.7.1.15
L-rhamnose isomerase	Cytosol	$rhamD \rightarrow rhul$		5.3.1.14
L-rhamnose isomerase, nucleus	Nucleus	$rhamD \rightarrow rhul$		5.3.1.14
riboflavin transport in via Proton symport		$NH + RIBfl(i) \leftrightarrow H_2C + RIBfl(i)$	Transport, Extracellular	
Riboflavin reversible mitochondrial transport		$RIBfl(i) \leftrightarrow RIBfl(m)$	Transport, Mitochondrial	
ribose transport in via Proton symport		$NH + RIB(i) \rightarrow H_2C + RIB(i)$	Transport, Extracellular	
ribonucleosideDiphosphate reductase (ADP)	Cytosol	$ADP + TRORD \rightarrow GADP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase, mitochondria	Mitochondria	$ADP + TRORD \rightarrow GADP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (GDP)	Cytosol	$GDP + TRORD \rightarrow GADP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (GDP), mitochondria	Mitochondria	$GDP + TRORD \rightarrow GADP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (CDP)	Cytosol	$CDP + TRORD \rightarrow GCDP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (CDP), mitochondria	Mitochondria	$CDP + TRORD \rightarrow GCDP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (UDP)	Cytosol	$UDP + TRORD \rightarrow GUDP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleosideDiphosphate reductase (UDP), mitochondria	Mitochondria	$UDP + TRORD \rightarrow GUDP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.1
ribonucleoside-triphosphate reductase (ATP)	Cytosol	$ATP + TRORD \rightarrow GATP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.2
ribonucleoside-triphosphate reductase (GTP)	Cytosol	$GTP + TRORD \rightarrow GCTP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.2
ribonucleoside-triphosphate reductase (CTP)	Cytosol	$CTP + TRORD \rightarrow GCTP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.2
ribonucleoside-triphosphate reductase (UTP)	Cytosol	$UTP + TRORD \rightarrow GUTP + H_2O + TRODX$	Nucleotide Salvage Pathways	EC-1.17.4.2
ribose-5-phosphate 3-epimerase	Cytosol	$rSPD \leftrightarrow rSPD$	Pentose phosphate Cycle	EC-5.3.1.1
ribose-5-phosphate isomerase	Cytosol	$iSP \leftrightarrow rSPD$	Pentose phosphate Cycle	EC-5.3.1.6
saccharose dehydrogenase (NADP - Glutamate forming)	Cytosol	$2 aMDPaa + GLL + H + NADPH \leftrightarrow H_2O + NADP + aMDPRL$	Threonine and Lysine Metabolism	EC-1.5.1.10
saccharose dehydrogenase (NAD, Lysine forming)	Cytosol	$H_2O + NAD + aACPL \leftrightarrow aMG + H + LYS + NADH$	Threonine and Lysine Metabolism	EC-1.5.1.7
sphingolipid long chain base kinase (sphinganine)	Cytosol	$ATP + H + sat \leftrightarrow aPS + PP_i$	Cysteine Metabolism	EC-2.7.7.4
sulfate ADENylyltransferase	Cytosol	$SAM + Cymet \rightarrow ANCY5 + P-COS(i) + H$	Sterol Biosynthesis	EC-2.1.1.41
Plasma membrane sulfate pump involved in sulfate METabolism and required for efficient sulfate efflux.		$H_2O + aPSP \rightarrow P_i + aPga$	Sphingolipid Metabolism	PPAD0846
sphingolipid base phosphate phosphatase (sphinganine 1-phosphate)	Cytosol	$H_2O + PPSP(i) \rightarrow P_i + PSPHings$	Sphingolipid Metabolism	PPAD0846
Disorbitol transport via passive effluxion		$DSB(i) \leftrightarrow DSB(i)$	Transport, Extracellular	
Lisorbitol transport via passive diffusion		$SBE(i) \leftrightarrow SBE(i)$	Transport, Extracellular	
Disorbitol dehydrogenase (D-Fructose Producing)	Cytosol	$NAD + DSB \rightarrow FRU + H + NADH$	Alternate Carbon Metabolism	EC-1.1.1.14
Lisorbitol dehydrogenase (L-Orucose Producing)	Cytosol	$NAD + SBT + H + NADH + aRL$	Alternate Carbon Metabolism	EC-1.1.1.14
Disorbitol reductase	Cytosol	$GLC + H + NADPH \rightarrow NADP + DSBT$	Alternate Carbon Metabolism	EC-1.1.2.1
L-serine deaminase	Cytosol	$SER + NHA \rightarrow PHE$	Glycine and Serine Metabolism	EC-Undetermined
L-serine hydrolyase	Cytosol	$SER + H_2S + CYS + H_2O$	Glycine and Serine Metabolism	EC-4.2.1.22
L-serine hydrolyase, nucleus	Nucleus	$SER + H_2S + CYS + H_2O$	Glycine and Serine Metabolism	EC-4.2.1.22
L-serine aminoxylase	Cytosol	$SER + PHE + NHA$	Glycine, serine and threonine Metabolism	EC-4.1.1.19
serine C-palmitoyltransferase	Cytosol	$H + C16COA + SER \rightarrow 3aPPga + CO2 + COA$	Sphingolipid Metabolism	EC-2.3.1.50
serine C-palmitoyltransferase, nucleus	Nucleus	$H + C16COA + SER \rightarrow 3aPPga + CO2 + COA$	Sphingolipid Metabolism	EC-2.3.1.50
serine mitochondrial transport via Proton symport		$NH + SER(i) \leftrightarrow H_2C + SER(i)$	Transport, Mitochondrial	
L-serine reversible transport via Proton symport		$NH + SER(i) \leftrightarrow H_2C + SER(i)$	Transport, Extracellular	
Seryl-tRNA synthetase	Cytosol	$ATP + SER + tRNASeR \rightarrow AMP + PP_i + SERtRNA$	Glycine and Serine Metabolism	EC-6.1.1.11
5-Formylglutathione hydrolase	Cytosol	$5GLLiun + H_2O \rightarrow FORM + GTMRD + H$	Methane Metabolism	EC-3.12.12
shikimate dehydrogenase	Cytosol	$3aRK + H + NADPH + NADP + aKm$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-1.1.1.25
shikimate kinase	Cytosol	$ATP + shn \rightarrow ADP + H + shnSP$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-2.7.1.71
Oxalacetylhomoserine lyase (L-cysteine)	Cytosol	$CYS + SuChm \rightarrow lci + H + SuCC$	Methionine Metabolism	EC-4.2.9.9
Oxalacetylhomoserine lyase (L-cysteine), irreversible	Cytosol	$H_2O + SuChm \leftrightarrow 2aht + H + NHA + SuCC$	Methionine Metabolism	EC-4.2.9.9
sphingolipid long chain base kinase (sphinganine)	Cytosol	$ATP + aPga \rightarrow ADP + H + aPSP$	Sphingolipid Metabolism	PPAD0275
sphingolipid long chain base kinase (phosphatidylserine)	Cytosol	$ATP + PSPHings + ADP + H + PPSP$	Sphingolipid Metabolism	PPAD0275
sulfate ADENylyltransferase (ADP)	Cytosol	$ADP + H + sat \leftrightarrow aPS + P_i$	Cysteine Metabolism	EC-2.7.7.5
Sulfate membrane sulfate pump involved in sulfate METabolism and required for efficient sulfate efflux.		$SOS(i) \leftrightarrow SOS(i)$	Transport, Extracellular	
sulfate irreversible transport	Cytosol	$sat(i) \leftrightarrow sat(i)$	Transport, Extracellular	
sphingine phosphate lyase	Cytosol	$aPSP \rightarrow aPASP + Hsdal$	Sphingolipid Metabolism	PPAD0209
Spermidine acetyltransferase	Cytosol	$ACCOA + aPmd \rightarrow NIASpmd + COA + H$	Tyrosine, Tryptophan, and Phenylalanine Metabolism	EC-2.3.1.57
serpineine transport in via Proton symport		$NH + aMETam \leftrightarrow H_2C + aMETam$	Transport, Extracellular	
serpineine synthesis	Cytosol	$aMETam + PTC + Smta + H + aPmd$	Arginine and Proline Metabolism	EC-2.5.1.16
serpineine synthase, nucleus	Nucleus	$aMETam + aPmd \rightarrow Smta + H + aPMD$	Arginine and Proline Metabolism	EC-2.5.1.22
Polysamine transport Protein specific for spermine		$SPRM(i) \leftrightarrow SPRM(i)$	Transport, Extracellular	
spermine irreversible transport		$SPRM(i) \leftrightarrow SPRM(i)$	Transport, Extracellular	
Squalene-2,3-epoxide endoplasmic reticular transport	ER	$Suq2aPm(i) \leftrightarrow Suq2aPm(c)$	Transport, Endoplasmic Reticular	
Squalene epoxidase, endoplasmic reticular		$H + NADPH + O2 + sqj \rightarrow Suq2aPa + H_2O + NADP$	Sterol Biosynthesis	EC-1.14.99.7
Squalene lythase	Cytosol	$2 Hsd + H + NADPH + NADP + 2 PP_i + sqj$	Sterol Biosynthesis	EC-2.5.1.21
squalene endoplasmic reticular transport		$sqj(i) \leftrightarrow sqj(i)$	Transport, Endoplasmic Reticular	
Litorone reversible transport	Cytosol	$H_2O + NADP + SuCCat \leftrightarrow 2 H + NADPH + SuCC$	Transport, Extracellular	EC-1.2.1.16
succinate dehydrogenase (ubiquinone-6), mitochondrial	Mitochondria	$NH + SuCC(i) \leftrightarrow H_2C + SuCC(i)$	Transport, Extracellular	
succinate transport via Proton symport		$PP(i) + SuCC(i) \leftrightarrow P(i) + SuCC(i)$	Transport, Mitochondrial	
succinate transport, mitochondrial				
succinate dehydrogenase, mitochondrial	Mitochondria	$fad + SuCC \leftrightarrow fad2 + FUM$	Oxidative phosphorylation	EC-1.3.99.1
succinate dehydrogenase (ubiquinone-6), mitochondrial	Mitochondria	$qb + SuCC \leftrightarrow FUM + qb2$	Citrate Cycle (TCA)	EC-1.3.5.1
succinate dehydrogenase (ubiquinone-6), mitochondrial	Mitochondria	$fad2 + qb \leftrightarrow fad2 + qb2$	Oxidative phosphorylation	EC-1.3.5.1
succinate fumarate transport, mitochondrial		$FUM(in) + SuCC(i) \rightarrow FUM(i) + SuCC(in)$	Transport, Mitochondrial	

