

Table 4: Columns of the stoichiometric matrix (reactions). Ordered list of reactions in the stoichiometric matrix used in the debugging simulations (SI Table 2). Reaction # is a nonredundant identifier used to denote each reaction.

Column	Reaction #	Abbreviation	Reaction Name
1	19551	DM_13-cis-oretn(n)	13-cis-oxo-retinoic acid demand
2	19552	DM_13-cis-retn(n)	13-cis-retinoate demand
3	14122	DM_3aib(c)	DM_3aib(c)
4	20466	DM_Asn-X-Ser/Thr(ly)	DM_Asn-X-Ser/Thr(ly)
5	15019	DM_LINKDEGly	demand reaction for lysosomal degradation of proteoglycan linkage
6	20471	DM_Ser-Gly/Ala-X-Gly(ly)	DM_Ser-Gly/Ala-X-Gly(ly)
7	20470	DM_Ser/Thr(ly)	DM_Ser/Thr(ly)
8	13303	DM_accoa/nadh/co2	pyruvate decarboxylation
9	13304	DM_accoa/nadh/co2(m)	pyruvate decarboxylation
10	14117	DM_ala-B(c)	DM_ala-B(c)
11	2318	DM_amp	DM_amp
12	1012	DM_atp(c)	atp demand
13	4317	DM_atp2(c)	atp demand
14	20250	DM_avite1(c)	alpha-Tocopherol demand
15	20251	DM_avite2(c)	alpha-Tocotrienol demand
16	20252	DM_bvite(c)	beta-tocopherol demand
17	923	DM_coa(c)	Coenzyme A demand
18	14811	DM_dag_hs	dag_hs demand
19	19371	DM_datp(m)	dATP demand
20	14129	DM_datp(n)	DM_datp(n)
21	19372	DM_dctp(m)	dCTP demand
22	14128	DM_dctp(n)	DM_dctp(n)
23	14152	DM_dgtp(m)	DM_dgtp(m)
24	14130	DM_dgtp(n)	DM_dgtp(n)
25	941	DM_dhap(c)	Dihydroxyacetone phosphate demand
26	20467	DM_dsT_antigen(g)	DM_dsT_antigen(g)
27	19373	DM_dttp(m)	dTTP demand
28	14131	DM_dttp(n)	DM_dttp(n)
29	20347	DM_ethamp(r)	Ethanolamine phosphate demand
30	13542	DM_fadh(m)	fadh demand
31	13502	DM_g3p(c)	DM_g3p(c)
32	13381	DM_glc(c)	glucose demand
33	13438	DM_glc(r)	glucuronate demand
34	2319	DM_gmp(c)	DM_gmp(c)
35	20468	DM_gpi_sig(er)	DM_gpi_sig(er)
36	9284	DM_gtp2	gtp demand 2
37	13437	DM_guln	gulonate demand
38	14928	DM_ha(e)	DM_ha(e)
39	19553	DM_hretn(n)	4 hydroxy retinoic acid demand
40	9272	DM_imp	imp demand
41	20469	DM_kdn(c)	DM_kdn(c)
42	13300	DM_lac-D/atp/h2o	anaerobic glycolysis demand
43	14742	DM_malcoa(m)	malcoa demand
44	20464	DM_melanin(c)	DM_melanin(c)
45	19554	DM_oretn(n)	4-oxo-retinoic acid demand
46	14576	DM_pydx5p(c)	DM_pydx5p(c)
47	945	DM_pyr(c)	Pyruvate demand
48	10039	DM_pyr(m)	Pyruvate demand
49	14230	DM_q10(c)	DM_q10(c)
50	14233	DM_q10(m)	DM_q10(m)
51	20472	DM_sTn_antigen(g)	DM_sTn_antigen(g)
52	20463	DM_sprm(c)	DM_sprm(c)
53	14076	DM_thmpp(c)	Thiamin pyrophosphate demand
54	14071	DM_thmpp(m)	Thiamin pyrophosphate demand
55	3013	DM_uacgam(c)	uacgam demand

Column	Reaction #	Abbreviation	Reaction Name
56	2321	DM_ump(c)	DM_ump(c)
57	14086	DM_urate(x)	DM_urate(x)
58	20253	DM_yvite(c)	gamma-Tocopherol demand
59	14932	HADEGly	hyaluronan degradation demand function
60	13327	M_amet	amet maintenance reaction
61	14801	NGLYDEGly	N-glycan degradation optimization function, lysosomal
62	10533	sink_urea	sink_urea
63	12730	EX_10fthf(e)	10-Formyltetrahydrofolate exchange
64	14905	EX_10fthf5glu(e)	10-formyltetrahydrofolate-[Glu](5) exchange
65	14906	EX_10fthf6glu(e)	10-formyltetrahydrofolate-[Glu](6) exchange
66	14907	EX_10fthf7glu(e)	10-formyltetrahydrofolate-[Glu](7) exchange
67	15122	EX_11-cis-retfa(e)	fatty acid 11-cis-retinol exchange
68	20388	EX_13-cis-retnglc(e)	13-cis-retinoyl glucuronide exchange
69	14077	EX_1glyc_hs(e)	1 acyl phosphoglycerol exchange
70	10938	EX_1mncam(e)	1-Methylnicotinamide exchange
71	11640	EX_2425dhvitd2(e)	24R,25-Dihydroxyvitamin D2 exchange
72	11641	EX_2425dhvitd3(e)	24R,25-Dihydroxyvitamin D3 exchange
73	20437	EX_24nph(e)	2,4 dihydroxy nitrophenol exchange
74	11642	EX_25hvitd2(e)	25-Hydroxyvitamin D2 exchange
75	11643	EX_25hvitd3(e)	25-Hydroxyvitamin D3 exchange
76	12491	EX_2hb(e)	2-Hydroxybutyrate exchange
77	20839	EX_2mctit(e)	2-Methylcitrate exchange
78	14613	EX_34dhoxpeg(e)	3,4-Dihydroxyphenylethyleneglycol exchange
79	12585	EX_34dhphe(e)	3,4-Dihydroxy-L-phenylalanine exchange
80	12627	EX_35cgmp(e)	3',5'-Cyclic GMP exchange
81	12085	EX_3aib(e)	L-3-Amino-isobutanoate exchange
82	20419	EX_3aib-D(e)	D-3-Amino-isobutanoate exchange
83	14614	EX_3mlda(e)	3-Methylimidazoleacetic acid exchange
84	827	EX_4abut(e)	4-Aminobutanoate exchange
85	20408	EX_4hdebrisoquine(e)	4 hydroxy debrisoquine exchange
86	9538	EX_4hphac(e)	4-Hydroxyphenylacetate exchange
87	20425	EX_4mtolbutamide(e)	4 hydroxy tolbutamide exchange
88	20431	EX_4nph(e)	4-Nitrophenol exchange
89	20432	EX_4nphsf(e)	4-Nitrophenyl sulfate exchange
90	11003	EX_4pyrdx(e)	4-Pyridoxate exchange
91	20374	EX_5adtststerone(e)	5alpha-Dihydrotestosterone exchange
92	20377	EX_5adtststeroneglc(e)	5alpha-Dihydrotestosterone glucuronide exchange
93	20387	EX_5adtststerones(e)	5alpha-Dihydrotestosterone sulfate exchange
94	14908	EX_5dhf(e)	pentaglutamyl folate (DHF) exchange
95	14840	EX_5fthf(e)	5-Formyltetrahydrofolate exchange
96	20414	EX_5homeprazole(e)	5 hydroxy omeprazole exchange
97	12034	EX_5htrp(e)	5-Hydroxy-L-tryptophan exchange
98	14841	EX_5mthf(e)	5-Methyltetrahydrofolate exchange
99	14909	EX_5thf(e)	pentaglutamyl folate (THF) exchange
100	14910	EX_6dhf(e)	haxglutamyl folate (DHF) exchange
101	20433	EX_6htststerone(e)	6 beta hydroxy testosterone exchange
102	14911	EX_6thf(e)	hexaglutamyl folate (THF) exchange
103	14912	EX_7dhf(e)	heptaglutamyl folate (DHF) exchange
104	14913	EX_7thf(e)	heptaglutamyl folate (THF) exchange
105	15123	EX_9-cis-retfa(e)	fatty acid 9-cis-retinol exchange
106	12499	EX_CLPND(e)	clupanodonic acid (docosapentaenoic (n-3)) exchange
107	12035	EX_Lcystin(e)	L-Cystine exchange
108	14078	EX_Rtotal(e)	R total exchange
109	12138	EX_Rtotal2(e)	R total 2 position exchange
110	12139	EX_Rtotal3(e)	R total 3 position exchange