Succinate-CoA ligase (ADP-forming), mitochondrial	Mitochondria	ATP + CoA + SUCC <=> ADP + Pi + SUCCoA	EC 6.2.1.4	Citrate Cycle (TCA)	PIPA02591
sucrose transport in via Proton symport		h[e] + SUC[c] >= h[i]c] + SUC[c]		Transport, Extracellular	PIPA00866
sulfite reductase (NADph2)	Cytosol	3 H2O + H2S + 3 NADP <=> 5 H + 3 NADPH + SO3	EC 1.8.2.2	Cysteine Metabolism	PIPA03369 or PIPA04045
transaldolase	Cytosol	G3P + F7P <=> E4P + F6P	EC 2.2.1.2	Pentose phosphate Cycle	PIPA03744 PIPA05545 PIPA06867
tetrahydrofolate aminomethyltransferase, mitochondrial	Mitochondria	H2O + METHF -> 5THF + H	EC 2.1.1.20	Folate Metabolism	PIPA05480 PIPA04584
Tetrahydrofolate, L-Glutamate gamma:glutase (ADP-forming)	Cytosol	ATP + GLU + THF <=> ADP + H + Pi + THFGLU	EC 6.3.2.17	Folate Metabolism	PIPA01736 or PIPA02776
5,6,7,8-Tetrahydrofolate transport, diffusion, mitochondrial	Extracellular	THF[c] <=> THF[i]	EC 5.13.1.2	Transport, Mitochondrial	
thiamine diphosphatase, extracellular	Extracellular	2 H2O + thmPP >= H + 2 Pi + thm		Thiamine Metabolism	
thymidine transport in via Proton symport		h[e] + THYM[c] >= h[i]c] + THYM[c]		Transport, Extracellular	
thiamin phosphatase	Cytosol	H2O + thmPP >= Pi + thm		Thiamine Metabolism	
thiamin phosphatase, extracellular	Extracellular	H2O + thmPP >= H + thm	EC 3.1.3.2	Thiamine Metabolism	
Thiamine transport in via Proton symport		h[e] + THYM[c] >= h[i]c] + thm[c]		Transport, Extracellular	
Theonine aldolase	Cytosol	GLV + ACAL <=> THR	EC 4.1.2.5	Theonine and Lysine Metabolism	PIPA01820
L-threonine deaminase	Cytosol	THR -> 2obut + NH4		Theonine and Lysine Metabolism	PIPA00867
L-threonine deaminase, mitochondrial	Mitochondria	THR -> 2obut + NH4	EC 4.1.1.19	Theonine and Lysine Metabolism	PIPA05293
threonine synthase	Cytosol	PHSER + H2O -> Pi + THR	EC 4.2.3.1	Theonine and Lysine Metabolism	PIPA02214
threonine mitochondrial transport via Proton symport		h[i]c] + THR[c] <=> h[e]c] + THR[i]		Transport, Mitochondrial	PIPA02367
L-threonine reversible transport via Proton symport		h[e] + THR[c] <=> h[i]c] + THR[c]		Transport, Extracellular	PIPA00044
Threonyl-tRNA synthetase	Cytosol	ATP + Thr + t-matrH -> AMP + PPi + t-thrma	EC 6.1.1.3	Theonine and Lysine Metabolism	PIPA04183
threonyl-tRNA synthetase, mitochondrial	Mitochondria	ATP + Thr + t-matrH -> AMP + PPi + t-thrma		Theonine and Lysine Metabolism	PIPA00865
thymine reversible transport via Proton antiport		h[e] + THYM[c] <=> h[i]c] + THYM[i]		Transport, Extracellular	
thiazole phosphate synthesis (xylulose 5-phosphate)	Cytosol	ACSER + C5S + GLV + H + XUSP -> 4abut + 4mPez + AC + CO2 + 3 H2O + NH4 + PIR		Thiamine Metabolism	
thiazole phosphate synthesis (ribose 5-phosphate), yeastSpecific	Cytosol	ACSER + C5S + GLV + H + rSP -> 4abut + 4mPez + AC + CO2 + 3 H2O + NH4 + PIR		Thiamine Metabolism	
transketolase	Cytosol	rSP + XUSP <=> G3P + r7P	EC 2.2.1.1	Pentose phosphate Cycle	PIPA02093
transketolase	Cytosol	rSP + XUSP <=> G3P + G3P	EC 2.2.1.1	Pentose phosphate Cycle	PIPA02093
thymidine kinase (ATP:thymidine)	Cytosol	ATP + THYMd -> ADP + thmP + H	EC 2.7.1.21	Purine and Pyrimidine Biosynthesis	PIPA00044
thiamine diphosphokinase	Cytosol	ATP + thm + AMP + H + thmPP	EC 2.7.6.2	Thiamine Metabolism	PIPA00852
thymidine phosphorylase	Cytosol	Pi + THYMd <=> 2d3P + THIM	EC 2.4.2.4	Purine and Pyrimidine Biosynthesis	PIPA03551
thiamine diphosphate kinase	Cytosol	ATP + thmPP >= ADP + thmSP	EC 2.7.4.15	Thiamine Metabolism	PIPA00852
thymidylate synthase	Cytosol	dUMP + N5CH3 -> dUMP + dUMP	EC 2.1.1.45	Purine and Pyrimidine Biosynthesis	PIPA03286
thiaminase	Cytosol	H2O + thm -> 4abmPP + 4mPez + H	EC 3.5.99.2	Thiamine Metabolism	
thiamine phosphate kinase	Cytosol	ATP + thmPP <=> ADP + thmPP	EC 2.7.4.16	Thiamine Metabolism	PIPA02604
thiamine-phosphate diphosphophase	Cytosol	2matPP + 4mPez + H -> PPi + thmPP	EC 2.8.1.9	Thiamine Metabolism	PIPA03461
triose phosphate isomerase	Cytosol	DHAP <=> G3P	EC 5.3.1.1	Glycolysis/Gluconeogenesis	PIPA04491
thioredoxin reductase (NADph)	Cytosol	H + NADPH + TROX -> NADP + TROD	EC 1.8.1.9	Purine and Pyrimidine Biosynthesis	PIPA04090
thioredoxin reductase (NADph), mitochondrial	Mitochondria	H + NADPH + TROX -> NADP + TROD		Purine and Pyrimidine Biosynthesis	PIPA04100
thioredoxin peroxidase	Peroxisome	H + NADPH + TROX -> NADP + TROD		Purine and Pyrimidine Biosynthesis	PIPA04168
trehalose-phosphatase	Cytosol	H2O + TREP -> Pi + TRE	EC 3.1.3.12	Alternate Carbon Metabolism	PIPA00664 and PIPA03182 and PIPA00782
alpha, alpha-trehalose-phosphate synthase (UDF-forming)	Cytosol	G6P + UDPH -> H + TREEP + UDP	EC 2.4.1.15	Alternate Carbon Metabolism	PIPA00664 and PIPA03182 and PIPA00782
alpha, alpha-trehalase, golg	Golg	H2O + TRE -> 2 GIC	EC 3.2.1.28	Alternate Carbon Metabolism	PIPA04504
alpha, alpha-trehalase	Mitochondria	H2O + TRE -> 2 GIC	EC 3.2.1.28	Alternate Carbon Metabolism	PIPA04504
trehalose transport in via Proton symporter		h[e] + TRE[i] >= h[i]c] + TRE[c]		Transport, Extracellular	
trehalose vacuolar transport via Proton symport		h[i]c] + TRE[c] <=> h[e]c] + TRE[c]		Transport, Vacuolar	
triglycerid synthesis	Cytosol	0.01 DGR + 0.02 C10COA + 0.06 C12COA + 0.17 HCoA + 0.09 acylCoA + 0.24 ocdA + 0.27 C16COA + 0.05 C18COA + 0.1 C14COA -> CoA + 0.01 trigLC	EC 1.13.11.11	Glycerolipid Metabolism	PIPA02017
L-Tryptophan oxygen 2,3 oxidoreductase (deacylizing)	Cytosol	O2 + TRYP -> 2matPP	EC 4.2.1.20	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA04573
tryptophan synthase (indoleglycerol phosphate)	Cytosol	3d3P + 5EB -> H2P + H2O + TRP		Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02707
tryptophan mitochondrial transport via Proton symport		h[i]c] + TRYP[c] <=> h[e]c] + TRYP[c]		Transport, Mitochondrial	PIPA00044
L-tryptophan reversible transport via Proton symport		h[e] + TRYP[c] <=> h[i]c] + TRYP[c]		Transport, Extracellular	PIPA00915
tryptophanyl-tRNA synthetase	Cytosol	ATP + t-matrTR + TRP -> AMP + PPi + TRPma	EC 6.1.1.2	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02307
Tryptophanyl-tRNA synthetase, mitochondrial	Mitochondria	ATP + t-matrTR + TRP -> AMP + PPi + TRPma		Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02307
TetraAcanbate (C14:0) transport in via uniport		C14[0] <=> C14[0]		Transport, Extracellular	
tyrosine mitochondrial transport via Proton symport		h[i]c] + TYRE[c] <=> h[e]c] + TYRE[c]		Transport, Mitochondrial	
tyrosine peroxisomal transport via Proton symport		h[i]c] + TYRE[c] <=> h[e]c] + TYRE[c]		Transport, Peroxisomal	
L-tyrosine reversible transport via Proton symport		h[e] + TYRE[c] <=> h[i]c] + TYRE[c]		Transport, Extracellular	
tyrosine transaminase	Cytosol	AGS + TYR <=> 3d3PP + GLU	EC 2.6.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA00044
tyrosine transaminase, irreversible	Cytosol	3d3PP + GLU -> AGS + TYR		Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02780 or PIPA03996
tyrosine transaminase, mitochondrial	Mitochondria	AGS + TYR <=> 3d3PP + GLU	EC 2.6.1.5	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03996
tyrosine transaminase, peroxisomal	Peroxisome	AGS + TYR <=> 3d3PP + GLU	EC 2.6.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA03996
tyrosyl-tRNA synthetase	Cytosol	ATP + t-matrTR + TRP -> AMP + PPi + TYRma	EC 6.1.1.1	Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02522
tyrosyl-tRNA synthetase, mitochondrial	Mitochondria	ATP + t-matrTR + TRP -> AMP + PPi + TYRma		Tyrosine, Tryptophan, and Phenylalanine Metabolism	PIPA02814
UDP-N-acetylglucosamine diphosphorylase	Cytosol	nagP1P + H + UTP <=> Pi + UDPAGAL	EC 2.7.7.23	Glutamate Metabolism	PIPA01576
UDPGlucose 4-epimerase	Cytosol	UDGP <=> UDPGAL	EC 5.1.3.2	Galactose Metabolism	PIPA00665
Protein with a role in UDP-galactose transport to the Golgi lumen		UDPGAL[c] -> UDPGAL[i]			
Uridylate kinase	Cytosol	2 Pi + H2O + uridylic <=> C22 + GLX + 2 N4H	EC 5.3.1.19	Histidine Metabolism	PIPA02195
UMP kinase	Cytosol	ATP + UMP <=> ADP + UDP		Nucleotide Salvage Pathways	PIPA00554
UMP kinase, nuclear	Nucleus	ATP + UMP <=> ADP + UDP		Nucleotide Salvage Pathways	PIPA00554
UMP nuclear transport		UMP[i]c] <=> UMP[i]		Transport, Nuclear	
uroporphyrinogen METHyltransferase	Cytosol	2 SAM + uPP3 <=> 2 AHCVS + H + shc	EC 2.1.1.107	Porphyrin and Chlorophyll Metabolism	PIPA06180
uroporphyrinogen-III synthase	Cytosol	Hmbil -> H2O + uPP3	EC 4.2.1.75	Porphyrin and Chlorophyll Metabolism	PIPA02485
uroporphyrinogen decarboxylase (uroporphyrinogen III)	Cytosol	4 + H -> uPP3 + 4 CO2 + PP3P3	EC 4.1.1.37	Porphyrin and Chlorophyll Metabolism	PIPA03444
uracil phosphoribosyltransferase, mitochondria	Mitochondria	PURP + URA -> PPi + UMP	EC 2.4.2.9	Purine and Pyrimidine Biosynthesis	PIPA02377
uracil transport in via Proton symport		h[e] + URA[c] >= h[i]c] + URA[c]		Transport, Extracellular	
Uric acid-xanthine permease (URPA transporter)		URAT[i]c] <=> URAT[i]			
urea reversible transport via Proton symport (2 H+)		2 H[i]c] + urea[c] <=> 2 H[i]c] + urea[c]		Transport, Extracellular	
urea carbonylase	Cytosol	ATP + HCO3 -> urea <=> ADP + allPen + H + Pi	EC 6.3.4.6	Nitrogen Metabolism	PIPA04802
Uridylate kinase (GUMP)	Cytosol	ATP + GUMP <=> ADP + GUDP		Nitrogen Metabolism	PIPA02562
Uridylate kinase (GUMP), nuclear	Nucleus	ATP + GUMP <=> ADP + GUDP		Nitrogen Metabolism	PIPA03130
Uridine kinase (ATP:Uridine)	Cytosol	URi + ATP -> UMP + ADP + H		Nucleotide Salvage Pathways	PIPA01753
Uridine kinase (ATP:Uridine), nucleus	Nucleus	URi + ATP -> UMP + ADP + H	EC 2.7.1.48	Nucleotide Salvage Pathways	PIPA00554
Uridine kinase (CTP:Uridine)	Cytosol	URi + CTP -> UMP + GDP + H	EC 2.7.1.48	Purine and Pyrimidine Biosynthesis	PIPA00749
Uridine kinase (CTP:Uridine), nucleus	Nucleus	URi + CTP -> UMP + GDP + H	EC 2.7.1.48	Purine and Pyrimidine Biosynthesis	PIPA00749
Uridine transport in via Proton symport		h[e] + UR[i]c] >= h[i]c] + UR[i]c]		Transport, Extracellular	
urate oxidase	Cytosol	URAT + H2O + O2 -> 5-hydroxyisourAT + H2O2	EC 1.7.3.3	Transport, Extracellular	
Valine reversible mitochondrial transport via Proton symport		h[i]c] + VAL[i]c] <=> h[e]c] + VAL[i]		Transport, Mitochondrial	PIPA02307
L-valine reversible transport via Proton symport		h[e] + VAL[c] <=> h[i]c] + VAL[c]		Transport, Extracellular	PIPA00044
valine transaminase	Cytosol	AGS + VAL -> 3d3PP + GLU	EC 2.6.1.42	Valine, leucine, and isoleucine Metabolism	PIPA05648
Valyl-tRNA synthetase	Cytosol	ATP + t-matrV + VAL -> AMP + PPi + valtrma	EC 6.1.1.9	Valine, leucine, and isoleucine Metabolism	PIPA02648
valyl-tRNA synthetase, mitochondrial	Mitochondria	ATP + t-matrV + VAL -> AMP + PPi + valtrma	EC 6.1.1.9	Valine, leucine, and isoleucine Metabolism	PIPA02648
xanthine oxidase	Cytosol	XAN + H2O + O2 -> URAT + H2O2	EC 1.17.3.2	Valine, leucine, and isoleucine Metabolism	PIPA03032
xanthine oxidase	Cytosol	HXAN + H2O + O2 -> XAN + H2O2	EC 1.17.3.2	Valine, leucine, and isoleucine Metabolism	PIPA03032
xanthine reversible transport		XAN[i]c] <=> XAN[i]		Transport, Extracellular	
Uric acid-xanthine permease (URPA transporter)		XAN[i]c] <=> XAN[i]			
xanthine phosphoribosyltransferase	Cytosol	PPRP + XAN -> PPi + XMP	EC 2.4.2.22	Nucleotide Salvage Pathways	PIPA02377
xanthine transport in via Proton symport		h[i]c] + xnt[c] <=> h[e]c] + xnt[c]		Transport, Extracellular	
xylulokinase	Cytosol	ATP + xylu -> ADP + H + XUSP	EC 2.7.1.17	Xylose Metabolism	PIPA01671
D-xylose reversible transport	Cytosol	xyli[c] <=> xyli[c]	EC 1.1.1.21	Transport, Extracellular	PIPA02620
Xylitol transport via passive diffusion		xyli[i]c] <=> xyli[i]		Transport, Extracellular	
xylMP synthetase	Cytosol	rSP + URA -> H2O + PSd5P	EC 4.2.1.70	Purine and Pyrimidine Biosynthesis	PIPA02121
xylMP synthetase, nucleus	Nucleus	rSP + URA -> H2O + PSd5P	EC 4.2.1.70	Purine and Pyrimidine Biosynthesis	PIPA01028
Vacuolar membrane zinc transporter		zn[i]c] <=> zn[i]			
lysosomal reversible transport		ymy[i]c] <=> ymy[i]		Transport, Extracellular	
	Cytosol	CYS + H2O -> PIR + NH4 + H2S	EC 4.4.1.8	Methionine Metabolism	PIPA04067
	Cytosol	LCYlin + H2O -> ICYS + PIR + NH4	EC 4.4.1.8	Methionine Metabolism	PIPA04067
	Cytosol	hALA + AGS <=> GLU + MALGA	EC 2.6.1.19	Methionine Metabolism	PIPA01134
	Cytosol	sPRP -> PIR + SD3			
	Cytosol	ruuP + ATP -> ruuPP + ADP			
	Cytosol	ruuP <=> dNAP + LALD			
Naz/Pi cotransporter		na[i]c] + P[i]c] -> na[i]c] + P[i]c]			PIPA02248

ABBREVIATION	METABOLITE NAME	COMPARTMENT
10FTHF(c)	10-Formyltetrahydrofolate	Cytosol
12DGR(c)	1,2-Diacylglycerol	Cytosol
13bDGLCN(c)	1,3-beta-D-Glucan	Cytosol
13DAMPP(c)	1,3-Diaminopropane	Cytosol
13DPG(c)	3-Phospho-D-glyceroyl phosphate	Cytosol
14GLUN(c)	(1,4-alpha-D-Glucosyl)n	Cytosol
16bDGLCN(c)	1,6-beta-D-Glucan	Cytosol
1AG3P(c)	1-Acyl-sn-glycerol 3-phosphate	Cytosol
1AGLY3P(c)	1-Acyl-glycerone 3-phosphate	Cytosol
1AGPC(c)	1-Acyl-sn-glycerol-3-phosphocholine	Cytosol
1DGALI(c)	1-alpha-D-Galactosyl-myo-inositol	Cytosol
1MNCAM(c)	1-Methylnicotinamide	Cytosol
1P3H5C(c)	L-1-Pyrroline-3-hydroxy-5-carboxylate	Cytosol
1PYR5C(c)	1-Pyrroline-5-carboxylate	Cytosol
23cAMP(c)	2',3'-Cyclic AMP	Cytosol
23DPG(c)	2,3-Disphospho-D-glycerate	Cytosol
SAICAR(c)	(S)-2-[5-Amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxamido]succinate	Cytosol
25DHPP(c)	2,5-Diamino-6-hydroxy-4-(5'-phosphoribosylamino)-pyrimidine	Cytosol
25DTHPP(c)	2,5-diamino-6-ribitylamino-4(3H)-pyrimidinone 5'-phosphate	Cytosol
2AMSA(c)	2-Aminomalonate semialdehyde	Cytosol
2AOBUT(c)	L-2-Amino-3-oxobutanoate	Cytosol
2CPR5P(c)	1-(2-Carboxyphenylamino)-1-deoxy-D-ribulose 5-phosphate	Cytosol
2DCA7P(c)	2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate	Cytosol
2DGLC(c)	2-Deoxy-D-glucose	Cytosol
2DHP(c)	2-Dehydropantoate	Cytosol
2DOXG6P(c)	2-Deoxy-D-glucose 6-phosphate	Cytosol
2DR1P(c)	2-Deoxy-D-ribose 1-phosphate	Cytosol
2DR5P(c)	2-Deoxy-D-ribose 5-phosphate	Cytosol
2HB(c)	2-Hydroxybutyrate	Cytosol
2HHXDAL(c)	2-Hydroxy-hexadecanal	Cytosol
2IPPM(c)	2-Isopropylmaleate	Cytosol
2KMB(c)	2-keto-4-methylthiobutyrate	Cytosol
2MAHMP(c)	2-Methyl-4-amino-5-hydroxymethylpyrimidine diphosphate	Cytosol
2MBAC(c)	2-methylbutyl acetate	Cytosol
2OBUT(c)	2-Oxobutanoate	Cytosol
2OXOADP(c)	2-Oxadipate	Cytosol
2PG(c)	D-Glycerate 2-phosphate	Cytosol
2PHETOH(c)	2-phenylethanol	Cytosol
34HPP(c)	3-(4-Hydroxyphenyl)pyruvate	Cytosol
35cCMP(c)	3',5'-Cyclic CMP	Cytosol
35cdAMP(c)	3',5'-Cyclic dAMP	Cytosol
35cGMP(c)	3',5'-Cyclic GMP	Cytosol
35cIMP(c)	3',5'-Cyclic IMP	Cytosol
3C2HMP(c)	3-Carboxy-2-hydroxy-4-methylpentanoate	Cytosol
3C3HMP(c)	3-Carboxy-3-hydroxy-4-methylpentanoate	Cytosol
3C4MOP(c)	3-Carboxy-4-methyl-2-oxopentanoate	Cytosol
3CH5HPB(c)	3-Hexaprenyl-4,5-dihydroxybenzoate	Cytosol
3DHq(c)	3-Dehydroquininate	Cytosol
3DHSK(c)	3-Dehydroshikimate	Cytosol
3DSPHGN(c)	3-Dehydrosphinganine	Cytosol
3HANTHRN(c)	3-Hydroxyanthranilate	Cytosol
3IG3P(c)	C'-(3-Indolyl)-glycerol 3-phosphate	Cytosol
3IPMMEST(c)	3-isopropylmalate-methyl-ester	Cytosol
3MOB(c)	3-Methyl-2-oxobutanoate	Cytosol
3MOP(c)	(S)-3-Methyl-2-oxopentanoate	Cytosol
3OPHB_5(c)	3-Hexaprenyl-4-hydroxybenzoate	Cytosol
3PG(c)	3-Phospho-D-glycerate	Cytosol
3PHP(c)	3-Phosphohydroxypyruvate	Cytosol
3PSME(c)	5-O-(1-Carboxyvinyl)-3-phosphoshikimate	Cytosol
44MCTR(c)	4,4-dimethylcholesta-8,14,24-trienol	Cytosol
44MZYM(c)	4,4-dimethylzymosterol	Cytosol
4AABUTN(c)	4-Acetamidobutanoate	Cytosol
4ABUT(c)	4-Aminobutanoate	Cytosol

4ABUTN(c)	4-Aminobutanal	Cytosol
4ABZ(c)	4-Aminobenzoate	Cytosol
4ADCHO(c)	4-amino-4-deoxychorismate	Cytosol
4AHMMP(c)	4-Amino-5-hydroxymethyl-2-methylpyrimidine	Cytosol
4AMPM(c)	4-Amino-2-methyl-5-phosphomethylpyrimidine	Cytosol
4FUMACAC(c)	4-Fumarylacetoacetate	Cytosol
4GUCBD(c)	4-Guanidinobutanamide	Cytosol
4GUCBUTN(c)	4-Guanidinobutanoate	Cytosol
4H2OGLT(c)	4-Hydroxy-2-oxoglutarate	Cytosol
4HBZ(c)	4-Hydroxybenzoate	Cytosol
4HPROLT(c)	trans-4-Hydroxy-proline	Cytosol
4HTHR(c)	4-Hydroxy-threonine	Cytosol
4MHETZ(c)	4-Methyl-5-(2-hydroxyethyl)-thiazole	Cytosol
4MLACAC(c)	4-Maleylacetoacetate	Cytosol
4MOP(c)	4-Methyl-2-oxopentanoate	Cytosol
4MPETZ(c)	4-Methyl-5-(2-phosphoethyl)-thiazole	Cytosol
4MZYM(c)	4-methylzymosterol	Cytosol
4MZYM_INT1(c)	4-Methylzymosterol intermediate 1	Cytosol
4MZYM_INT2(c)	4-Methylzymosterol intermediate 2	Cytosol
4PASP(c)	4-Phospho-aspartate	Cytosol
4PPAN(c)	D-4'-Phosphopantothenate	Cytosol
4PPCYS(c)	N-((R)-4-Phosphopantothenoyl)-cysteine	Cytosol
4R5AU(c)	4-(1-D-Ribitylamino)-5-aminouracil	Cytosol
CAIR(c)	5-amino-1-(5-phospho-D-ribosyl)imidazole-4-carboxylate	Cytosol
5AOP(c)	5-Amino-4-oxopentanoate	Cytosol
5APRBU(c)	5-Amino-6-(5'-phosphoribitylamino)uracil	Cytosol
5CPMEV(c)	(R)-5-Diphosphomevalonate	Cytosol
5FTHF(c)	5-Formyltetrahydrofolate	Cytosol
5MCR1P(c)	5-Methylthio-5-deoxy-D-ribose 1-phosphate	Cytosol
5MCRU1P(c)	5-Methylthio-5-deoxy-D-ribulose 1-phosphate	Cytosol
5MTA(c)	5-Methylthioadenosine	Cytosol
5MTHF(c)	5-Methyltetrahydrofolate	Cytosol
5PMEV(c)	(R)-5-Phosphomevalonate	Cytosol
6PGC(c)	6-Phospho-D-gluconate	Cytosol
6PGL(c)	6-phospho-D-glucono-1,5actone	Cytosol
8AONN(c)	8-Amino-7-oxononanoate	Cytosol
AACAL(c)	Aminoacetaldehyde	Cytosol
AACOA(c)	Acetoacetyl-CoA	Cytosol
AACT(c)	Aminoacetone	Cytosol
ABT(c)	L-Arabinitol	Cytosol
AC(c)	Acetate	Cytosol
ACAC(c)	Acetoacetate	Cytosol
ACACP(c)	Acetyl-ACP	Cytosol
ACAL(c)	Acetaldehyde	Cytosol
ACCOA(c)	Acetyl-CoA	Cytosol
ACES(c)	Acetic ester	Cytosol
NAGA1P(c)	N-Acetyl-D-glucosamine 1-phosphate	Cytosol
NAGA6P(c)	N-Acetyl-D-glucosamine 6-phosphate	Cytosol
ACHMS(c)	O-Acetyl-homoserine	Cytosol
ACHSER	O-Acetylhomoserine	Cytosol
ACON5M(c)	E-3-carboxyl-2-pentenedioate 5-methyl ester	Cytosol
ACON-T(c)	trans-Aconitate	Cytosol
ACP(c)	acyl carrier protein	Cytosol
ACRN(c)	O-Acetylcarnitine	Cytosol
ACSER(c)	O-Acetyl-serine	Cytosol
ACTN-R(c)	(R)-Acetoin	Cytosol
ACYBUT(c)	gamma-Amino-gamma-cyanobutanoate	Cytosol
ADE(c)	Adenine	Cytosol
ADN(c)	Adenosine	Cytosol
ADP(c)	ADP	Cytosol
ADPRIB(c)	ADPribose	Cytosol
AHCYS(c)	S-Adenosyl-homocysteine	Cytosol
AHDT(c)	2-Amino-4-hydroxy-6-(erythro-1,2,3-trihydroxypropyl)dihydropteridine triphosphate	Cytosol
AICAR(c)	5-Amino-1-(5-Phospho-D-ribosyl)imidazole-4-carboxamide	Cytosol