Column	Reaction #	Abbreviation	Reaction Name
111	10421	EX_Tyr-ggn(e)	Tyr-194 of apo-glycogenin protein (primer for glycogen synthesis) exchange
112	2300	EX_abt(e)	L-Arabinitol exchange
113	828	EX_ac(e)	Acetate exchange
114	3659	EX_acac(e)	Acetoacetate exchange
115	1456	EX_acald(e)	Acetaldehyde exchange
116	12492	EX_acetone(e)	Acetone exchange
117	20442	EX_acgalfucgalacgalfuc12gal14acglcgalgluside_hs(e)	Type IIIA glycolipid exchange
118	20356	EX_acgalfucgalacgalfucgalacglcgal14acglcgalgluside_hs(e)	Type IIIAb exchange
119	1045	EX_acgam(e)	N-Acetyl-D-glucosamine exchange
120	12036	EX_ach(e)	Acetylcholine exchange
121	20380	EX_acn13acngalgsbside_hs(e)	sialyl (1,3) sialyl (2,6) galactosylgloboside (homo sapiens) exchange
122	20381	EX_acn23acngalgsbside_hs(e)	sialyl (2,3) sialyl (2,6) galactosylgloboside (homo sapiens) exchange
123	20383	EX_acnacngal14acglcgalgluside_hs(e)	3',8'-LD1 exchange
124	20385	EX_acnacngalgsbside_hs(e)	disialyl galactosylgloboside (homo sapiens) exchange
125	20386	EX_acngalacglcgal14acglcgalgluside_hs(e)	VI3NeuAc-nLc6Cer exchange
126	826	EX_ade(e)	Adenine exchange
127	758	EX_adn(e)	Adenosine exchange
128	4069	EX_adp	adp exchange
129	15038	EX_adprbp(e)	ADPribose 2'-phosphate exchange
130	15039	EX_adprib(e)	ADPribose exchange
131	12493	EX_adrn(e)	adrenic acid exchange
132	12037	EX_adrnl(e)	Adrenaline exchange
133	20427	EX_aflatoxin(e)	aflatoxin B1 exchange
134	20430	EX_ahandrostanglc(e)	Etiocolan-3alpha-ol-17-one 3-glucuronide exchange
135	15040	EX_ak2lgchol_hs(e)	1-alkyl 2-lysoglycerol 3-phosphocholine exchange
136	829	EX_akg(e)	2-Oxoglutarate exchange
137	8154	EX_ala-B(e)	beta-Alanine exchange
138	1064	EX_ala-D(e)	D-Alanine exchange
139	830	EX_ala-L(e)	L-Alanine exchange
140	20353	EX_aldstrn(e)	Aldosterone exchange
141	2026	EX_amp(e)	AMP exchange
142	20357	EX_andrstrn(e)	Androsterone exchange
143	20359	EX_andrstrnglc(e)	androsterone glucuronide exchange
144	20361	EX_antipyrene(e)	antipyrene exchange
145	20364	EX_apnox(e)	alpha-Pinene-oxide exchange
146	20365	EX_appnn(e)	(+)-alpha-Pinene exchange
147	20368	EX_aprgstrn(e)	20alpha-Hydroxyprogesterone exchange
148	14705	EX_aqcobal(e)	Aquacob(III)alamin exchange
149	680	EX_arab-L(e)	L-Arabinose exchange
150	12494	EX_arach(e)	Arachidic acid exchange
151	4039	EX_arachd(e)	nC20:4 exchange
152	831	EX_arg-L(e)	L-Arginine exchange
153	8153	EX_ascb-L(e)	L-Ascorbate exchange
154	832	EX_asn-L(e)	L-Asparagine exchange
155	12038	EX_asp-D(e)	D-Aspartate exchange
156	833	EX_asp-L(e)	L-Aspartate exchange

Column	Reaction #	Abbreviation	Reaction Name
157	4147	EX_atp(e)	ATP exchange
158	11644	EX_avite1(e)	alpha-Tocopherol exchange
159	11645	EX_avite2(e)	alpha-Tocotrienol exchange
160	5492	EX_bhb(e)	(R)-3-Hydroxybutanoate transport via H+ symport
161	12495	EX_bildglcur(e)	Bilirubin beta-diglucuronide exchange
162	12496	EX_bilglcur(e)	Bilirubin monoglucuronide exchange
163	8476	EX_bilirub(e)	Bilirubin exchange
164	10939	EX_biocyt(e)	Biocytin exchange
165	1608	EX_btn(e)	Biotin exchange
166	2629	EX_but(e)	Butyrate (n-C4:0) exchange
167	11646	EX_bvite(e)	beta-tocopherol exchange
168	20920	EX_bz(e)	Benzoate exchange
169	8748	EX_ca2(e)	Calcium exchange
170	12628	EX_camp(e)	cAMP exchange
171	11004	EX_caro(e)	beta-Carotene exchange
172	20348	EX_carveol(e)	(E)-carveol exchange
173	11647	EX_cca_d3(e)	Calcitroic acid (D3) exchange
174	10940	EX_cgly(e)	Cys-Gly exchange
175	1047	EX_chol(e)	Choline exchange
176	12497	EX_cholate(e)	Cholate exchange
177	12629	EX_chsterol(e)	Cholesterol exchange
178	10942	EX_chtn(e)	chitin exchange
179	1048	EX_cit(e)	Citrate exchange
180	9537	EX_cl(e)	Chloride exchange
181	10943	EX_cmp(e)	CMP exchange
182	8580	EX_co(e)	Carbon monoxide exchange
183	805	EX_co2(e)	CO2 exchange
184	20382	EX_coumarin(e)	coumarin exchange
185	12039	EX_creat(e)	Creatine exchange
186	20384	EX_crmp_hs(e)	Ceramide 1-phosphate exchange
187	706	EX_crn(e)	L-Carnitine exchange
188	4040	EX_crvnc(e)	nC22:6 exchange
189	835	EX_csn(e)	Cytosine exchange
190	14974	EX_cspg_a(e)	chondroitin sulfate A (GalNAc4S-GlcA) proteoglycan exchange
191	14975	EX_cspg_b(e)	chondroitin sulfate B / dermatan sulfate (IdoA2S-GalNAc4S) proteoglycan exchange
192	14976	EX_cspg_c(e)	chondroitin sulfate C (GalNAc6S-GlcA) proteoglycan exchange
193	14979	EX_cspg_d(e)	chondroitin sulfate D (GlcNAc6S-GlcA2S) proteoglycan exchange
194	14973	EX_cspg_e(e)	chondroitin sulfate E (GalNAc4,6diS-GlcA) proteoglycan exchange
195	13944	EX_cyan(e)	Hydrogen cyanide exchange
196	1065	EX_cys-L(e)	L-Cysteine exchange
197	836	EX_cyt(d)(e)	Cytidine exchange
198	4137	EX_dad-2(e)	Deoxyadenosine exchange
199	10422	EX_dad-5(e)	5'-Deoxyadenosine exchange
200	12133	EX_dag_hs(e)	diacylglycerol (homo sapiens) exchange
201	12498	EX_dcsptn1(e)	docosa-4,7,10,13,16-pentaenoic acid (n-6) exchange
202	837	EX_dcyt(e)	Deoxycytidine exchange
203	12500	EX_debrisoquine(e)	debrisoquine exchange
204	20446	EX_dgchol(e)	Chenodeoxyglycocholate exchange
205	1610	EX_dgsn(e)	Deoxyguanosine exchange
206	12040	EX_dhdascb(e)	Dehydroascorbate exchange
207	12501	EX_dheas(e)	Dehydroepiandrosterone sulfate exchange

Column	Reaction #	Abbreviation	Reaction Name
208	14914	EX_dhf(e)	7,8-Dihydrofolate exchange
209	20358	EX_digalsgalside_hs(e)	Digalactosylceramidesulfate exchange
210	1611	EX_din(e)	Deoxyinosine exchange
211	12502	EX_dlnlge(e)	dihomo-gamma-linolenic acid (n-6) exchange
212	20362	EX_dmantipyrine(e)	demethylated antipyrine exchange
213	20363	EX_dmhptcrn(e)	2,6 dimethylheptanoyl carnitine exchange
214	12041	EX_dopa(e)	Dopamine exchange
215	19506	EX_dopasf(e)	Dopamine 3-O-sulfate exchange
216	20366	EX_drib(e)	Deoxyribose exchange
217	1066	EX_duri(e)	Deoxyuridine exchange
218	20369	EX_eaflatoxin(e)	8,9 epoxy aflatoxin B1 exchange
219	20372	EX_ebastine(e)	ebastine exchange
220	20373	EX_ebastineoh(e)	hydroxylated ebastine exchange
221	12503	EX_eicostet(e)	eicosatetraenoic acid exchange
222	12504	EX_elaid(e)	elaidic acid exchange
223	12505	EX_estradiolglc(e)	estradiol glucuronide exchange
224	20379	EX_estriolglc(e)	16-Glucuronide-estriol exchange
225	14079	EX_estroneglc(e)	estrone glucuronide exchange
226	12506	EX_estrone(s)	Estrone 3-sulfate exchange
227	839	EX_etoh(e)	Ethanol exchange
228	1310	EX_fe2(e)	Fe2+ exchange
229	707	EX_fe3(e)	Fe3+ exchange
230	8752	EX_fol(e)	Folate exchange
231	1067	EX_for(e)	Formate exchange
232	681	EX_fru(e)	D-Fructose exchange
233	2028	EX_fuc-L(e)	L-Fucose exchange
234	20389	EX_fuc13galacglcgall4acglcgalgluside_hs(e)	III3Fuc-nLc6Cer exchange
235	20390	EX_fuc14galacglcgall4acglcgalgluside_hs(e)	Lea glycolipid exchange
236	20393	EX_fucacgalfucgalacglcgall4acglcgalgluside_hs(e)	(Gal)2 (GalNAc)1 (Glc)1 (GlcNAc)1 (LFuc)2 (Cer)1 exchange
237	20394	EX_fucacngal14acglcgall4acglcgalgluside_hs(e)	IV3-a-NeuAc,III3-a-Fuc-nLc4Cer exchange
238	20395	EX_fucacngalacglcgall4acglcgalgluside_hs(e)	IV3-a-Neu5Ac,III4-a-Fuc-Lc4Cer exchange
239	20396	EX_fucfuc12gal14acglcgall4acglcgalgluside_hs(e)	Ley glycolipid exchange
240	20397	EX_fucfuc132galacglcgall4acglcgalgluside_hs(e)	V3Fuc,III3Fuc-nLc6Cer exchange
241	20398	EX_fucfucfucgalacglc13galacglcgall4acglcgalgluside_hs(e)	(Gal)4 (Glc)1 (GlcNAc)3 (LFuc)3 (Cer)1 exchange
242	20401	EX_fucfucfucgalacglcgall4acglcgalgluside_hs(e)	(Gal)3 (Glc)1 (GlcNAc)2 (LFuc)3 (Cer)1 exchange
243	20403	EX_fucfucgalacglcgall4acglcgalgluside_hs(e)	Leb glycolipid exchange
244	20405	EX_fucgal14acglcgall4acglcgalgluside_hs(e)	Lacto-N-fucopentaosyl III ceramide exchange
245	20406	EX_fucgalfucgalacglcgall4acglcgalgluside_hs(e)	(Gal)3 (Glc)1 (GlcNAc)1 (LFuc)2 (Cer)1 exchange
246	20407	EX_fucgalgbside_hs(e)	fucosyl galactosylgloboside (homo sapiens) exchange
247	682	EX_gal(e)	D-Galactose exchange
248	20409	EX_galacglcgall4acglcgalgbside_hs(e)	Gal-GlcNAc-Gal globoside (homo sapiens) exchange