AIR(c)	5-amino-1-(5-phospho-D-ribosyl)imidazole	Cytosol
AKG(c)	2-Oxoglutarate	Cytosol
bALA(c)	beta-Alanine	Cytosol
ALA(c)	L-Alanine	Cytosol
ALAtrna(c)	L-Alanyl-tRNA(Ala)	Cytosol
ALLPHN(c)	Allophanate	Cytosol
ALLTN(c)	Allantoin	Cytosol
ALLTT(c)	Allantoate	Cytosol
SAM(c)	S-Adenosyl-methionine	Cytosol
AMETAM(c)	S-Adenosylmethioninamine	Cytosol
AMOB(c)	S-Adenosyl-4-methylthio-2-oxobutanoate	Cytosol
AMP(c)	AMP	Cytosol
AMP2P(c)	Adenosine 2'-phosphate	Cytosol
ANTH(c)	Anthranilate	Cytosol
AP4A(c)	P1,P4-Bis(5'-adenosyl) tetraphosphate	Cytosol
AP4G(c)	P1-(5'-adenosyl),P4-(5'-guanosyl) tetraphosphate	Cytosol
APEP(c)	Nalpha-Acetylpeptide	Cytosol
APROA(c)	3-Aminopropanal	Cytosol
APROP(c)	alpha-Aminopropiononitrile	Cytosol
APRUT(c)	N-Acetylputrescine	Cytosol
APS(c)	Adenosine 5'-phosphosulfate	Cytosol
ARABD(c)	D-Arabinose	Cytosol
ARAB(c)	L-Arabinose	Cytosol
ARG(c)	L-Arginine	Cytosol
ARGSUC(c)	N(omega)-(L-Arginino)succinate	Cytosol
ARGtrna(c)	L-Arginyl-tRNA(Arg)	Cytosol
ARS(c)	Arsenite	Cytosol
ASN(c)	L-Asparagine	Cytosol
ASNtrna(c)	L-Asparaginyl-tRNA(Asn)	Cytosol
ASP(c)	L-Aspartate	Cytosol
ASPSA(c)	L-Aspartate 4-semialdehyde	Cytosol
ASPtrna(c)	L-Aspartyl-tRNA(Asp)	Cytosol
ATHR(c)	L-Allo-threonine	Cytosol
ATP(c)	ATP	Cytosol
BTAMP(c)	Biotinyl-5'-AMP	Cytosol
BTN(c)	Biotin	Cytosol
cAMP(c)	cAMP	Cytosol
CAPHIS(c)	2-(3-Carboxy-3-aminopropyl)-histidine	Cytosol
CBASP(c)	N-Carbamoyl-aspartate	Cytosol
CBP(c)	Carbamoyl phosphate	Cytosol
CDP(c)	CDP	Cytosol
CDPCHOL(c)	CDPcholine	Cytosol
CDPCAG(c)	CDPdiacylglycerol	Cytosol
CDPEA(c)	CDPethanolamine	Cytosol
CGLY(c)	Cys-Gly	Cytosol
CH4S(c)	Methanethiol	Cytosol
CHIT(c)	Chitin (monomer)	Cytosol
CHITOS(c)	Chitosan	Cytosol
CHOL(c)	Choline	Cytosol
CHOLP(c)	Choline phosphate	Cytosol
CHOR(c)	chorismate	Cytosol
CIT(c)	Citrate	Cytosol
CITR(c)	L-Citrulline	Cytosol
CMAPHIS(c)	2-[3-Carboxy-3-(methylammonio)propyl]-histidine	Cytosol
CMP(c)	CMP	Cytosol
CMUSA(c)	2-Amino-3-carboxymuconate semialdehyde	Cytosol
CO2(c)	CO2	Cytosol
COA(c)	Coenzyme A	Cytosol
CPPPG3(c)	Coproporphyrinogen III	Cytosol
CRN(c)	L-Carnitine	Cytosol
CSN(c)	Cytosine	Cytosol
CTP(c)	CTP	Cytosol
CYS(c)	L-Cysteine	Cytosol
LLCT(c)	L-Cystathionine	Cytosol

CYStrna(c)	L-Cysteinyl-tRNA(Cys)	Cytosol
CYTD(c)	Cytidine	Cytosol
DAC(c)	Deoxyadenosine	Cytosol
dACP(c)	dADP	Cytosol
DAGPY(c)	diacylglycerol pyrophosphate	Cytosol
dAMP(c)	dAMP	Cytosol
DANN(c)	7,8-Diaminononanoate	Cytosol
DARA14LAC(c)	D-Arabinono-1,4-lactone	Cytosol
dATP(c)	dATP	Cytosol
DB4P(c)	3,4-dihydroxy-2-butanone 4-phosphate	Cytosol
C100(c)	Decanoate (n-C10:0)	Cytosol
C100COA(c)	Decanoyl-CoA (n-C10:0CoA)	Cytosol
DCAMP(c)	N6-(1,2-Dicarboxyethyl)-AMP, Adenylosuccinate	Cytosol
dCDP(c)	dCDP	Cytosol
dCMP(c)	dCMP	Cytosol
dCTP(c)	dCTP	Cytosol
DCYT(c)	Deoxycytidine	Cytosol
C120(c)	Dodecanoate (n-C12:0)	Cytosol
C120ACP(c)	Dodecanoyl-ACP (n-C12:0ACP)	Cytosol
C120COA(c)	Dodecanoyl-CoA (n-C12:0CoA)	Cytosol
dGDP(c)	dGDP	Cytosol
dGMP(c)	dGMP	Cytosol
DGSN(c)	Deoxyguanosine	Cytosol
dGTP(c)	dGTP	Cytosol
DHA(c)	Dihydroxyacetone	Cytosol
DHAP(c)	Dihydroxyacetone phosphate	Cytosol
DHF(c)	7,8-Dihydrofolate	Cytosol
DHNPT(c)	Dihydroneopterin	Cytosol
DHOR-S(c)	(S)-Dihydroorotate	Cytosol
DHPMP(c)	Dihydroneopterin monophosphate	Cytosol
DHPT(c)	Dihydropteroate	Cytosol
DIN(c)	Deoxyinosine	Cytosol
DKMPP(c)	2,3-diketo-5-methylthio-1-phosphopentane	Cytosol
DM LZ(c)	6,7-Dimethyl-8-(1-D-ribityl)lumazine	Cytosol
DMPP(c)	Dimethylallyl diphosphate	Cytosol
DNAD(c)	Deamino-NAD+	Cytosol
DOL(c)	Dolichol	Cytosol
DOLP(c)	Dolichol phosphate	Cytosol
DPDOA(c)	Dephospho-CoA	Cytosol
DRIB(c)	Deoxyribose	Cytosol
DSDL(c)	dihydrosirohydrochlorin	Cytosol
DTBT(c)	Dethiobiotin	Cytosol
dTDP(c)	dTDP	Cytosol
dTMP(c)	dTMP	Cytosol
dTTP(c)	dTTP	Cytosol
dUDP(c)	dUDP	Cytosol
dUMP(c)	dUMP	Cytosol
DURI(c)	Deoxyuridine	Cytosol
dUTP(c)	dUTP	Cytosol
E4HGLU(c)	L-erythro-4-Hydroxyglutamate	Cytosol
E4P(c)	D-Erythrose 4-phosphate	Cytosol
EIG3P(c)	D-erythro-1-(Imidazol-4-yl)glycerol 3-phosphate	Cytosol
EPIST(c)	episterol	Cytosol
EPISTEST(c)	episterol ester	Cytosol
EPM(c)	Epimelibiose	Cytosol
ERGST(c)	Ergosterol	Cytosol
ERGST3GLC(c)	ergosterol 3-beta-D-glucoside	Cytosol
ERGSTEST(c)	ergosterol ester	Cytosol
ERG TETROL(c)	Ergosta-5,7,22,24,(28)-tetraen-3beta-ol	Cytosol
ERG TROL(c)	ergosta-5,7,24(28)-trienol	Cytosol
ETHA(c)	Ethanolamine	Cytosol
ETHAMP(c)	Ethanolamine phosphate	Cytosol
ETOH(c)	Ethanol	Cytosol
F1P(c)	D-Fructose 1-phosphate	Cytosol

F26BP(c)	D-Fructose 2,6-bisphosphate	Cytosol
F6P(c)	D-Fructose 6-phosphate	Cytosol
FAD(c)	Flavin adenine dinucleotide oxidized	Cytosol
FALD(c)	Formaldehyde	Cytosol
FDP(c)	D-Fructose 1,6-bisphosphate	Cytosol
FE2(c)	Fe ²⁺	Cytosol
FECOST(c)	fecosterol	Cytosol
FECOSTEST(c)	fecosterol ester	Cytosol
FGAR(c)	N ² -Formyl-N ¹ -(5-phospho-D-ribosyl)glycinamide	Cytosol
FMN(c)	FMN	Cytosol
FMNH ₂ (c)	Reduced FMN	Cytosol
FORM(c)	Formate	Cytosol
FGAM(c)	2-(Formamido)-N ¹ -(5-phospho-D-ribosyl)acetamidine	Cytosol
FAICAR(c)	5-Formamido-1-(5-phospho-D-ribosyl)imidazole-4-carboxamide	Cytosol
FRDP(c)	Farnesyl diphosphate	Cytosol
FRU(c)	D-Fructose	Cytosol
FUM(c)	Fumarate	Cytosol
G1P(c)	D-Glucose 1-phosphate	Cytosol
G3P(c)	Glyceraldehyde 3-phosphate	Cytosol
G3PC(c)	sn-Glycero-3-phosphocholine	Cytosol
G3Pi(c)	sn-Glycero-3-phospho-1-inositol	Cytosol
G6P(c)	D-Glucose 6-phosphate	Cytosol
BG6P(c)	beta-D-glucose 6-phosphate	Cytosol
GAL(c)	D-Galactose	Cytosol
GAL1P(c)	alpha-D-Galactose 1-phosphate	Cytosol
GAM1P(c)	D-Glucosamine 1-phosphate	Cytosol
GAM6P(c)	D-Glucosamine 6-phosphate	Cytosol
GAR(c)	N ¹ -(5-Phospho-D-ribosyl)glycinamide	Cytosol
GCAL(c)	Glycolaldehyde	Cytosol
GDP(c)	GDP	Cytosol
GDPMANN(c)	GDP-D-mannose	Cytosol
GGDP(c)	Geranylgeranyl diphosphate	Cytosol
GGL(c)	Galactosylglycerol	Cytosol
GLC(c)	D-Glucose	Cytosol
GLN(c)	L-Glutamine	Cytosol
GLNtrna(c)	L-Glutaminyl-tRNA(Gln)	Cytosol
GLP(c)	Glycylpeptide	Cytosol
GLU5P(c)	L-Glutamate 5-phosphate	Cytosol
GLU5SA(c)	L-Glutamate 5-semialdehyde	Cytosol
GLUALA(c)	5-Glutamyl-alanine	Cytosol
GLUCYS(c)	gamma-Glutamyl-cysteine	Cytosol
GLU(c)	L-Glutamate	Cytosol
GLUtrna(c)	L-Glutamyl-tRNA(Glu)	Cytosol
GLX(c)	Glyoxylate	Cytosol
GLY(c)	Glycine	Cytosol
GLYAL(c)	D-Glyceraldehyde	Cytosol
GL(c)	Glycerol	Cytosol
GLYC3P(c)	Glycerol 3-phosphate	Cytosol
GLYCOGEN(c)	glycogen	Cytosol
GLYtrna(c)	Glycyl-tRNA(Gly)	Cytosol
GMP(c)	GMP	Cytosol
GP4G(c)	P ₁ ,P ₄ -Bis(5'-guanosyl) tetraphosphate	Cytosol
GRDP(c)	Geranyl diphosphate	Cytosol
GSN(c)	Guanosine	Cytosol
GTHOX(c)	Oxidized glutathione	Cytosol
GTHRD(c)	Reduced glutathione	Cytosol
GTP(c)	GTP	Cytosol
GUA(c)	Guanine	Cytosol
H(c)	H ⁺	Cytosol
H ₂ O(c)	H ₂ O	Cytosol
H ₂ O ₂ (c)	Hydrogen peroxide	Cytosol
H ₂ S(c)	Hydrogen sulfide	Cytosol
HCO ₃ (c)	Bicarbonate	Cytosol
HCYS(c)	L-Homocysteine	Cytosol

C160(c)	Hexadecanoate (n-C16:0)	Cytosol
C161(c)	Hexadecenoate (n-C16:1)	Cytosol
C160(c)	Hexadecenoyl-CoA (n-C16:1CoA)	Cytosol
C161ACP(c)	cis-hexadec-9-enoyl-[acyl-carrier protein] (n-C16:1)	Cytosol
HEXDP(c)	all-trans-Hexaprenyl diphosphate	Cytosol
HGENTIS(c)	Homogentisate	Cytosol
HIS(c)	L-Histidine	Cytosol
HISP(c)	L-Histidinol phosphate	Cytosol
HISTD(c)	L-Histidinol	Cytosol
HISrna(c)	L-Histidyl-tRNA(His)	Cytosol
HLKYNR(c)	3-Hydroxy-kynurenine	Cytosol
HMBIL(c)	Hydroxymethylbilane	Cytosol
HMGCOA(c)	Hydroxymethylglutaryl-CoA	Cytosol
HOIURAT	5-Hydroxyisourate	Cytosol
HOML(c)	L-Homoserine	Cytosol
HPGLU(c)	Tetrahydropteroyltri-glutamate	Cytosol
HTAUR	Hypotaurine	Cytosol
HXAN(c)	Hypoxanthine	Cytosol
HXDCAL(c)	Hexadecanal	Cytosol
IAC(c)	Indole-3-acetamide	Cytosol
IAMAC(c)	isoamyl acetate	Cytosol
IAMOH(c)	Isoamyl alcohol	Cytosol
IASP(c)	Iminoaspartate	Cytosol
IBUTAC(c)	isobutyl acetate	Cytosol
IBUTOH(c)	isobutyl alcohol	Cytosol
ICIT(c)	Isocitrate	Cytosol
ID3ACAL(c)	Indole-3-acetaldehyde	Cytosol
IDP(c)	IDP	Cytosol
ILE(c)	L-Isoleucine	Cytosol
ILErna(c)	L-Isoleucyl-tRNA(Ile)	Cytosol
IMACP(c)	3-(Imidazol-4-yl)-2-oxopropyl phosphate	Cytosol
IMP(c)	IMP	Cytosol
IND3AC(c)	Indole-3-acetate	Cytosol
IND3ACNL(c)	Indole-3-acetonitrile	Cytosol
IND3ETH(c)	Indole-3-ethanol	Cytosol
INDPYR(c)	Indolepyruvate	Cytosol
INOST(c)	myo-Inositol	Cytosol
INS(c)	Inosine	Cytosol
IPDP(c)	Isopentenyl diphosphate	Cytosol
ITP(c)	ITP	Cytosol
K(c)	potassium	Cytosol
2AADP(c)	L-2-Aminoadipate	Cytosol
2AADP6SA(c)	L-2-Aminoadipate 6-semialdehyde	Cytosol
DLAC(c)	D-Lactate	Cytosol
LAC(c)	Lactate	Cytosol
LALD(c)	Lactaldehyde	Cytosol
LANOST(c)	Lanosterol	Cytosol
LANOSTEST(c)	lanosterol ester	Cytosol
LCYSTIN(c)	L-Cystine	Cytosol
LEU(c)	Leucine	Cytosol
LEUtrna(c)	Leucyl-tRNA(Leu)	Cytosol
LFMKYNR(c)	L-Formylkynurenine	Cytosol
LGT(c)	(R)-Sactoylgutathione	Cytosol
LKYNR(c)	L-Kynurenine	Cytosol
LYS(c)	Lysine	Cytosol
LYStrna(c)	Lysine-tRNA (Lys)	Cytosol
MALACP(c)	Malonyl-[acyl-carrier protein]	Cytosol
MALCOA(c)	Malonyl-CoA	Cytosol
MAL(c)	L-Malate	Cytosol
MALSA	Malonate semialdehyde	Cytosol
MALT(c)	Maltose	Cytosol
MAN(c)	D-Mannose	Cytosol
MAN1P(c)	D-Mannose 1-phosphate	Cytosol
MAN2MI1P-C(c)	Mannose-(inositol-P)2	Cytosol