Column	Reaction #	Abbreviation	Reaction Name
249	20410	EX_galfuc12gal14acglcgalgl uside_hs(e)	(Gal)3 (Glc)1 (GlcNAc)1 (LFuc)1 (Cer)1 exchange
250	20411	EX_galfucgalacglcgal14acglc galgluside_hs(e)	(Gal)4 (Glc)1 (GlcNAc)2 (LFuc)1 (Cer)1 exchange
251	20412	EX_galgalfucfucgalacglcgal cglcgal14acglcgalgluside_hs(e)	(Gal)6 (Glc)1 (GlcNAc)3 (LFuc)2 (Cer)1 exchange
252	20413	EX_galgalgalthcrm_hs(e)	Gal-Gal-Gal-Gal-Gal-Glc-Cer (homo sapiens) exchange
253	708	EX_gam(e)	D-Glucosamine exchange
254	20417	EX_gbside_hs(e)	globoside (homo sapiens) exchange
255	12507	EX_gchola(e)	glycocholate exchange
256	20420	EX_gd1b2_hs(e)	GD1beta (homo sapiens) exchange
257	20421	EX_gd1c_hs(e)	GD1c (homo sapiens) exchange
258	20422	EX_gdchola(e)	glycochenodeoxycholate exchange
259	8166	EX_gdp(e)	GDP exchange
260	13047	EX_glc(c)	D-Glucose exchange
261	99	EX_glc(e)	D-Glucose exchange
262	710	EX_gln-L(e)	L-Glutamine exchange
263	841	EX_glu-L(e)	L-Glutamate exchange
264	10944	EX_gluala(e)	5-L-Glutamyl-L-alanine exchange
265	1068	EX_gly(e)	Glycine exchange
266	4150	EX_glyb(e)	Glycine betaine exchange
267	711	EX_glyc(e)	Glycerol exchange
268	20434	EX_glyc-S(e)	(S)-Glycerate exchange
269	10423	EX_glygn2(e)	glycogen, structure 2 (glycogenin-1,6-{7[1,4-Glc], 4[1,4-Glc]}) exchange
270	10424	EX_glygn4(e)	glycogen, structure 4 (glycogenin-1,6-{2[1,4-Glc], [1,4-Glc]}) exchange
271	10425	EX_glygn5(e)	glycogen, structure 5 (glycogenin-2[1,4-Glc]) exchange
272	10945	EX_gmp(e)	GMP exchange
273	20349	EX_gp1c_hs(e)	GP1c (homo sapiens) exchange
274	20350	EX_gp1calpha_hs(e)	GP1c alpha (homo sapiens) exchange
275	20351	EX_gq1b_hs(e)	GQ1b (homo sapiens) exchange
276	20352	EX_gq1balpha_hs(e)	GQ1balpha (homo sapiens) exchange
277	1069	EX_gsn(e)	Guanosine exchange
278	20355	EX_gt1a_hs(e)	GT1a (homo sapiens) exchange
279	1614	EX_gthox(e)	Oxidized glutathione exchange
280	2571	EX_gthrd(e)	Reduced glutathione exchange
281	8167	EX_gtp(e)	GTP exchange
282	842	EX_gua(e)	Guanine exchange
283	104	EX_h(e)	H+ exchange
284	100	EX_h2o(e)	H2O exchange
285	10946	EX_h2o2(e)	Hydrogen peroxide exchange
286	14615	EX_ha(e)	hyaluronan exchange
287	14616	EX_ha_pre1(e)	hyaluronan biosynthesis, precursor 1 exchange
288	12134	EX_hco3(e)	Bicarbonate exchange
289	20367	EX_hcoumarin(e)	hydroxy coumarin exchange
290	4143	EX_hdca(e)	Hexadecanoate (n-C16:0) exchange
291	2040	EX_hdcea(e)	hexadecenoate (n-C16:1) exchange
292	20371	EX_hestriatriol(e)	4,17 dihydroxy estradiol exchange
293	12508	EX_hexc(e)	hexacosanoate (n-C26:0) exchange
294	843	EX_his-L(e)	L-Histidine exchange
295	12042	EX_hista(e)	Histamine exchange
296	12043	EX_hom-L(e)	L-Homoserine exchange
297	20376	EX_hpdc(a)	heptadecanoate exchange
298	14972	EX_hspg(e)	heparan sulfate proteoglycan exchange

Column	Reaction #	Abbreviation	Reaction Name
299	20378	EX_htaxol(e)	hydroxylated taxol exchange
300	844	EX_hxan(e)	Hypoxanthine exchange
301	12135	EX_i(e)	Iodide exchange
302	11255	EX_idp(e)	IDP exchange
303	845	EX_ile-L(e)	L-Isoleucine exchange
304	11256	EX_imp(e)	IMP exchange
305	712	EX_inost(e)	myo-Inositol exchange
306	759	EX_ins(e)	Inosine exchange
307	846	EX_k(e)	K+ exchange
308	14617	EX_ksi(e)	keratan sulfate I exchange
309	14618	EX_ksi_deg1(e)	keratan sulfate I, degradation product 1 exchange
310	14977	EX_ksii_core2(e)	keratan sulfate II (core 2-linked) exchange
311	14978	EX_ksii_core4(e)	keratan sulfate II (core 4-linked) exchange
312	3075	EX_lac-D(e)	D-lactate exchange
313	847	EX_lac-L(e)	L-Lactate exchange
314	2032	EX_lcts(e)	Lactose exchange
315	848	EX_leu-L(e)	L-Leucine exchange
316	12509	EX_leuktrC4(e)	Leukotriene C4 exchange
317	12510	EX_lgnc(e)	lignoceric acid exchange
318	20399	EX_limnen(e)	Limonene exchange
319	9487	EX_lipoate(e)	Lipoate exchange
320	12511	EX_lneldc(e)	linoelaidic acid exchange
321	14080	EX_lnlc(e)	linoleic acid (all cis C18:2) exchange
322	12512	EX_lnlc(e) [deleted 08/16/2005 05:23:37 PM]	linoleic acid exchange
323	12513	EX_lnlnc(a)	alpha-Linolenic acid exchange
324	12514	EX_lnlncg(e)	gamma-linolenic acid exchange
325	12136	EX_lpchol_hs(e)	lysophosphatidylcholine (homo sapiens) exchange
326	1072	EX_lys-L(e)	L-Lysine exchange
327	14081	EX_mag_hs(e)	monoacylglycerol 2 (homo sapiens) exchange
328	713	EX_malt(e)	Maltose exchange
329	3253	EX_malttr(e)	Maltotriose exchange
330	714	EX_man(e)	D-Mannose exchange
331	2631	EX_man6p(e)	D-Mannose 6-phosphate exchange
332	7746	EX_meoh(e)	methanol exchange
333	20415	EX_mepi(e)	Metanephrine exchange
334	20416	EX_mercplaccys(e)	3-mercaptolactate-cysteine disulfide exchange
335	1120	EX_met-L(e)	L-Methionine exchange
336	14823	EX_mthgxl(e)	Methylglyoxal exchange
337	20919	EX_n2m2nmasn(e)	N-Acetyl-beta-D-glucosaminyl-1,2-alpha-D-mannosyl-1,3-(N-acetyl-beta-D-glucosaminyl-1,2-alpha-D-mannosyl-1,6)-(N-acetyl-beta-D-glucosaminyl-1,4)-beta-D-mannosyl-1,4-N-acetyl-beta-D-glucosaminyl-R exchange
338	850	EX_na1(e)	Sodium exchange
339	2033	EX_nac(e)	Nicotinate exchange
340	2034	EX_nad(e)	Nicotinamide adenine dinucleotide exchange
341	10111	EX_nadp(e)	Nicotinamide adenine dinucleotide phosphate exchange
342	8203	EX_ncam(e)	Nicotinamide exchange
343	892	EX_nh4(e)	Ammonia exchange
344	20428	EX_nifedipine(e)	nifedipine exchange
345	6011	EX_no(e)	Nitric oxide exchange
346	20429	EX_npthl(e)	Naphthalene exchange
347	12044	EX_nrpphr(e)	Norepinephrine exchange
348	19507	EX_nrpphrsf(e)	Sulfate derivative of norepinephrine exchange
349	12515	EX_nrvnc(e)	nervonic acid exchange
350	804	EX_o2(e)	O2 exchange