MAN6P(c)	D-Mannose 6-phosphate	Cytosol
MANMI1P-C(c)	mannose-1D-myo-Inositol 1-phosphate	Cytosol
MANNAN(c)	Mannan	Cytosol
MELIB(c)	Melibiose	Cytosol
MELT(c)	melibiitol	Cytosol
METHF(c)	5,10-Methenyltetrahydrofolate	Cytosol
MET(c)	L-Methionine	Cytosol
METtrna(c)	L-Methionyl-tRNA (Met)	Cytosol
MEV(c)	(R)-Mevalonate	Cytosol
MHIS(c)	1-Methylhistidine	Cytosol
MHPGLU(c)	5-Methyltetrahydropteroyltri-glutamate	Cytosol
MI13456P(c)	1D-myo-Inositol 1,3,4,5,6-pentakisphosphate	Cytosol
MI145P(c)	1D-myo-Inositol 1,4,5-trisphosphate	Cytosol
MI1P-C(c)	1D-myo-Inositol 1-phosphate	Cytosol
MINOHP(c)	myo-Inositol hexakisphosphate	Cytosol
MLTHF(c)	5,10-Methylenetetrahydrofolate	Cytosol
MMET(c)	S-Methyl-methionine	Cytosol
MTHGXL(c)	Methylglyoxal	Cytosol
C140ACP(c)	Myristoyl-ACP (n-C14:0ACP)	Cytosol
N1ASPM(c)	N1-Acetylspermidine	Cytosol
N1SPRM(c)	N1-Acetylspermine	Cytosol
N4ABUTN(c)	N4-Acetylaminobutanol	Cytosol
NA1(c)	Sodium	Cytosol
NAC(c)	Nicotinate	Cytosol
NAD(c)	Nicotinamide adenine dinucleotide	Cytosol
NADH(c)	Nicotinamide adenine dinucleotide - reduced	Cytosol
NADP(c)	Nicotinamide adenine dinucleotide phosphate	Cytosol
NADPH(c)	Nicotinamide adenine dinucleotide phosphate - reduced	Cytosol
NAGA	N-Acetyl-D-glucosamine	Cytosol
NAGAD	N-Acetyl-D-glucosaminide	Cytosol
NBFORTYR(c)	N,N-bisformyl-dityrosine	Cytosol
NCAM(c)	Nicotinamide	Cytosol
NFORTYR(c)	N-Formyl-tyrosine	Cytosol
NH4(c)	Ammonium	Cytosol
NICRNT(c)	Nicotinate D-ribonucleotide	Cytosol
NMN(c)	NMN	Cytosol
O2(c)	O2	Cytosol
OAA(c)	Oxaloacetate	Cytosol
C080COA(c)	Octanoyl-CoA (n-C8:0CoA)	Cytosol
C180(c)	octadecanoate (n-C18:0)	Cytosol
C180ACP(c)	Octadecanoyl-ACP (n-C18:0ACP)	Cytosol
C181(c)	octadecenoate (n-C18:1)	Cytosol
C182(c)	octadecadienoate (n-C18:2)	Cytosol
C182ACP(c)	Octadecynoyl-ACP (n-C18:2ACP)	Cytosol
C182COA(c)	Octadecynoyl-CoA (n-C18:2CoA)	Cytosol
C080(c)	octanoate (n-C8:0)	Cytosol
C181ACP(c)	cis-octadec-11-enoyl-[acyl-carrier protein] (n-C18:1)	Cytosol
C181COA(c)	Octadecenoyl-CoA (n-C18:1CoA)	Cytosol
OH1(c)	hydroxide ion	Cytosol
OHPB(c)	2-Oxo-3-hydroxy-4-phosphobutanoate	Cytosol
ORN(c)	Ornithine	Cytosol
OROT(c)	Orotate	Cytosol
OROT5P(c)	Orotidine 5'-phosphate	Cytosol
OXAG(c)	Oxaloglutarate	Cytosol
PA(c)	Phosphatidate	Cytosol
PAC(c)	Phenylacetic acid	Cytosol
PACAL(c)	Phenylacetaldehyde	Cytosol
PAD(c)	2-Phenylacetamide	Cytosol
C160ACP(c)	Palmitoyl-ACP (n-C16:0ACP)	Cytosol
PAN4P(c)	Pantetheine 4'-phosphate	Cytosol
PANT(c)	(R)-Pantoate	Cytosol
PAP(c)	Adenosine 3',5'-bisphosphate	Cytosol
PAPS(c)	3'-Phosphoadenylyl sulfate	Cytosol
PC(c)	Phosphatidylcholine	Cytosol

PDX5P(c)	Pyridoxine 5'-phosphate	Cytosol
PE(c)	phosphatidylethanolamine	Cytosol
PENDP(c)	all-trans-Pentaprenyl diphosphate	Cytosol
PEP(c)	Phosphoenolpyruvate	Cytosol
PEPC(c)	peptide	Cytosol
PHEAC(c)	Phenethyl acetate	Cytosol
PHE(c)	L-Phenylalanine	Cytosol
PHetrna(c)	L-Phenylalanyl-tRNA(Phe)	Cytosol
PHPYR(c)	Phenylpyruvate	Cytosol
PHTHR(c)	O-Phospho-4-hydroxy-threonine	Cytosol
Pi(c)	Phosphate	Cytosol
C160COA(c)	Palmitoyl-CoA (n-C16:0CoA)	Cytosol
PNT0-R(c)	(R)-Pantothenate	Cytosol
PPBNG(c)	Porphobilinogen	Cytosol
PPHN(c)	Prephenate	Cytosol
PPHSER	O-Phosphorylhomoserine	Cytosol
PPI(c)	Diphosphate	Cytosol
PPMI12346P(c)	5-Diphosphoinositol pentakisphosphate	Cytosol
PPMI1346P(c)	Diphosphoinositol tetrakisphosphate	Cytosol
PPPG9(c)	Protoporphyrinogen IX	Cytosol
PRAM(c)	5-Phospho-beta-D-ribosylamine	Cytosol
PRAN(c)	N-(5-Phospho-D-ribosyl)anthranilate	Cytosol
PRBAMP(c)	1-(5-Phosphoribosyl)-AMP	Cytosol
PRBATP(c)	1-(5-Phosphoribosyl)-ATP	Cytosol
PRFP(c)	1-(5-Phosphoribosyl)-5-[(5-phosphoribosylamino)methylideneamino]imidazole-	Cytosol
PRLP(c)	5-[(5-phospho-1-deoxyribulos-1-ylamino)methylideneamino]-1-(5-phosphoribo:	Cytosol
PRO(c)	L-Proline	Cytosol
PROtrna(c)	L-Prolyl-tRNA(Pro)	Cytosol
PRPP(c)	5-Phospho-alpha-D-ribose 1-diphosphate	Cytosol
PS(c)	phosphatidylserine	Cytosol
PSD5P(c)	Pseudouridine 5'-phosphate	Cytosol
PSER(c)	O-Phospho-serine	Cytosol
PSPH1P(c)	Phytosphingosine 1-phosphate	Cytosol
PSPHINGS(c)	Phytosphingosine	Cytosol
PTD134BP(c)	phosphatidyl-1D-myo-inositol 3,4-bisphosphate	Cytosol
PTD135BP(c)	1-Phosphatidyl-D-myo-inositol 3,5-bisphosphate	Cytosol
PTD145BP(c)	1-Phosphatidyl-D-myo-inositol 4,5-bisphosphate	Cytosol
PTD1INO(c)	phosphatidyl-1D-myo-inositol	Cytosol
PTD2MEETA(c)	Phosphatidyl-N-dimethylethanolamine	Cytosol
PTD3INO(c)	phosphatidyl-1D-myo-3-inositol	Cytosol
PTD4INO(c)	phosphatidyl-1D-myo-4-inositol, yeast specific	Cytosol
PTDMEETA(c)	Phosphatidyl-N-methylethanolamine	Cytosol
PTRC(c)	Putrescine	Cytosol
PYAM5P(c)	Pyridoxamine 5'-phosphate	Cytosol
PYDAM(c)	Pyridoxamine	Cytosol
PYDX(c)	Pyridoxal	Cytosol
PYDX5P(c)	Pyridoxal 5'-phosphate	Cytosol
PYDXN(c)	Pyridoxine	Cytosol
PYR(c)	Pyruvate	Cytosol
qULN(c)	Quinolate	Cytosol
R1P(c)	alpha-D-Ribose 1-phosphate	Cytosol
R5P(c)	alpha-D-Ribose 5-phosphate	Cytosol
RAFFIN(c)	Raffinose	Cytosol
RIB(c)	D-Ribose	Cytosol
RIBFLV(c)	Riboflavin	Cytosol
RNAM(c)	N-Ribosylnicotinamide	Cytosol
RU5P(c)	D-Ribulose 5-phosphate	Cytosol
S(c)	Sulfur	Cytosol
S17BP(c)	Sedoheptulose 1,7-bisphosphate	Cytosol
S7P(c)	Sedoheptulose 7-phosphate	Cytosol
SACCRP(c)	L-Saccharopine	Cytosol
SALA	3-Sulfinoalanine	Cytosol
DSBT(c)	D-Sorbitol	Cytosol
SBT(c)	L-Sorbitol	Cytosol

SCL(c)	sirohydrochlorin	Cytosol
SENCYS	Selenocysteine	Cytosol
SER(c)	L-Serine	Cytosol
SERtrna(c)	L-Seryl-tRNA(Ser)	Cytosol
SFGLUTTH(c)	S-Formylglutathione	Cytosol
SHEME(c)	Siroheme	Cytosol
SKM(c)	Shikimate	Cytosol
SKM5P(c)	Shikimate 5-phosphate	Cytosol
SLCYSTH	Selenocystathionine	Cytosol
SO3(c)	Sulfite	Cytosol
SO4(c)	Sulfate	Cytosol
SPH1P(c)	Sphinganine 1-phosphate	Cytosol
SPHGN(c)	Sphinganine	Cytosol
SPMD(c)	Spermidine	Cytosol
SPRM(c)	Spermine	Cytosol
SPYR	3-Sulfinylpyruvate	Cytosol
SqL(c)	Squalene	Cytosol
SRB(c)	L-Sorbose	Cytosol
SSq23EPX(c)	(S)-Squalene-2,3-epoxide	Cytosol
C180COA(c)	Stearoyl-CoA (n-C18:0CoA)	Cytosol
SUCC(c)	Succinate	Cytosol
SUCHMS	O-Succinylhomoserine	Cytosol
SUCR(c)	Sucrose	Cytosol
SUCSAL(c)	Succinic semialdehyde	Cytosol
TAG6P(c)	D-Tagatose 6-phosphate	Cytosol
TAGDP(c)	D-Tagatose 1,6-biphosphate	Cytosol
TAUR(c)	Taurine	Cytosol
TCHOLA(c)	taurocholic acid	Cytosol
TCYS	Thiocysteine	Cytosol
C140COA(c)	Tetradecanoyl-CoA (n-C14:0CoA)	Cytosol
C141ACP(c)	cis-tetradec-7-enoyl-[acyl-carrier protein] (n-C14:1)	Cytosol
C141COA(c)	Tetradecenoyl-CoA (n-C14:1CoA)	Cytosol
TGLP(c)	N-Tetradecanoylglycylpeptide	Cytosol
THF(c)	5,6,7,8-Tetrahydrofolate	Cytosol
THFGLU(c)	Tetrahydrofolyl-[Glu](2)	Cytosol
THM(c)	Thiamin	Cytosol
THMMP(c)	Thiamin monophosphate	Cytosol
THMPP(c)	Thiamine diphosphate	Cytosol
THMTP(c)	Thiamin triphosphate	Cytosol
THR(c)	L-Threonine	Cytosol
THRtrna(c)	L-Threonyl-tRNA(Thr)	Cytosol
THYM(c)	Thymine	Cytosol
THYMD(c)	Thymidine	Cytosol
TRDOX(c)	Oxidized thioredoxin	Cytosol
TRDRD(c)	Reduced thioredoxin	Cytosol
TRE(c)	Trehalose	Cytosol
TRE6P(c)	alpha,alpha'-Trehalose 6-phosphate	Cytosol
TRIGLYC(c)	triglyceride	Cytosol
trnaALA(c)	tRNA(Ala)	Cytosol
trnaARG(c)	tRNA(Arg)	Cytosol
trnaASN(c)	tRNA(Asn)	Cytosol
trnaASP(c)	tRNA(Asp)	Cytosol
trnaCYS(c)	tRNA(Cys)	Cytosol
trnaGLN(c)	tRNA(Gln)	Cytosol
trnaGLU(c)	tRNA (Glu)	Cytosol
trnaGLY(c)	tRNA(Gly)	Cytosol
trnaHIS(c)	tRNA(His)	Cytosol
trnaILE(c)	tRNA(Ile)	Cytosol
trnaLEU(c)	tRNA(Leu)	Cytosol
trnaLYS(c)	tRNA(Lys)	Cytosol
trnaMET(c)	tRNA(Met)	Cytosol
trnaPHE(c)	tRNA(Phe)	Cytosol
trnaPRO(c)	tRNA(Pro)	Cytosol
trnaSER(c)	tRNA(Ser)	Cytosol