Column	Reaction #	Abbreviation	Reaction Name
351	12318	EX_o2s(e)	Superoxide anion exchange
352	20435	EX_oagd3_hs(e)	9-O-Acetylated GD3 (homo sapiens) exchange
353	20436	EX_oagt3_hs(e)	9-O-Acetylated GT3 (homo sapiens) exchange
354	2035	EX_ocdca(e)	octadecanoate (n-C18:0) exchange
355	4144	EX_ocdcea(e)	octadecenoate (n-C18:1) exchange
356	8163	EX_octa(e)	octanoate (n-C8:0) exchange
357	3809	EX_oh1	OH1 Exchange
358	20447	EX_omeprazole(e)	omeprazole exchange
359	20448	EX_onpthl(e)	naphthalene epoxide exchange
360	852	EX_orn(e)	Ornithine exchange
361	12516	EX_oxa(e)	Oxalate exchange
362	15041	EX_paf_hs(e)	1-alkyl 2-acteylglycerol 3-phosphocholine (homo sapiens) exchange
363	12137	EX_pchol_hs(e)	Phosphatidylcholine (homo sapiens) exchange
364	15042	EX_pe_hs(e)	phosphatidylethanolamine (homo sapiens) exchange
365	14824	EX_peplys(e)	Peptidyl-L-lysine exchange
366	20354	EX_perillyl(e)	Perillyl alcohol exchange
367	14082	EX_pglyc_hs(e)	phosphatidylglycerol (homo sapiens) exchange
368	853	EX_phe-L(e)	L-Phenylalanine exchange
369	14619	EX_pheacglN(e)	alpha-N-Phenylacetyl-L-glutamine exchange
370	7833	EX_pheme(e)	Protoheme exchange
371	10947	EX_phyQ(e)	Phylloquinone exchange
372	20360	EX_phyt(e)	phytanic acid exchange
373	101	EX_pi(e)	Phosphate exchange
374	1616	EX_pnto-R(e)	(R)-Pantothenate exchange
375	8443	EX_ppa(e)	Propionate exchange
376	11702	EX_pro-D(e)	D-Proline exchange
377	854	EX_pro-L(e)	L-Proline exchange
378	12517	EX_prostgd2(e)	Prostaglandin D2 exchange
379	12518	EX_prostge1(e)	Prostaglandin E1 exchange
380	12519	EX_prostge2(e)	Prostaglandin E2 exchange
381	12520	EX_prostgf2(e)	Prostaglandin F2alpha exchange
382	15043	EX_ps_hs(e)	phosphatidylserine (homo sapiens) exchange
383	20370	EX_ptdca(e)	pentadecanoate exchange
384	11005	EX_pydam(e)	Pyridoxamine exchange
385	11006	EX_pydx(e)	Pyridoxal exchange
386	11007	EX_pydxn(e)	Pyridoxine exchange
387	855	EX_pyr(e)	Pyruvate exchange
388	20375	EX_rbt(e)	Ribitol exchange
389	15070	EX_retfa(e)	fatty acid retinol exchange
390	11008	EX_retinol(e)	Retinol exchange
391	15125	EX_retinol-9-cis(e)	9-cis-retinol exchange
392	15126	EX_retinol-cis-11(e)	cis-11-retinol exchange
393	15127	EX_retn(e)	Retinoate exchange
394	15128	EX_retnqlc(e)	retinoyl glucuronide exchange
395	15129	EX_retpalm [deleted 10/09/2005 06:18:49 PM](e)	Retinyl palminate exchange
396	11009	EX_retpalm(e) [deleted 10/09/2005 06:38:54 PM]	Retinyl palminate exchange
397	717	EX_rib-D(e)	D-Ribose exchange
398	991	EX_ribflv(e)	Riboflavin exchange
399	10032	EX_s2l2fn2m2masn(e)	PA6 exchange
400	10033	EX_s2l2n2m2masn(e)	de-Fuc form of PA6 exchange
401	14706	EX_sarcs(e)	Sarcosine exchange
402	12521	EX_sel(e)	Selenate exchange
403	4138	EX_ser-D(e)	D-Serine exchange

Column	Reaction #	Abbreviation	Reaction Name
404	1074	EX_ser-L(e)	L-Serine exchange
405	14620	EX_sl-L(e)	L-sulfolactate exchange
406	719	EX_so4(e)	Sulfate exchange
407	20921	EX_spc_hs(e)	sphingosylphosphorylcholine (homo sapiens) exchange
408	20391	EX_sph1p(e)	Sphinganine 1-phosphate exchange
409	20392	EX_sphs1p(e)	Sphingosine 1-phosphate exchange
410	12522	EX_srtn(e)	Serotonin exchange
411	10426	EX_strch1(e)	starch, structure 1 (1,6-{7[1,4-Glc], 4[1,4-Glc]}) exchange
412	10427	EX_strch2(e)	starch, structure 2 (1,6-{2[1,4-Glc], [1,4-Glc]}) exchange
413	12523	EX_strdnc(e)	stearidonic acid exchange
414	856	EX_succ(e)	Succinate exchange
415	720	EX_sucr(e)	Sucrose exchange
416	12140	EX_tag_hs(e)	triacylglycerol (homo sapiens) exchange
417	20400	EX_tagat-D(e)	D-Tagatose exchange
418	2634	EX_taur(e)	Taurine exchange
419	20402	EX_taxol(e)	paclitaxel exchange
420	12524	EX_tchola(e)	Taurocholic acid exchange
421	13954	EX_tcynt(e)	Thiocyanate exchange
422	20404	EX_tdchola(e)	taurochenodeoxycholate exchange
423	12525	EX_tethex3(e)	tetracosahexaenoic acid, n-3 exchange
424	12526	EX_tetpent3(e)	tetracosapentaenoic acid, n-3 exchange
425	12527	EX_tetpent6(e)	tetracosapentaenoic acid, n-6 exchange
426	12528	EX_tettet6(e)	tetracosatetraenoic acid n-6 exchange
427	12733	EX_thf(e)	5,6,7,8-Tetrahydrofolate exchange
428	1075	EX_thm(e)	Thiamin exchange
429	2298	EX_thmmp(e)	Thiamin monophosphate exchange
430	14083	EX_thmtp(e)	Thiamin triphosphate exchange
431	857	EX_thr-L(e)	L-Threonine exchange
432	1621	EX_thym(e)	Thymine exchange
433	858	EX_thymd(e)	Thymidine exchange
434	12529	EX_thyox-L(e)	L-Thyroxine exchange
435	12530	EX_tmndnc(e)	timnodonic acid exchange
436	20418	EX_tolbutamide(e)	tolbutamide exchange
437	721	EX_tre(e)	Trehalose exchange
438	12531	EX_triodythy(e)	Triiodothyronine exchange
439	19508	EX_triodythysuf(e)	Triiodothyronine sulfate exchange
440	1076	EX_trp-L(e)	L-Tryptophan exchange
441	20423	EX_tststeroneglc(e)	testosterone glucuronide exchange
442	20424	EX_tststerones(e)	testosterone sulfate exchange
443	2635	EX_tsul(e)	Thiosulfate exchange
444	2037	EX_ttdca(e)	tetradecanoate (n-C14:0) exchange
445	20426	EX_txa2(e)	Thromboxane A2 exchange
446	19509	EX_tymsf(e)	Tyramine O-sulfate exchange
447	859	EX_tyr-L(e)	L-Tyrosine exchange
448	11257	EX_udp(e)	UDP exchange
449	10948	EX_ump(e)	UMP exchange
450	860	EX_ura(e)	Uracil exchange
451	19510	EX_urate(e)	Urate exchange
452	2925	EX_urea(e)	Urea exchange
453	861	EX_uri(e)	Uridine exchange
454	11258	EX_utp(e)	UTP exchange
455	12532	EX_vacc(e)	vaccenic acid exchange
456	862	EX_val-L(e)	L-Valine exchange
457	11648	EX_vitd2(e)	Vitamin D2 exchange
458	11649	EX_vitd3(e)	Vitamin D3 exchange
459	20438	EX_whddca(e)	omega hydroxy dodecanoate (n-C12:0) exchange

Column	Reaction #	Abbreviation	Reaction Name
460	20439	EX_whhdca(e)	omega hydroxy hexadecanoate (n-C16:0) exchange
461	20440	EX_whtststerone(e)	w hydroxy testosterone exchange
462	20441	EX_whtttdca(e)	omega hydroxy tetradecanoate (n-C14:0) exchange
463	14825	EX_xolest2_hs(e)	cholesterol ester (from FULLR2) exchange
464	14826	EX_xolest_hs(e)	cholesterol ester exchange
465	20443	EX_xoltri24(e)	7-alpha,24(S)-Dihydroxycholesterol exchange
466	20444	EX_xoltri25(e)	7-alpha,25-Dihydroxycholesterol exchange
467	20445	EX_xoltri27(e)	7-alpha,27-Dihydroxycholesterol exchange
468	684	EX_xyl-D(e)	D-Xylose exchange
469	4145	EX_xylt(e)	Xylitol exchange
470	11650	EX_yvite(e)	gamma-Tocopherol exchange
471	3153	IN_glc(er)	IN_glc(er)
472	3158	IN_glc(g)	IN_glc
473	6061	sink_10fthf	sink_10fthf
474	14185	sink_12ppd-S(c)	sink_12ppd-S(c)
475	13461	sink_2amac(c)	sink_2amac(c)
476	10599	sink_2dr1p(c)	sink_2dr1p(c)
477	6027	sink_2obut(c)	sink_2obut(c)
478	14024	sink_2pg(c)	sink_2pg(c)
479	13479	sink_34dhoxpeg	sink_34dhoxpeg
480	13462	sink_34hpp	sink_34hpp
481	14235	sink_3aib(m)	sink_3aib(m)
482	12688	sink_3mla	sink_3mla
483	978	sink_3pg(c)	sink_3pg(c)
484	12760	sink_4abut	sink_4abut
485	13475	sink_4hphac(c)	sink_4hphac(c)
486	13919	sink_4hpro-LT(m)	sink_4hpro-LT(m)
487	14109	sink_5aop(c)	sink_5aop(c)
488	12232	sink_5forthf(c)	5forthf sink
489	13445	sink_5moxact(c)	sink_5moxact(c)
490	12825	sink_5mta(c)	sink_5mta(c)
491	13446	sink_6hoxmelatn(c)	sink_6hoxmelatn(c)
492	14796	sink_Asn-X-Ser/Thr(ly)	sink_Asn-X-Ser/Thr(ly)
493	14733	sink_Asn-X-Ser/Thr(r)	sink_Asn-X-Ser/Thr(r)
494	13420	sink_Lcyst(c)	sink_Lcyst(c)
495	13499	sink_Lcystin(c)	sink_Lcystin(c)
496	13442	sink_Lfmkynr(c)	sink_Lfmkynr(c)
497	13443	sink_Lkynr(c)	sink_Lkynr(c)
498	13333	sink_Rtotal(c)	sink_Rtotal(c)
499	13370	sink_Rtotal2(c)	sink_Rtotal2(c)
500	13374	sink_Rtotal3(c)	sink_Rtotal3(c)
501	14934	sink_Ser-Gly/Ala-X-Gly(er)	sink_Ser-Gly/Ala-X-Gly(er)
502	15014	sink_Ser-Gly/Ala-X-Gly(ly)	sink_Ser-Gly/Ala-X-Gly(ly)
503	14804	sink_Ser/Thr(g)	sink_Ser/Thr(g)
504	15030	sink_Ser/Thr(ly)	sink_Ser/Thr(ly)
505	13699	sink_Tyr-ggn	sink_Tyr-ggn
506	14092	sink_aact(c)	sink_aact(c)
507	1291	sink_ac(c)	sink_ac(c)
508	14970	sink_ac(g)	sink_ac(g)
509	5808	sink_acac(c)	sink_acac(c)
510	13452	sink_acac(m)	sink_acac(m)
511	13357	sink_acald(c)	Acetaldehyde exchange
512	3815	sink_accoa(c)	sink_accoa(c)
513	15017	sink_accoa(ly)	sink_accoa(ly)
514	4300	sink_accoa(m)	sink_accoa(m)
515	15138	sink_accoa(x)	sink_accoa(x)

Column	Reaction #	Abbreviation	Reaction Name
516	14091	sink_acetone(c)	sink_acetone(c)
517	14201	sink_acetone(m)	sink_acetone(m)
518	13349	sink_acgagbside_hs(g)	sink_acgagbside_hs(g)
519	13735	sink_acgal(c)	sink_acgal(c)
520	15023	sink_acgal(ly)	sink_acgal(ly)
521	13740	sink_acgam	sink_acgam
522	14798	sink_acgam(ly)	sink_acgam(ly)
523	13352	sink_acnacngalgsbside_hs(g)	sink_acnacngalgsbside_hs(g)
524	14799	sink_acnam(ly)	sink_acnam(ly)
525	13869	sink_acorn(c)	sink_acorn(c)
526	6032	sink_ade(c)	sink_ade(c)
527	6066	sink_adn(c)	sink_adn(c)
528	888	sink_adp(c)	sink_adp(c)
529	965	sink_adp(m)	sink_adp(m)
530	13246	sink_adp(x)	sink_adp(x)
531	13465	sink_adrml(c)	sink_adrml(c)
532	12759	sink_agm(c)	sink_agm(c)
533	7791	sink_ahcys(c)	sink_ahcys(c)
534	14232	sink_ahcys(m)	sink_ahcys(m)
535	4622	sink_akg(c)	sink_akg(c)
536	967	sink_akg(m)	sink_akg(m)
537	15136	sink_akg(x)	sink_akg(x)
538	12821	sink_ala-B(c)	sink_ala-B(c)
539	12862	sink_ala-D(c)	sink_ala-D(c)
540	14027	sink_ala-D(x)	sink_ala-D(x)
541	7980	sink_ala-L(c)	sink_ala-L(c)
542	14032	sink_ala-L(x)	sink_ala-L(x)
543	924	sink_alac-S(c)	sink_alac-S(c)
544	4932	sink_amet	sink_amet
545	14231	sink_amet(m)	sink_amet(m)
546	12823	sink_ametam	sink_ametam
547	1131	sink_amp(c)	sink_amp(c)
548	4292	sink_amp(m)	sink_amp(m)
549	13764	sink_amp(r)	sink_amp(r)
550	13278	sink_amp(x)	sink_amp(x)
551	13453	sink_anth(c)	sink_anth(c)
552	14741	sink_arachd(c)	sink_arachd(c)
553	13366	sink_arachd(er)	sink_arachd(er)
554	7982	sink_arg(c)	sink_arg(c)
555	12743	sink_arg(m)	sink_arg(m)
556	13633	sink_ascb-L(c)	L-Ascorbate sink
557	7983	sink_asn(c)	sink_asn(c)
558	4625	sink_asp(c)	sink_asp(c)
559	12861	sink_asp(m)	sink_asp(m)
560	933	sink_atp(c)	sink_atp(c)
561	13104	sink_atp(m)	sink_atp(m)
562	13762	sink_atp(r)	sink_atp(r)
563	13245	sink_atp(x)	sink_atp(x)
564	13319	sink_betald(m)	sink_betald(m)
565	14203	sink_bhb(m)	sink_bhb(m)
566	14195	sink_bilirub(c)	sink_bilirub(c)
567	13760	sink_bz(r)	sink_bz(r)
568	12843	sink_carn(c)	sink_carn(c)
569	14136	sink_cdp(c)	sink_cdp(c)
570	13789	sink_cdpdag(c)	sink_cdpdag(c)

Column	Reaction #	Abbreviation	Reaction Name
571	13096	sink_chol(c)	sink_chol(c)
572	13320	sink_chol(m)	sink_chol(m)
573	13421	sink_cholcoa(x)	sink_cholcoa(x)
574	14746	sink_chsterol(c)	sink_chsterol(c)
575	13263	sink_chsterol(r)	sink_chsterol(r)
576	14190	sink_citr(c)	sink_citr(c)
577	4024	sink_cmp(c)	sink_cmp(c)
578	13343	sink_cmp(g)	sink_cmp(g)
579	13741	sink_cmpacna(c)	sink_cmpacna(c)
580	13345	sink_cmpacna(g)	sink_cmpacna(g)
581	14197	sink_co(c)	sink_co(c)
582	1289	sink_co2(c)	sink_co2(c)
583	7817	sink_co2(m)	sink_co2(m)
584	13258	sink_co2(r)	sink_co2(r)
585	13247	sink_co2(x)	sink_co2(x)
586	922	sink_coa(c)	sink_coa(c)
587	15018	sink_coa(ly)	sink_coa(ly)
588	964	sink_coa(m)	sink_coa(m)
589	13763	sink_coa(r)	sink_coa(r)
590	13251	sink_coa(x)	sink_coa(x)
591	13758	sink_coke(r)	sink_coke(r)
592	14809	sink_core2(g)	sink_core2(g)
593	14810	sink_core4(g)	sink_core4(g)
594	13486	sink_creat(c)	sink_creat(c)
595	13335	sink_crmp_hs(c)	sink_crmp_hs(c)
596	4291	sink_crn(c)	sink_crn(c)
597	14739	sink_crn(m)	sink_crn(m)
598	15139	sink_crn(x)	sink_crn(x)
599	14938	sink_cs_pre(g)	sink_cs_pre(g)
600	14941	sink_cspg_a(g)	sink_cspg_a(g)
601	15022	sink_cspg_a(ly)	sink_cspg_a(ly)
602	14942	sink_cspg_b(g)	sink_cspg_b(g)
603	15024	sink_cspg_b(ly)	sink_cspg_b(ly)
604	14943	sink_cspg_c(g)	sink_cspg_c(g)
605	15025	sink_cspg_c(ly)	sink_cspg_c(ly)
606	14944	sink_cspg_d(g)	sink_cspg_d(g)
607	15026	sink_cspg_d(ly)	sink_cspg_d(ly)
608	14945	sink_cspg_e(g)	sink_cspg_e(g)
609	15027	sink_cspg_e(ly)	sink_cspg_e(ly)
610	1915	sink_ctp(c)	sink_ctp(c)
611	7986	sink_cys-L(c)	L-Cys sink
612	14115	sink_cytd(c)	sink_cytd(c)
613	13332	sink_dag_hs(c)	sink_dag_hs(c)
614	14830	sink_dag_hs(er)	sink_dag_hs(er)
615	14118	sink_dcmp(c)	sink_dcmp(c)
616	14229	sink_decdp(m)	sink_decdp(m)
617	14026	sink_dhap(c)	sink_dhap(c)
618	13180	sink_dhbpt(c)	sink_dhbpt(c)
619	5085	sink_dhf(c)	sink_dhf(c)
620	15134	sink_dmhptcoa(m)	sink_dmhptcoa(m)
621	15142	sink_dmnoncoa(m)	sink_dmnoncoa(m)
622	15141	sink_dmnoncoa(x)	sink_dmnoncoa(x)
623	13745	sink_dmpp	sink_dmpp
624	13309	sink_dna(n)	sink_dna(n)
625	13310	sink_dna5mtc(n)	sink_dna5mtc(n)
626	14727	sink_dolglcp_U(g)	sink_dolglcp_U(g)