trnaTHR(c)	tRNA(Thr)	Cytosol
trnaTRP(c)	tRNA(Trp)	Cytosol
trnaTYR(c)	tRNA(Tyr)	Cytosol
trnaVAL(c)	tRNA(Val)	Cytosol
TRP(c)	L-Tryptophan	Cytosol
TRPtrna(c)	L-Tryptophanyl-tRNA(Trp)	Cytosol
C140(c)	tetradecanoate (n-C14:0)	Cytosol
C141(c)	tetradecenoate (n-C14:1)	Cytosol
TYR(c)	L-Tyrosine	Cytosol
TYRtrna(c)	L-Tyrosyl-tRNA(Tyr)	Cytosol
UDP(c)	UDP	Cytosol
UDPACGAL(c)	UDP-N-acetyl-D-galactosamine	Cytosol
UDPG(c)	UDPglucose	Cytosol
UDPGAL(c)	UDPgaltactose	Cytosol
UMP(c)	UMP	Cytosol
UPPG3(c)	Uroporphyrinogen III	Cytosol
URA(c)	Uracil	Cytosol
URAT	Urate	Cytosol
URDGLYC(c)	(-)-Ureidoglycolate	Cytosol
UREA(c)	Urea	Cytosol
URI(c)	Uridine	Cytosol
UTP(c)	UTP	Cytosol
VAL(c)	L-Valine	Cytosol
VALtrna(c)	L-Valyl-tRNA(Val)	Cytosol
XAN(c)	Xanthine	Cytosol
XMP(c)	Xanthosine 5'-phosphate	Cytosol
XTSN(c)	Xanthosine	Cytosol
XU5P(c)	D-Xylulose 5-phosphate	Cytosol
XYL(c)	D-Xylose	Cytosol
XYLT(c)	Xylitol	Cytosol
XYLU(c)	D-Xylulose	Cytosol
ZYM_INT1(c)	zymosterol intermediate 1	Cytosol
ZYM_INT2(c)	zymosterol intermediate 2	Cytosol
ZYMST(c)	zymosterol	Cytosol
ZYMSTEST(c)	zymosterol ester	Cytosol
6PGL(r)	6-phospho-D-glucono-1,5actone	Endoplasmic Reticulum
COA(r)	Coenzyme A	Endoplasmic Reticulum
DOLMANP(r)	Dolichyl phosphate D-mannose	Endoplasmic Reticulum
DOLP(r)	Dolichol phosphate	Endoplasmic Reticulum
ERGST(r)	Ergosterol	Endoplasmic Reticulum
ERGTESTROL(r)	Ergosta-5,7,22,24,(28)-tetraen-3beta-ol	Endoplasmic Reticulum
G6P(r)	D-Glucose 6-phosphate	Endoplasmic Reticulum
H(r)	H+	Endoplasmic Reticulum
H2O(r)	H2O	Endoplasmic Reticulum
MANNAN(r)	Mannan	Endoplasmic Reticulum
NAD(r)	Nicotinamide adenine dinucleotide	Endoplasmic Reticulum
NADH(r)	Nicotinamide adenine dinucleotide - reduced	Endoplasmic Reticulum
NADP(r)	Nicotinamide adenine dinucleotide phosphate	Endoplasmic Reticulum
NADPH(r)	Nicotinamide adenine dinucleotide phosphate - reduced	Endoplasmic Reticulum
O2(r)	O2	Endoplasmic Reticulum
Pi(r)	Phosphate	Endoplasmic Reticulum
PSPH1P(r)	Phytosphingosine 1-phosphate	Endoplasmic Reticulum
PSPHINGS(r)	Phytosphingosine	Endoplasmic Reticulum
SPH1P(r)	Sphinganine 1-phosphate	Endoplasmic Reticulum
SPHGN(r)	Sphinganine	Endoplasmic Reticulum
SqL(r)	Squalene	Endoplasmic Reticulum
SSq23EPX(r)	(S)-Squalene-2,3-epoxide	Endoplasmic Reticulum
13BDGLCN(e)	1,3-beta-D-Glucan	External
2HB(e)	2-Hydroxybutyrate	External
2MBAC(e)	2-methylbutyl acetate	External
2PHETOH(e)	2-phenylethanol	External
3C3HMP(e)	3-Carboxy-3-hydroxy-4-methylpentanoate	External
3MBALC(e)	3-Methylbutanal	External
3MOP(e)	(S)-3-Methyl-2-oxopentanoate	External

4ABUT(e)	4-Aminobutanoate	External
4ABZ(e)	4-Aminobenzoate	External
5AOP(e)	5-Amino-4-oxopentanoate	External
8AONN(e)	8-Amino-7-oxononanoate	External
ABT(e)	L-Arabinitol	External
AC(e)	Acetate	External
ACALC(e)	Acetaldehyde	External
ACES(e)	Acetic ester	External
ADE(e)	Adenine	External
ADN(e)	Adenosine	External
AKG(e)	2-Oxoglutarate	External
ALA(e)	L-Alanine	External
ALLTN(e)	Allantoin	External
ALLTT(e)	Allantoate	External
SAM(e)	S-Adenosyl-methionine	External
DARAB(e)	D-Arabinose	External
ARAB(e)	L-Arabinose	External
ARG(e)	L-Arginine	External
ARS(e)	Arsenite	External
ASN(e)	L-Asparagine	External
ASP(e)	L-Aspartate	External
BTN(e)	Biotin	External
CHOL(e)	Choline	External
CO2(e)	CO2	External
CRN(e)	L-Carnitine	External
CSN(e)	Cytosine	External
CYS(e)	L-Cysteine	External
CYTC(e)	Cytidine	External
DAD(e)	Deoxyadenosine	External
DANN(e)	7,8-Diaminononanoate	External
C100(e)	Decanoate (n-C10:0)	External
DCYT(e)	Deoxycytidine	External
C120(e)	Dodecanoate (n-C12:0)	External
DGSN(e)	Deoxyguanosine	External
DIN(e)	Deoxyinosine	External
dTTP(e)	dTTP	External
DURI(e)	Deoxyuridine	External
EPIST(e)	episterol	External
EPISTEST(e)	episterol ester	External
ERGST(e)	Ergosterol	External
ERGSTEST(e)	ergosterol ester	External
ETHA(e)	Ethanolamine	External
ETOH(e)	Ethanol	External
FE2(e)	Fe2+	External
FECOST(e)	fecosterol	External
FECOSTEST(e)	fecosterol ester	External
FMN(e)	FMN	External
FORM(e)	Formate	External
FRU(e)	D-Fructose	External
FUM(e)	Fumarate	External
G3PC(e)	sn-Glycero-3-phosphocholine	External
G3Pi(e)	sn-Glycero-3-phospho-1-inositol	External
GAL(e)	D-Galactose	External
GALUR(e)	D-Galacturonate	External
GAM6P(e)	D-Glucosamine 6-phosphate	External
GCALC(e)	Glycolaldehyde	External
GLC(e)	D-Glucose	External
GLN(e)	L-Glutamine	External
GLU(e)	L-Glutamate	External
GLX(e)	Glyoxylate	External
GLY(e)	Glycine	External
GL(e)	Glycerol	External
GSN(e)	Guanosine	External
GTHOX(e)	Oxidized glutathione	External

GTHRD(e)	Reduced glutathione	External
GUA(e)	Guanine	External
H(e)	H ⁺	External
H2O(e)	H2O	External
C160(e)	Hexadecanoate (n-C16:0)	External
C161(e)	Hexadecenoate (n-C16:1)	External
HIS(e)	L-Histidine	External
HXAN(e)	Hypoxanthine	External
IAMAC(e)	isoamyl acetate	External
IAMOH(e)	Isoamyl alcohol	External
IBUTAC(e)	isobutyl acetate	External
IBUTOH(e)	isobutyl alcohol	External
ID3ACALD(e)	Indole-3-acetaldehyde	External
ILE(e)	L-Isoleucine	External
IND3ETH(e)	Indole-3-ethanol	External
INOST(e)	myo-Inositol	External
INS(e)	Inosine	External
K(e)	potassium	External
LACD(e)	Dactate	External
LAC(e)	Lactate	External
LANOST(e)	Lanosterol	External
LANOSTEST(e)	lanosterol ester	External
LEU(e)	Leucine	External
LYS(e)	Lysine	External
MAL(e)	L-Malate	External
MALT(e)	Maltose	External
MAN(e)	D-Mannose	External
MELIB(e)	Melibiose	External
MET(e)	L-Methionine	External
MMET(e)	S-Methyl-methionine	External
NA1(e)	Sodium	External
NAC(e)	Nicotinate	External
NADP(e)	Nicotinamide adenine dinucleotide phosphate	External
NBFORTYR(e)	N,N-bisformyl-dityrosine	External
NH4(e)	Ammonium	External
NMN(e)	NMN	External
O2(e)	O2	External
OAA(e)	Oxaloacetate	External
C180(e)	octadecanoate (n-C18:0)	External
C181(e)	octadecenoate (n-C18:1)	External
C182(e)	octadecadienoate (n-C18:2)	External
ORN(e)	Ornithine	External
PACALD(e)	Phenylacetaldehyde	External
PAP(e)	Adenosine 3',5'-bisphosphate	External
PC(e)	Phosphatidylcholine	External
PECTIN(e)	Pectin	External
PEPD(e)	peptide	External
PHEAC(e)	Phenethyl acetate	External
PHE(e)	L-Phenylalanine	External
Pi(e)	Phosphate	External
PNTOR(e)	(R)-Pantothenate	External
PRO(e)	L-Proline	External
PTD1INO(e)	phosphatidyl-1D-myo-inositol	External
PTRC(e)	Putrescine	External
PYR(e)	Pyruvate	External
DRIB(e)	D-Ribose	External
RIBFLV(e)	Riboflavin	External
DSBT(e)	D-Sorbitol	External
SBT(e)	L-Sorbitol	External
SER(e)	L-Serine	External
SO3(e)	Sulfite	External
SO4(e)	Sulfate	External
SPMD(e)	Spermidine	External
SPRM(e)	Spermine	External