Column	Reaction #	Abbreviation	Reaction Name
627	14719	sink_dolichol_L(c)	sink_dolichol_L(c)
628	14718	sink_dolichol_U(c)	sink_dolichol_U(c)
629	14720	sink_dolmanp_L(c)	sink_dolmanp_L(c)
630	14721	sink_dolmanp_L(r)	sink_dolmanp_L(r)
631	14722	sink_dolmanp_U(r)	sink_dolmanp_U(r)
632	14729	sink_dolp_U(g)	sink_dolp_U(g)
633	14732	sink_dolp_U(r)	sink_dolp_U(r)
634	13476	sink_dopa(c)	sink_dopa(c)
635	14807	sink_dsT_antigen(g)	sink_dsT_antigen(g)
636	13744	sink_dtdprmn(c)	sink_dtdprmn(c)
637	14123	sink_dtmp(c)	sink_dtmp(c)
638	13311	sink_dtt(c)	sink_dtt(c)
639	13312	sink_dttOX(c)	sink_dttOX(c)
640	7991	sink_dttp(c)	sink_dttp(c)
641	14119	sink_dump(c)	sink_dump(c)
642	13641	sink_eryth	sink_eryth
643	1272	sink_etha	ethanolamine sink
644	13356	sink_etoh(c)	Ethanol exchange
645	13449	sink_f5hoxkyn(c)	sink_f5hoxkyn(c)
646	1135	sink_f6p(c)	sink_f6p(c)
647	4305	sink_fad(c)	sink_fad(c)
648	4296	sink_fad(m)	sink_fad(m)
649	13262	sink_fad(r)	sink_fad(r)
650	13286	sink_fad(x)	sink_fad(x)
651	4303	sink_fadh2(c)	sink_fadh2(c)
652	4295	sink_fadh2(m)	sink_fadh2(m)
653	13261	sink_fadh2(r)	sink_fadh2(r)
654	13285	sink_fadh2(x)	sink_fadh2(x)
655	13485	sink_fald(c)	sink_fald(c)
656	13324	sink_fald(m)	sink_fald(m)
657	14194	sink_fe2(c)	sink_fe2(c)
658	14113	sink_fe2(m)	sink_fe2(m)
659	4307	sink_ficytc(m)	sink_ficytc(m)
660	13447	sink_fna5moxam(c)	sink_fna5moxam(c)
661	4309	sink_focytc(m)	sink_focytc(m)
662	13259	sink_for(r)	sink_for(r)
663	14717	sink_frdp(c)	sink_frdp(c)
664	13249	sink_frdp(x)	sink_frdp(x)
665	13500	sink_fru(c)	D-Fructose sink
666	5827	sink_fuc-L	sink_fuc-L
667	14795	sink_fuc-L(ly)	sink_fuc-L(ly)
668	5027	sink_fum	sink_fum
669	966	sink_fum(m)	sink_fum(m)
670	1455	sink_glp(c)	glp Input
671	14784	sink_g3m8mpdol_L(r)	sink_g3m8mpdol_L(r)
672	14726	sink_g3m8mpdol_U(g)	sink_g3m8mpdol_U(g)
673	14730	sink_g3m8mpdol_U(r)	sink_g3m8mpdol_U(r)
674	977	sink_g3p(c)	sink_g3p(c)
675	959	sink_g6p(c)	sink_g6p(c)
676	13380	sink_g6p(r)	sink_g6p(r)
677	14828	sink_gacpail_hs(c)	sink_gacpail_hs(c)
678	5749	sink_gal(c)	sink_gal(c)
679	14800	sink_gal(ly)	sink_gal(ly)
680	13351	sink_galgaltherm_hs(g)	sink_galgaltherm_hs(g)
681	13337	sink_galgluside_hs(g)	sink_galgluside_hs(g)
682	13733	sink_gam6p(c)	sink_gam6p(c)

Column	Reaction #	Abbreviation	Reaction Name
683	13282	sink_gchola(x)	sink_gchola(x)
684	13348	sink_gd1b2_hs(g)	sink_gd1b2_hs(g)
685	13346	sink_gd1c_hs(g)	sink_gd1c_hs(g)
686	4079	sink_gdp(c)	sink_gdp(c)
687	14790	sink_gdp(g)	sink_gdp(g)
688	4080	sink_gdp(m)	sink_gdp(m)
689	13728	sink_gdpfuc(c)	sink_gdpfuc(c)
690	14789	sink_gdpfuc(g)	sink_gdpfuc(g)
691	13727	sink_gdpmann(c)	sink_gdpmann(c)
692	13746	sink_ggdp	sink_ggdp
693	15020	sink_glcu(ly)	sink_glcu(ly)
694	13168	sink_gln-D(m)	sink_gln-D(m)
695	7993	sink_gln-L(c)	sink_gln-L(c)
696	12864	sink_gln-L(m)	sink_gln-L(m)
697	13169	sink_glu-D(m)	sink_glu-D(m)
698	4547	sink_glu-L(c)	sink_glu-L(c)
699	12712	sink_glu-L(m)	sink_glu-L(m)
700	13488	sink_glu5sa(c)	sink_glu5sa(c)
701	13353	sink_gluside_hs(g)	sink_gluside_hs(g)
702	14033	sink_glx(c)	sink_glx(c)
703	13920	sink_glx(m)	sink_glx(m)
704	14031	sink_glx(x)	sink_glx(x)
705	7994	sink_gly(c)	sink_gly(c)
706	13290	sink_gly(m)	sink_gly(m)
707	13281	sink_gly(x)	sink_gly(x)
708	13373	sink_glyc(c)	sink_glyc(c)
709	4001	sink_glyc(m)	sink_glyc(m)
710	14037	sink_glyc-S(c)	sink_glyc-S(c)
711	13393	sink_glyc3p(c)	Glycerol 3-phosphate sink
712	8275	sink_glyclt(c)	sink_glyclt(c)
713	14036	sink_glyclt(m)	sink_glyclt(m)
714	13700	sink_glygn2(c)	sink_glygn2(c)
715	13347	sink_gp1c_hs(g)	sink_gp1c_hs(g)
716	14833	sink_gpi_prot_hs(er)	sink_gpi_prot_hs(er)
717	14832	sink_gpi_sig(er)	sink_gpi_sig(er)
718	13339	sink_gq1balpha_hs(g)	sink_gq1balpha_hs(g)
719	14093	sink_gsn(c)	sink_gsn(c)
720	13177	sink_gthox(c)	sink_gthox(c)
721	13176	sink_gthrd(c)	sink_gthrd(c)
722	1916	sink_gtp(c)	sink_gtp(c)
723	4082	sink_gtp(m)	sink_gtp(m)
724	5131	sink_gua(c)	sink_gua(c)
725	934	sink_h(c)	sink_h(c)
726	2162	sink_h(er)	sink_h(er)
727	2164	sink_h(g)	sink_h(g)
728	15012	sink_h(ly)	sink_h(ly)
729	1004	sink_h(m)	sink_h(m)
730	2163	sink_h(n)	sink_h(n)
731	2161	sink_h(p)	sink_h(p)
732	1877	sink_h2o(c)	sink_h2o(c)
733	1302	sink_h2o(g)	sink_h2o(g)
734	14794	sink_h2o(ly)	sink_h2o(ly)
735	4301	sink_h2o(m)	sink_h2o(m)
736	13253	sink_h2o(r)	sink_h2o(r)
737	12941	sink_h2o(x)	sink_h2o(x)
738	8600	sink_h2o2(c)	sink_h2o2(c)

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739	14105	sink_h2o2(m)	sink_h2o2(m)
740	12944	sink_h2o2(x)	sink_h2o2(x)
741	14933	sink_ha(ly)	sink_ha(ly)
742	911	sink_hco3(c)	sink_hco3(c)
743	12784	sink_hco3(m)	sink_hco3(m)
744	5781	sink_hcys-L	sink_hcys-L
745	13301	sink_hcys-L(c)	sink_hcys-L(c)
746	13368	sink_hemeBo(er)	sink_hemeBo(er)
747	13369	sink_hemeBr(er)	sink_hemeBr(er)
748	13459	sink_hi(c)	sink_hi(c)
749	7996	sink_his-L	sink_his-L
750	12686	sink_hista	sink_hista
751	13250	sink_hmgcoa(x)	sink_hmgcoa(x)
752	13478	sink_homoval(c)	sink_homoval(c)
753	14023	sink_hpyr(c)	sink_hpyr(c)
754	14969	sink_hspg(g)	sink_hspg(g)
755	15011	sink_hspg(ly)	sink_hspg(ly)
756	5133	sink_hxan(c)	sink_hxan(c)
757	13418	sink_hyptaur(c)	sink_hyptaur(c)
758	13451	sink_id3acald(c)	sink_id3acald(c)
759	15015	sink_idour(ly)	sink_idour(ly)
760	13457	sink_ile(m)	sink_ile(m)
761	12687	sink_im4ac	sink_im4ac
762	6062	sink_imp	sink_imp
763	13371	sink_inost(c)	sink_inost(c)
764	13458	sink_iodine(c)	sink_iodine(c)
765	13747	sink_ipdp	sink_ipdp
766	13750	sink_ipdp(x)	sink_ipdp(x)
767	13792	sink_itacon(m)	sink_itacon(m)
768	13725	sink_kdn(c)	sink_kdn(c)
769	14948	sink_ksi(g)	sink_ksi(g)
770	15028	sink_ksi(ly)	sink_ksi(ly)
771	14946	sink_ksii_core2(g)	sink_ksii_core2(g)
772	15029	sink_ksii_core2(ly)	sink_ksii_core2(ly)
773	14947	sink_ksii_core4(g)	sink_ksii_core4(g)
774	15033	sink_ksii_core4(ly)	sink_ksii_core4(ly)
775	13454	sink_kynate(c)	sink_kynate(c)
776	14788	sink_l2fn2m2masn(g)	sink_l2fn2m2masn(g)
777	10522	sink_lac-D	D-lactate sink
778	13518	sink_lcts(g)	sink_lcts(g)
779	13450	sink_leu(m)	sink_leu(m)
780	8000	sink_lys(c)	sink_lys(c)
781	12949	sink_lys(x)	sink_lys(x)
782	13642	sink_lyxnt(c)	sink_lyxnt(c)
783	14725	sink_m4mpdol_U(c)	sink_m4mpdol_U(c)
784	14724	sink_m8masn(g)	sink_m8masn(g)
785	14772	sink_m8masn(r)	sink_m8masn(r)
786	4623	sink_mal(c)	sink_mal(c)
787	14740	sink_malcoa(m)	sink_malcoa(m)
788	13726	sink_man(c)	sink_man(c)
789	14787	sink_man(g)	sink_man(g)
790	13724	sink_man6p(c)	sink_man6p(c)
791	13466	sink_melanin(c)	sink_melanin(c)
792	13441	sink_melatn(c)	sink_melatn(c)
793	13761	sink_meoh(r)	sink_meoh(r)
794	13793	sink_mescon(m)	sink_mescon(m)

Column	Reaction #	Abbreviation	Reaction Name
795	5782	sink_met(c)	sink_met(c)
796	13791	sink_mi145p(c)	sink_mi145p(c)
797	6064	sink_mlthf(c)	sink_mlthf(c)
798	13296	sink_mlthf(m)	sink_mlthf(m)
799	13480	sink_mma(c)	sink_mma(c)
800	12847	sink_msa(c)	sink_msa(c)
801	20459	sink_msa(m)	sink_msa(m)
802	14090	sink_mthgxl(c)	sink_mthgxl(c)
803	14792	sink_n2m2nmasn(g)	sink_n2m2nmasn(g)
804	14803	sink_n2m2nmasn(ly)	sink_n2m2nmasn(ly)
805	13419	sink_na1(x)	sink_na1(x)
806	4071	sink_nad(c)	sink_nad(c)
807	1575	sink_nad(m)	sink_nad(m)
808	13254	sink_nad(r)	sink_nad(r)
809	12945	sink_nad(x)	sink_nad(x)
810	1965	sink_nadh(c)	sink_nadh(c)
811	4075	sink_nadh(m)	sink_nadh(m)
812	13255	sink_nadh(r)	sink_nadh(r)
813	12946	sink_nadh(x)	sink_nadh(x)
814	1132	sink_nadp(c)	nadp sink
815	4921	sink_nadp(m)	nadph sink
816	13257	sink_nadp(r)	nadp sink
817	13248	sink_nadp(x)	nadph sink
818	1133	sink_nadph(c)	nadph sink
819	4920	sink_nadph(m)	nadph sink
820	13256	sink_nadph(r)	nadph sink
821	13242	sink_nadph(x)	nadph sink
822	13444	sink_nformanth(c)	sink_nformanth(c)
823	12923	sink_nh3(m)	sink_nh3(m)
824	12943	sink_nh3(x)	sink_nh3(x)
825	1292	sink_nh4(c)	sink_nh4(c)
826	14785	sink_nm4masn(g)	sink_nm4masn(g)
827	13448	sink_nmthsrtm(c)	sink_nmthsrtm(c)
828	12762	sink_no(c)	sink_no(c)
829	13464	sink_nrpplr(c)	sink_nrpplr(c)
830	7977	sink_o2(c)	sink_o2(c)
831	13237	sink_o2(m)	sink_o2(m)
832	13260	sink_o2(r)	sink_o2(r)
833	12940	sink_o2(x)	sink_o2(x)
834	13640	sink_o2s(c)	sink_o2s(c)
835	4925	sink_o2s(m)	sink_o2s(m)
836	4076	sink_oaa(c)	sink_oaa(c)
837	980	sink_oaa(m)	sink_oaa(m)
838	14073	sink_oh1	OH1 sink
839	14074	sink_oh1(m)	OH1 sink
840	1700	sink_orn(c)	sink_orn(c)
841	13635	sink_oxa(c)	sink_oxa(c)
842	13201	sink_pac(c)	sink_pac(c)
843	13198	sink_pacald(c)	sink_pacald(c)
844	13372	sink_pail45p_hs(c)	sink_pail45p_hs(c)
845	13790	sink_pail4p_hs(c)	sink_pail4p_hs(c)
846	13787	sink_pail_hs(c)	sink_pail_hs(c)
847	14940	sink_pap(g)	sink_pap(g)
848	14099	sink_paps(c)	sink_paps(c)
849	14939	sink_paps(g)	sink_paps(g)
850	13331	sink_pchol_hs(c)	sink_pchol_hs(c)

Column	Reaction #	Abbreviation	Reaction Name
851	13487	sink_pcreat(c)	sink_pcreat(c)
852	13376	sink_pe_hs(c)	sink_pe_hs(c)
853	14829	sink_pe_hs(er)	sink_pe_hs(er)
854	13192	sink_peamn(c)	sink_peamn(c)
855	13759	sink_pegoncoa(r)	sink_pegoncoa(r)
856	979	sink_pep(c)	sink_pep(c)
857	13202	sink_phaccoa(c)	sink_phaccoa(c)
858	8004	sink_phe-L(c)	sink_phe-L(c)
859	13191	sink_pheacgln(c)	sink_pheacgln(c)
860	14196	sink_pheme(c)	sink_pheme(c)
861	14110	sink_pheme(m)	sink_pheme(m)
862	13185	sink_phpyr(c)	sink_phpyr(c)
863	15135	sink_phytcoa(c)	sink_phytcoa(c)
864	932	sink_pi(c)	sink_pi(c)
865	13325	sink_pi(er)	sink_pi(er)
866	7816	sink_pi(m)	sink_pi(m)
867	13243	sink_pi(x)	sink_pi(x)
868	920	sink_pmtcoa(c)	sink_pmtcoa(c)
869	13298	sink_ppcoa(c)	sink_ppcoa(c)
870	13460	sink_ppcoa(m)	sink_ppcoa(m)
871	13365	sink_ppcoa(x)	sink_ppcoa(x)
872	931	sink_ppi(c)	sink_ppi(c)
873	4310	sink_ppi(m)	sink_ppi(m)
874	13264	sink_ppi(r)	sink_ppi(r)
875	13244	sink_ppi(x)	sink_ppi(x)
876	14831	sink_pre_prot(er)	sink_pre_prot(er)
877	8006	sink_pro-L(c)	sink_pro-L(c)
878	12740	sink_pro-L(m)	sink_pro-L(m)
879	1963	sink_prpp(c)	sink_prpp(c)
880	8008	sink_ptrc(c)	sink_ptrc(c)
881	14573	sink_pydx(c)	sink_pydx(c)
882	1288	sink_pyr(c)	sink_pyr(c)
883	960	sink_pyr(m)	sink_pyr(m)
884	14028	sink_pyr(x)	sink_pyr(x)
885	14124	sink_q10(c)	sink_q10(c)
886	4286	sink_q10(m)	sink_q10(m)
887	14125	sink_q10h2(m)	sink_q10h2(m)
888	13172	sink_quln	sink_quln
889	13203	sink_r1p	sink_r1p
890	975	sink_r5p(c)	sink_r5p(c)
891	3657	sink_ru5p-D	sink_ru5p-D
892	14791	sink_s2l2fn2m2masn(g)	sink_s2l2fn2m2masn(g)
893	14793	sink_s2l2fn2m2masn(ly)	sink_s2l2fn2m2masn(ly)
894	14806	sink_sT_antigen(g)	sink_sT_antigen(g)
895	14808	sink_sTn_antigen(g)	sink_sTn_antigen(g)
896	12711	sink_saccrp-L(m)	sink_saccrp-L(m)
897	13416	sink_seahcys(n)	sink_seahcys(n)
898	13417	sink_seasmet(n)	sink_seasmet(n)
899	13305	sink_selmeth(c)	sink_selmeth(c)
900	13306	sink_selnp(c)	sink_selnp(c)
901	8009	sink_ser-L(c)	sink_ser-L(c)
902	1701	sink_so4(c)	sink_so4(c)
903	15013	sink_so4(ly)	sink_so4(ly)
904	13334	sink_sphmyln_hs(c)	sink_sphmyln_hs(c)
905	8010	sink_spmc(c)	sink_spmc(c)
906	12860	sink_sprm(c)	sink_sprm(c)