SRB(e)	L-Sorbose	External
SUCC(e)	Succinate	External
SUCR(e)	Sucrose	External
TAUR(e)	Taurine	External
THM(e)	Thiamin	External
THMMP(e)	Thiamin monophosphate	External
THMPP(e)	Thiamine diphosphate	External
THR(e)	L-Threonine	External
THYM(e)	Thymine	External
THYMD(e)	Thymidine	External
TRE(e)	Trehalose	External
TRP(e)	L-Tryptophan	External
C140(e)	tetradecanoate (n-C14:0)	External
TYR(e)	L-Tyrosine	External
URA(e)	Uracil	External
UREA(e)	Urea	External
URI(e)	Uridine	External
VAL(e)	L-Valine	External
XAN(e)	Xanthine	External
XTSN(e)	Xanthosine	External
DXYL(e)	D-Xylose	External
XYLT(e)	Xylitol	External
ZYMST(e)	zymosterol	External
ZYMSTEST(e)	zymosterol ester	External
ADP(g)	ADP	Golgi Apparatus
ATP(g)	ATP	Golgi Apparatus
CO2(g)	CO2	Golgi Apparatus
GDP(g)	GDP	Golgi Apparatus
GDPMANN(g)	GDP-D-mannose	Golgi Apparatus
GMP(g)	GMP	Golgi Apparatus
H(g)	H+	Golgi Apparatus
H2O(g)	H2O	Golgi Apparatus
M1MADCHITPPCOL(g)	alpha-D-mannosyl-beta-D-mannosyl-diacetylchitobiosyldiphosphodolichol	Golgi Apparatus
M2MADCHITPPCOL(g)	(alpha-D-mannosyl)2-beta-D-mannosyl-diacetylchitobiosyldiphosphodolichol	Golgi Apparatus
M3MADCHITPPCOL(g)	(alpha-D-mannosyl)3-beta-D-mannosyl-diacetylchitodiphosphodolichol	Golgi Apparatus
M4MADCHITPPCOL(g)	(alpha-D-Mannosyl)4-beta-D-mannosyl-diacetylchitobiosyldiphosphodolichol	Golgi Apparatus
MADCHITPPCOL(g)	beta-D-Mannosyldiacetylchitobiosyldiphosphodolichol	Golgi Apparatus
PE(g)	phosphatidylethanolamine	Golgi Apparatus
Pi(g)	Phosphate	Golgi Apparatus
PS(g)	phosphatidylserine	Golgi Apparatus
UDPGAL(g)	UDPgallactose	Golgi Apparatus
10FTHF(m)	10-Formyltetrahydrofolate	Mitochondria
1P3H5C(m)	L-1-Pyrroline-3-hydroxy-5-carboxylate	Mitochondria
1PYR5C(m)	1-Pyrroline-5-carboxylate	Mitochondria
23DHMB(m)	(R)-2,3-Dihydroxy-3-methylbutanoate	Mitochondria
23dHMP(m)	(R)-2,3-Dihydroxy-3-methylpentanoate	Mitochondria
2AHBUT(m)	(S)-2-Aceto-2-hydroxybutanoate	Mitochondria
2AHHMD(m)	2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine diphosphate	Mitochondria
2AHHMP(m)	2-Amino-4-hydroxy-6-hydroxymethyl-7,8-dihydropteridine	Mitochondria
2DCA7P(m)	2-Dehydro-3-deoxy-D-arabino-heptonate 7-phosphate	Mitochondria
2DHP(m)	2-Dehydropantoate	Mitochondria
2HP6MBq(m)	2-Hexaprenyl-6-methoxy-1,4-benzoquinone	Mitochondria
2HP6MP(m)	2-Hexaprenyl-6-methoxyphenol	Mitochondria
2HPMHMBq(m)	2-hexaprenyl-3-methyl-5-hydroxy-6-methoxy-1,4-benzoquinone	Mitochondria
2HPMMBq(m)	2-hexaprenyl-3-methyl-6-methoxy-1,4-benzoquinone	Mitochondria
2MCIT(m)	2-Methylcitrate	Mitochondria
2OBUT(m)	2-Oxobutanoate	Mitochondria
2OXOADP(m)	2-Oxo adipate	Mitochondria
2PHETOH(m)	2-phenylethanol	Mitochondria
34HPL(m)	3-(4-Hydroxyphenyl)lactate	Mitochondria
34HPP(m)	3-(4-Hydroxyphenyl)pyruvate	Mitochondria
3C3HMP(m)	3-Carboxy-3-hydroxy-4-methylpentanoate	Mitochondria
3C4MOP(m)	3-Carboxy-4-methyl-2-oxopentanoate	Mitochondria
3CH5HPB(m)	3-Hexaprenyl-4,5-dihydroxybenzoate	Mitochondria

3HPH5MB(m)	3-Hexaprenyl-4-hydroxy-5-methoxybenzoate	Mitochondria
3MOB(m)	3-Methyl-2-oxobutanoate	Mitochondria
3MOP(m)	(S)-3-Methyl-2-oxopentanoate	Mitochondria
3OPHB_5(m)	3-Hexaprenyl-4-hydroxybenzoate	Mitochondria
4ABUT(m)	4-Aminobutanoate	Mitochondria
4ABUTN(m)	4-Aminobutanal	Mitochondria
4ABZ(m)	4-Aminobenzoate	Mitochondria
4H2OGLT(m)	4-Hydroxy-2-oxoglutarate	Mitochondria
4HBZ(m)	4-Hydroxybenzoate	Mitochondria
4HBZCOA(m)	4-hydroxybenoyl-CoA	Mitochondria
4HGLUSA(m)	L-4-Hydroxyglutamate semialdehyde	Mitochondria
4HPROLT(m)	trans-4-Hydroxy-proline	Mitochondria
4MOP(m)	4-Methyl-2-oxopentanoate	Mitochondria
5AOP(m)	5-Amino-4-oxopentanoate	Mitochondria
5FTHF(m)	5-Formyltetrahydrofolate	Mitochondria
AACOA(m)	Acetoacetyl-CoA	Mitochondria
AC(m)	Acetate	Mitochondria
ACACP(m)	Acetyl-ACP	Mitochondria
ACAL(m)	Acetaldehyde	Mitochondria
ACCOA(m)	Acetyl-CoA	Mitochondria
ACG5P(m)	N-Acetyl-glutamyl 5-phosphate	Mitochondria
ACG5SA(m)	N-Acetyl-glutamate 5-semialdehyde	Mitochondria
ACGLU(m)	N-Acetyl-glutamate	Mitochondria
ACORN(m)	N2-Acetyl-ornithine	Mitochondria
ACP(m)	acyl carrier protein	Mitochondria
ACRN(m)	O-Acetylcarnitine	Mitochondria
ADE(m)	Adenine	Mitochondria
ADN(m)	Adenosine	Mitochondria
ADP(m)	ADP	Mitochondria
ADPRIB(m)	ADPribose	Mitochondria
AHCYS(m)	S-Adenosyl-homocysteine	Mitochondria
AKG(m)	2-Oxoglutarate	Mitochondria
ALACS(m)	(S)-2-Acetolactate	Mitochondria
ALA(m)	L-Alanine	Mitochondria
ALPAM(m)	S-aminomethylidihydrolipoamide	Mitochondria
ALPRO(m)	S-Aminomethylidihydrolipoylprotein	Mitochondria
SAM(m)	S-Adenosyl-methionine	Mitochondria
AMP(m)	AMP	Mitochondria
ARG(m)	L-Arginine	Mitochondria
ARGtrna(m)	L-Arginyl-tRNA(Arg)	Mitochondria
ASN(m)	L-Asparagine	Mitochondria
ASNtrna(m)	L-Asparaginyl-tRNA(Asn)	Mitochondria
ASP(m)	L-Aspartate	Mitochondria
ASPtrna(m)	L-Aspartyl-tRNA(Asp)	Mitochondria
ATP(m)	ATP	Mitochondria
B124TC(m)	But-1-ene-1,2,4-tricarboxylate	Mitochondria
CDPCAG(m)	CDPdiacylglycerol	Mitochondria
CIT(m)	Citrate	Mitochondria
CLPN(m)	Cardiolipin	Mitochondria
CMP(m)	CMP	Mitochondria
CO2(m)	CO2	Mitochondria
COA(m)	Coenzyme A	Mitochondria
COUCOA(m)	p-coumaroyl-CoA	Mitochondria
CRN(m)	L-Carnitine	Mitochondria
CTP(m)	CTP	Mitochondria
C100ACP(m)	Decanoyl-ACP (n-C10:0ACP)	Mitochondria
C120ACP(m)	Dodecanoyl-ACP (n-C12:0ACP)	Mitochondria
DHAP(m)	Dihydroxyacetone phosphate	Mitochondria
DHF(m)	7,8-Dihydrofolate	Mitochondria
DHLAM(m)	Dihydrolipoamide	Mitochondria
DHLPRO(m)	Dihydrolipolprotein	Mitochondria
DHNPT(m)	Dihydroneopterin	Mitochondria
DHPT(m)	Dihydropteroate	Mitochondria
DNAD(m)	Deamino-NAD+	Mitochondria

DPDOA(m)	Dephospho-CoA	Mitochondria
E4HGLU(m)	L-erythro-4-Hydroxyglutamate	Mitochondria
E4P(m)	D-Erythrose 4-phosphate	Mitochondria
ETOH(m)	Ethanol	Mitochondria
FAD(m)	Flavin adenine dinucleotide oxidized	Mitochondria
FADH2(m)	Flavin adenine dinucleotide reduced	Mitochondria
FE2(m)	Fe2+	Mitochondria
FICYTC(m)	Ferricytochrome c	Mitochondria
FMETtrna(m)	N-Formylmethionyl-tRNA	Mitochondria
FMN(m)	FMN	Mitochondria
FOCYTC(m)	Ferrocyclochrome c	Mitochondria
FORM(m)	Formate	Mitochondria
FRDP(m)	Farnesyl diphosphate	Mitochondria
FUM(m)	Fumarate	Mitochondria
GAL(m)	Glycolaldehyde	Mitochondria
GDP(m)	GDP	Mitochondria
GLU5SA(m)	L-Glutamate 5-semialdehyde	Mitochondria
GLU(m)	L-Glutamate	Mitochondria
GLUtrna(m)	L-Glutamyl-tRNA(Glu)	Mitochondria
GLY(m)	Glycine	Mitochondria
GLYC3P(m)	Glycerol 3-phosphate	Mitochondria
GSN(m)	Guanosine	Mitochondria
GTHOX(m)	Oxidized glutathione	Mitochondria
GTHRD(m)	Reduced glutathione	Mitochondria
GTP(m)	GTP	Mitochondria
GUA(m)	Guanine	Mitochondria
H(m)	H+	Mitochondria
H2O(m)	H2O	Mitochondria
H2O2(m)	Hydrogen peroxide	Mitochondria
HCIT(m)	2-Hydroxybutane-1,2,4-tricarboxylate	Mitochondria
HCO3(m)	Bicarbonate	Mitochondria
C161ACP(m)	cis-hexadec-9-enoyl-[acyl-carrier protein] (n-C16:1)	Mitochondria
HemeA(m)	Heme A	Mitochondria
HemeO(m)	Heme O	Mitochondria
HEXDP(m)	all-trans-Hexaprenyl diphosphate	Mitochondria
HICIT(m)	Homoisocitrate	Mitochondria
HIS(m)	L-Histidine	Mitochondria
HIStrna(m)	L-Histidyl-tRNA(His)	Mitochondria
HMGCOA(m)	Hydroxymethylglutaryl-CoA	Mitochondria
IAMOH(m)	Isoamyl alcohol	Mitochondria
IBUTOH(m)	isobutyl alcohol	Mitochondria
ICIT(m)	Isocitrate	Mitochondria
ID3ACAL(m)	Indole-3-acetaldehyde	Mitochondria
IDP(m)	IDP	Mitochondria
ILE(m)	L-Isoleucine	Mitochondria
ILEtrna(m)	L-Isoleucyl-tRNA(Ile)	Mitochondria
IND3AC(m)	Indole-3-acetate	Mitochondria
IND3ETH(m)	Indole-3-ethanol	Mitochondria
IPDP(m)	Isopentenyl diphosphate	Mitochondria
ITACCOA(m)	Itaconyl-CoA	Mitochondria
ITACON(m)	Itaconate	Mitochondria
ITP(m)	ITP	Mitochondria
DLAC(m)	D-Lactate	Mitochondria
LAC(m)	Lactate	Mitochondria
LEU(m)	Leucine	Mitochondria
LEUtrna(m)	Leucyl-tRNA(Leu)	Mitochondria
LGT(m)	(R)-Sactoylglutathione	Mitochondria
LPAM(m)	Lipoamide	Mitochondria
LPRO(m)	Lipoylprotein	Mitochondria
LYS(m)	Lysine	Mitochondria
LYStrna(m)	Lysine-tRNA (Lys)	Mitochondria
MALACP(m)	Malonyl-[acyl-carrier protein]	Mitochondria
MALCOA(m)	Malonyl-CoA	Mitochondria
MAL(m)	L-Malate	Mitochondria

METHF(m)	5,10-Methenyltetrahydrofolate	Mitochondria
MET(m)	L-Methionine	Mitochondria
METtrna(m)	L-Methionyl-tRNA (Met)	Mitochondria
MICIT(m)	methylisocitrate	Mitochondria
MLTHF(m)	5,10-Methylenetetrahydrofolate	Mitochondria
C140ACP(m)	Myristoyl-ACP (n-C14:0ACP)	Mitochondria
NAC(m)	Nicotinate	Mitochondria
NAD(m)	Nicotinamide adenine dinucleotide	Mitochondria
NADH(m)	Nicotinamide adenine dinucleotide - reduced	Mitochondria
NADP(m)	Nicotinamide adenine dinucleotide phosphate	Mitochondria
NADPH(m)	Nicotinamide adenine dinucleotide phosphate - reduced	Mitochondria
NCAM(m)	Nicotinamide	Mitochondria
NH4(m)	Ammonium	Mitochondria
NICRNT(m)	Nicotinate D-ribonucleotide	Mitochondria
NMN(m)	NMN	Mitochondria
O2(m)	O2	Mitochondria
OAA(m)	Oxaloacetate	Mitochondria
C080ACP(m)	Octanoyl-ACP (n-C8:0ACP)	Mitochondria
C180ACP(m)	Octadecanoyl-ACP (n-C18:0ACP)	Mitochondria
C182ACP(m)	Octadecynoyl-ACP (n-C18:2ACP)	Mitochondria
C181ACP(m)	cis-octadec-11-enoyl-[acyl-carrier protein] (n-C18:1)	Mitochondria
OH1(m)	hydroxide ion	Mitochondria
ORN(m)	Ornithine	Mitochondria
OXAG(m)	Oxaloglutarate	Mitochondria
PA(m)	Phosphatidate	Mitochondria
PACAL(m)	Phenylacetaldehyde	Mitochondria
C160ACP(m)	Palmitoyl-ACP (n-C16:0ACP)	Mitochondria
PAN4P(m)	Pantetheine 4'-phosphate	Mitochondria
PANT(m)	(R)-Pantoate	Mitochondria
PAP(m)	Adenosine 3',5'-bisphosphate	Mitochondria
PE(m)	phosphatidylethanolamine	Mitochondria
PENDP(m)	all-trans-Pentaprenyl diphosphate	Mitochondria
PEP(m)	Phosphoenolpyruvate	Mitochondria
PG(m)	Phosphatidylglycerol	Mitochondria
PGP(m)	Phosphatidylglycerophosphate	Mitochondria
PHE(m)	L-Phenylalanine	Mitochondria
PHEME(m)	Protoheme	Mitochondria
PHEtrna(m)	L-Phenylalanyl-tRNA(Phe)	Mitochondria
Pi(m)	Phosphate	Mitochondria
PPCOA(m)	Propanoyl-CoA	Mitochondria
PPi(m)	Diphosphate	Mitochondria
PPP9(m)	Protoporphyrin	Mitochondria
PPPG9(m)	Protoporphyrinogen IX	Mitochondria
PRO(m)	L-Proline	Mitochondria
PRPP(m)	5-Phospho-alpha-D-ribose 1-diphosphate	Mitochondria
PS(m)	phosphatidylserine	Mitochondria
PYR(m)	Pyruvate	Mitochondria
q6(m)	Ubiquinone-6	Mitochondria
q6H2(m)	Ubiquinol-6	Mitochondria
qULN(m)	Quinolate	Mitochondria
R1P(m)	alpha-D-Ribose 1-phosphate	Mitochondria
RIBFLV(m)	Riboflavin	Mitochondria
SCHLAM(m)	S-Succinyl dihydroipoamide	Mitochondria
SER(m)	L-Serine	Mitochondria
SUCC(m)	Succinate	Mitochondria
SUCCOA(m)	Succinyl-CoA	Mitochondria
T4HCINNM(m)	trans-4-Hydroxycinnamate	Mitochondria
C141ACP(m)	cis-tetradec-7-enoyl-[acyl-carrier protein] (n-C14:1)	Mitochondria
THF(m)	5,6,7,8-Tetrahydrofolate	Mitochondria
THMPP(m)	Thiamine diphosphate	Mitochondria
THR(m)	L-Threonine	Mitochondria
THRtrna(m)	L-Threonyl-tRNA(Thr)	Mitochondria
TRDOX(m)	Oxidized thioredoxin	Mitochondria
TRDRD(m)	Reduced thioredoxin	Mitochondria

trnaARG(m)	tRNA(Arg)	Mitochondria
trnaASN(m)	tRNA(Asn)	Mitochondria
trnaASP(m)	tRNA(Asp)	Mitochondria
trnaGLU(m)	tRNA (Glu)	Mitochondria
trnaHIS(m)	tRNA(His)	Mitochondria
trnaILE(m)	tRNA(Ile)	Mitochondria
trnaLEU(m)	tRNA(Leu)	Mitochondria
trnaLYS(m)	tRNA(Lys)	Mitochondria
trnaMET(m)	tRNA(Met)	Mitochondria
trnaPHE(m)	tRNA(Phe)	Mitochondria
trnaTHR(m)	tRNA(Thr)	Mitochondria
trnaTRP(m)	tRNA(Trp)	Mitochondria
trnaTYR(m)	tRNA(Tyr)	Mitochondria
trnaVAL(m)	tRNA(Val)	Mitochondria
TRP(m)	L-Tryptophan	Mitochondria
TRPtrna(m)	L-Tryptophanyl-tRNA(Trp)	Mitochondria
TYR(m)	L-Tyrosine	Mitochondria
TYRtrna(m)	L-Tyrosyl-tRNA(Tyr)	Mitochondria
UMP(m)	UMP	Mitochondria
UTP(m)	UTP	Mitochondria
VAL(m)	L-Valine	Mitochondria
VALtrna(m)	L-Valyl-tRNA(Val)	Mitochondria
ACCOA(n)	Acetyl-CoA	Nucleus
ADP(n)	ADP	Nucleus
AKG(n)	2-Oxoglutarate	Nucleus
AMP(n)	AMP	Nucleus
ASP(n)	L-Aspartate	Nucleus
ATP(n)	ATP	Nucleus
CBASP(n)	N-Carbamoyl-aspartate	Nucleus
CBP(n)	Carbamoyl phosphate	Nucleus
CDP(n)	CDP	Nucleus
CO2(n)	CO2	Nucleus
COA(n)	Coenzyme A	Nucleus
dACP(n)	dADP	Nucleus
dCDP(n)	dCDP	Nucleus
dGDP(n)	dGDP	Nucleus
DNAD(n)	Deamino-NAD+	Nucleus
dUDP(n)	dUDP	Nucleus
dUMP(n)	dUMP	Nucleus
GDP(n)	GDP	Nucleus
GLN(n)	L-Glutamine	Nucleus
GLU(n)	L-Glutamate	Nucleus
H(n)	H+	Nucleus
H2O(n)	H2O	Nucleus
H2O2(n)	Hydrogen peroxide	Nucleus
HCIT(n)	2-Hydroxybutane-1,2,4-tricarboxylate	Nucleus
HCO3(n)	Bicarbonate	Nucleus
MI13456P(n)	1D-myo-Inositol 1,3,4,5,6-pentakisphosphate	Nucleus
MI1345P(n)	1D-myo-Inositol 1,3,4,5-tetrakisphosphate	Nucleus
MI1456P(n)	1D-myo-Inositol 1,4,5,6-tetrakisphosphate	Nucleus
MI145P(n)	1D-myo-Inositol 1,4,5-trisphosphate	Nucleus
MINOHP(n)	myo-Inositol hexakisphosphate	Nucleus
NAD(n)	Nicotinamide adenine dinucleotide	Nucleus
NH4(n)	Ammonium	Nucleus
Pi(n)	Phosphate	Nucleus
PPI(n)	Diphosphate	Nucleus
PTD1INO(n)	phosphatidyl-1D-myo-inositol	Nucleus
PTD4INO(n)	phosphatidyl-1D-myo-4-inositol, yeast specific	Nucleus
TRDOX(n)	Oxidized thioredoxin	Nucleus
TRDRD(n)	Reduced thioredoxin	Nucleus
UDP(n)	UDP	Nucleus
UMP(n)	UMP	Nucleus
34HPP(x)	3-(4-Hydroxyphenyl)pyruvate	Peroxisome
3HCOA(x)	(S)-3-Hydroxydecanoyl-CoA	Peroxisome

3HDDCOA(x)	(S)-3-Hydroxydodecanoyl-CoA	Peroxisome
3HHDCOA(x)	(S)-3-Hydroxyhexadecanoyl-CoA	Peroxisome
3HODCOA(x)	(S)-3-Hydroxyoctadecanoyl-CoA	Peroxisome
3HTDCOA(x)	(S)-3-Hydroxytetradecanoyl-CoA	Peroxisome
3HXDCOA(x)	(S)-3-Hydroxyhexacosyl-CoA	Peroxisome
3ODCOA(x)	3-Oxodecanoyl-CoA	Peroxisome
3ODDCOA(x)	3-Oxododecanoyl-CoA	Peroxisome
3OHDCOA(x)	3-Oxohexadecanoyl-CoA	Peroxisome
3OHODCOA(x)	3-Oxoctadecanoyl-CoA	Peroxisome
3OHXDCOA(x)	3-Oxohexacosyl-CoA	Peroxisome
3OTDCOA(x)	3-Oxotetradecanoyl-CoA	Peroxisome
4H2OGLT(x)	4-Hydroxy-2-oxoglutarate	Peroxisome
AC(x)	Acetate	Peroxisome
ACCOA(x)	Acetyl-CoA	Peroxisome
ACRN(x)	O-Acetylcarnitine	Peroxisome
ADP(x)	ADP	Peroxisome
AKG(x)	2-Oxoglutarate	Peroxisome
AMP(x)	AMP	Peroxisome
ASP(x)	L-Aspartate	Peroxisome
ATP(x)	ATP	Peroxisome
CIT(x)	Citrate	Peroxisome
CO2(x)	CO2	Peroxisome
COA(x)	Coenzyme A	Peroxisome
CRN(x)	L-Carnitine	Peroxisome
LLCT(x)	L-Cystathionine	Peroxisome
DC2COA(x)	trans-Dec-2-enoyl-CoA	Peroxisome
C100(x)	Decanoate (n-C10:0)	Peroxisome
C100COA(x)	Decanoyl-CoA (n-C10:0CoA)	Peroxisome
DC2COA(x)	trans-Dodec-2-enoyl-CoA	Peroxisome
C120(x)	Dodecanoate (n-C12:0)	Peroxisome
C120COA(x)	Dodecanoyl-CoA (n-C12:0CoA)	Peroxisome
E4HGLU(x)	L-erythro-4-Hydroxyglutamate	Peroxisome
GLU(x)	L-Glutamate	Peroxisome
GLX(x)	Glyoxylate	Peroxisome
H(x)	H+	Peroxisome
H2O(x)	H2O	Peroxisome
H2O2(x)	Hydrogen peroxide	Peroxisome
HCYS(x)	L-Homocysteine	Peroxisome
C160(x)	Hexadecanoate (n-C16:0)	Peroxisome
C161(x)	Hexadecenoate (n-C16:1)	Peroxisome
C160(x)	Hexadecenoyl-CoA (n-C16:1CoA)	Peroxisome
HDC2COA(x)	trans-Hexadec-2-enoyl-CoA	Peroxisome
HXC2COA(x)	trans-Hexacos-2-enoyl-CoA	Peroxisome
ICIT(x)	Isocitrate	Peroxisome
MAL(x)	L-Malate	Peroxisome
NAD(x)	Nicotinamide adenine dinucleotide	Peroxisome
NADH(x)	Nicotinamide adenine dinucleotide - reduced	Peroxisome
NADP(x)	Nicotinamide adenine dinucleotide phosphate	Peroxisome
NADPH(x)	Nicotinamide adenine dinucleotide phosphate - reduced	Peroxisome
NH4(x)	Ammonium	Peroxisome
NMN(x)	NMN	Peroxisome
O2(x)	O2	Peroxisome
OAA(x)	Oxaloacetate	Peroxisome
C080COA(x)	Octanoyl-CoA (n-C8:0CoA)	Peroxisome
C180(x)	octadecanoate (n-C18:0)	Peroxisome
C182COA(x)	Octadecynoyl-CoA (n-C18:2CoA)	Peroxisome
C080(x)	octanoate (n-C8:0)	Peroxisome
OD2COA(x)	trans-Octadec-2-enoyl-CoA	Peroxisome
C181COA(x)	Octadecenoyl-CoA (n-C18:1CoA)	Peroxisome
PAN4P(x)	Pantetheine 4'-phosphate	Peroxisome
PAP(x)	Adenosine 3',5'-bisphosphate	Peroxisome
Pi(x)	Phosphate	Peroxisome
C160COA(x)	Palmitoyl-CoA (n-C16:0CoA)	Peroxisome
PPi(x)	Diphosphate	Peroxisome

PYR(x)	Pyruvate	Peroxisome
C180COA(x)	Stearoyl-CoA (n-C18:0CoA)	Peroxisome
TD2COA(x)	trans-Tetradec-2-enoyl-CoA	Peroxisome
C140COA(x)	Tetradecanoyl-CoA (n-C14:0CoA)	Peroxisome
C141COA(x)	Tetradecenoyl-CoA (n-C14:1CoA)	Peroxisome
TRDOX(x)	Oxidized thioredoxin	Peroxisome
TRDRD(x)	Reduced thioredoxin	Peroxisome
C140(x)	tetradecanoate (n-C14:0)	Peroxisome
C141(x)	tetradecenoate (n-C14:1)	Peroxisome
TYR(x)	L-Tyrosine	Peroxisome
ADP(v)	ADP	Vacuole
ARG(v)	L-Arginine	Vacuole
ASN(v)	L-Asparagine	Vacuole
ASP(v)	L-Aspartate	Vacuole
ATP(v)	ATP	Vacuole
CO2(v)	CO2	Vacuole
GLC(v)	D-Glucose	Vacuole
GLN(v)	L-Glutamine	Vacuole
GLU(v)	L-Glutamate	Vacuole
GLYCOGEN(v)	glycogen	Vacuole
GTHRD(v)	Reduced glutathione	Vacuole
H(v)	H+	Vacuole
H2O(v)	H2O	Vacuole
HIS(v)	L-Histidine	Vacuole
ILE(v)	L-Isoleucine	Vacuole
LCYSTIN(v)	L-Cystine	Vacuole
LEU(v)	Leucine	Vacuole
LYS(v)	Lysine	Vacuole
PE(v)	phosphatidylethanolamine	Vacuole
Pi(v)	Phosphate	Vacuole
PS(v)	phosphatidylserine	Vacuole
TCHOLA(v)	taurocholic acid	Vacuole
TRE(v)	Trehalose	Vacuole
TYR(v)	L-Tyrosine	Vacuole
CYST	L-Cysteate	
DHDOLPP	Dehydrodolichol diphosphate	
DOLPP	Dolichol diphosphate	
GAM	D-Glucosamine	
GCOA	Glutaryl-coa	