Column	Reaction #	Abbreviation	Reaction Name
907	13751	sink_sql(r)	sink_sql(r)
908	13440	sink_srtn(c)	sink_srtn(c)
909	968	sink_succ(m)	sink_succ(m)
910	15137	sink_succ(x)	sink_succ(x)
911	981	sink_succoa(m)	sink_succoa(m)
912	13375	sink_tag_hs(c)	sink_tag_hs(c)
913	13280	sink_taur(x)	sink_taur(x)
914	13283	sink_tchola(x)	sink_tchola(x)
915	13179	sink_thbpt(c)	sink_thbpt(c)
916	13277	sink_thcholstoic(m)	sink_thcholstoic(m)
917	13284	sink_thcholstoic(x)	sink_thcholstoic(x)
918	3821	sink_thf(c)	sink_thf(c)
919	13295	sink_thf(m)	sink_thf(m)
920	5903	sink_thm(c)	sink_thm(c)
921	14075	sink_thmmp(c)	sink_thmmp(c)
922	8012	sink_thr-L(c)	sink_thr-L(c)
923	13634	sink_thrnt(c)	sink_thrnt(c)
924	937	sink_thym(c)	sink_thym(c)
925	13455	sink_thyox-L(c)	sink_thyox-L(c)
926	10600	sink_trdox(c)	sink_trdox(c)
927	10601	sink_trdrd(c)	sink_trdrd(c)
928	13456	sink_triodythy(c)	sink_triodythy(c)
929	8015	sink_trp-L(c)	sink_trp-L(c)
930	13367	sink_txa2(er)	sink_txa2(er)
931	8016	sink_tyr-L(c)	sink_tyr-L(c)
932	14228	sink_tyr-L(m)	sink_tyr-L(m)
933	5829	sink_uacgam	sink_uacgam
934	14786	sink_uacgam(g)	sink_uacgam(g)
935	13436	sink_udp(c)	sink_udp(c)
936	14936	sink_udp(er)	sink_udp(er)
937	13340	sink_udp(g)	sink_udp(g)
938	15031	sink_udp(ly)	sink_udp(ly)
939	13736	sink_udpacgal(c)	sink_udpacgal(c)
940	13341	sink_udpacgal(g)	sink_udpacgal(g)
941	15032	sink_udpacgal(ly)	sink_udpacgal(ly)
942	5787	sink_udpg(c)	sink_udpg(c)
943	13517	sink_udpgal(c)	sink_udpgal(c)
944	13344	sink_udpgal(g)	sink_udpgal(g)
945	10615	sink_udpglcur(c)	sink_udpglcur(c)
946	14937	sink_udpglcur(g)	sink_udpglcur(g)
947	14935	sink_udpxyl(er)	sink_udpxyl(er)
948	10627	sink_ump(c)	sink_ump(c)
949	13519	sink_ump(g)	sink_ump(g)
950	12837	sink_ura(c)	sink_ura(c)
951	14085	sink_urate(x)	sink_urate(x)
952	1917	sink_utp(c)	sink_utp(c)
953	13463	sink_val-L(m)	sink_val-L(m)
954	13273	sink_xoldiolone(r)	sink_xoldiolone(r)
955	13275	sink_xoltriol(c)	sink_xoltriol(c)
956	13276	sink_xoltriol(m)	sink_xoltriol(m)
957	1910	sink_xu5p-D	sink_xu5p-D
958	15021	sink_xyl-D(ly)	sink_xyl-D(ly)
959	13643	sink_xylnt(c)	sink_xylnt(c)
960	14025	sink_xylu-D(c)	sink_xylu-D(c)
961	14894	10FTHF5GLUtl	5-glutamyl-10FTHF transport, lysosomal
962	14901	10FTHF5GLUtm	5-glutamyl-10FTHF transport, mitochondrial

Column	Reaction #	Abbreviation	Reaction Name
963	14896	10FTHF6GLUtl	6-glutamyl-10FTHF transport, lysosomal
964	14900	10FTHF6GLUtm	6-glutamyl-10FTHF transport, mitochondrial
965	14895	10FTHF7GLUtl	7-glutamyl-10FTHF transport, lysosomal
966	14899	10FTHF7GLUtm	7-glutamyl-10FTHF transport, mitochondrial
967	14902	10FTHFtl	10-Formyltetrahydrofolate lysosomal transport via diffusion
968	3763	10FTHFtm	10-Formyltetrahydrofolate mitochondrial transport via diffusion
969	19788	11DOCRTSLtm	11-deoxycortisol intracellular transport
970	19787	11DOCRTSLtr	11-deoxycortisol intracellular transport
971	19790	11DOCRTSTRNtm	11-deoxycorticosterone intracellular transport
972	19789	11DOCRTSTRNtr	11-deoxycorticosterone intracellular transport
973	10534	13DAMPPOX	1,3-Diaminopropane:oxygen oxidoreductase (deaminating)
974	10513	1MNCAMti	N1-Methylnicotinamide transport
975	12671	1PPDCRp	delta1-piperideine-2-carboxylate reductase, perioxosomal
976	11378	1a,24,25VITD2Hm	1-alpha-Vitamin D-24,25-hydroxylase (D2)
977	11379	1a,24,25VITD3Hm	1-alpha-Vitamin D-24,25-hydroxylase (D3)
978	11380	1a,25VITD2Hm	1-alpha,24R,25-Vitamin D-hydroxylase (D2)
979	11381	1a,25VITD3Hm	1-alpha,24R,25-Vitamin D-hydroxylase (D3)
980	11367	24,25DHVITD2t	24,25-Dihydroxyvitamin D2 transport from cytoplasm
981	11366	24,25DHVITD2tm	24,25-Dihydroxyvitamin D2 transport from mitochondria
982	11368	24,25DHVITD3t	24,25-Dihydroxyvitamin D3 transport from cytoplasm
983	11369	24,25DHVITD3tm	24,25-Dihydroxyvitamin D3 transport from mitochondria
984	11329	24,25VITD2Hm	24R-Vitamin D-25-hydroxylase (D2)
985	11331	24,25VITD3Hm	24R-Vitamin D-25-hydroxylase (D3)
986	19709	24NPHte	xenobiotic transport
987	11370	25HVITD2t	25-hydroxyvitamin D2 transport from cytoplasm
988	11371	25HVITD2tin	25-hydroxyvitamin D2 transport in cytoplasm
989	11373	25HVITD2tin-m	25-hydroxyvitamin D2 transport in mitochondria
990	11372	25HVITD2tm	25-hydroxyvitamin D2 transport from mitochondria
991	11374	25HVITD3t	25-hydroxyvitamin D3 transport from cytoplasm
992	11375	25HVITD3tin	25-hydroxyvitamin D3 transport in cytoplasm
993	11376	25HVITD3tin-m	25-hydroxyvitamin D3 transport in mitochondria
994	11377	25HVITD3tm	25-hydroxyvitamin D3 transport from mitochondria
995	11328	25VITD2Hm	1-alpha-Vitamin D-25-hydroxylase (D2)
996	11327	25VITD3Hm	1-alpha-Vitamin D-25-hydroxylase (D3)
997	13555	2AMACHYD	2-Aminoacrylate hydrolysis
998	14558	2AMACULT	2-Aminoacrylate sulfotransferase
999	11294	2AMADPTm	L-2-aminoadipate shuttle (cytosol/mitochondria)
1000	20139	2DR1PP	2-deoxy-D-ribose 1-phosphate phosphorylase
1001	10742	2HBO	2-Hydroxybutyrate:NAD+ oxidoreductase
1002	12476	2HBt2	2-hydroxybutyrate cotransport with proton
1003	12047	2HCO3_NAt	bicarbonate transport (Na/HCO3 1:2 cotransport)
1004	20838	2MCITt	2-methylcitrate transport via diffusion
1005	9498	2OXOADOXm	2-Oxoadipate:lipoamide 2-oxidoreductase(decarboxylating and acceptor-succinylating) (mitochondria)
1006	11293	2OXOADPTm	2-oxoadipate shuttle (cytosol/mitochondria)
1007	9453	34DHOXPEGOX	3,4-Dihydroxyphenylethyleneglycol:NAD+ oxidoreductase
1008	14589	34DHOXPEGt	3,4-Dihydroxyphenylethyleneglycol transport (diffusion)
1009	11389	34DHPHMT	3,4-Dihydroxyphenylacetate:acet O-methyltransferase
1010	12564	34DHPHET	3,4-Dihydroxy-L-phenylalanine transport
1011	11585	34DHPLACOX	3,4-Dihydroxyphenylacetaldehyde:NAD+ oxidoreductase
1012	9441	34DHPLACOX(NADP)	3,4-Dihydroxyphenylacetaldehyde:NADP+ oxidoreductase
1013	11582	34DHXMANDACOX	3,4-Dihydroxymandelaldehyde:NAD+ oxidoreductase
1014	9448	34DHXMANDACOX(NADP)	3,4-Dihydroxymandelaldehyde:NADP+ oxidoreductase

Column	Reaction #	Abbreviation	Reaction Name
1015	14223	34HPLFM	3-(4-hydroxyphenyl-)lactate formation
1016	2388	34HPPOR	4-Hydroxyphenylpyruvate:oxygen oxidoreductase
1017	19548	35CGMPtn	35cGMP nuclear transport
1018	14094	3AIBTm	L-3-aminoisobutyrate transaminase, mitochondrial
1019	12083	3AIBt	3-amino-isobutyrate transport
1020	14971	3AIBtm	3-amino-isobutyrate transport, mitochondrial
1021	11091	3DPHBH1	Hydroxylation of 3-Decaprenyl-4-hydroxybenzoate (NADH)
1022	11092	3DPHBH2	Hydroxylation of 3-Decaprenyl-4-hydroxybenzoate (NADPH)
1023	1879	3DSPHR	3-Dehydrosphinganine reductase
1024	3260	3HAO	3-hydroxyanthranilate 3,4-dioxygenase
1025	10779	3HBCDm	3-hydroxybutyryl-CoA dehydratase, mitochondrial
1026	10911	3HBCOAHLM	3-hydroxyisobutyryl-CoA hydrolase, mitochondrial
1027	12048	3HCO3_NAt	bicarbonate transport (Na/HCO3 1:3 cotransport)
1028	9508	3HKYNAKGAT	3-Hydroxy-L-kynurenine:2-oxoglutarate aminotransferase
1029	9391	3HLYTCL	3-Hydroxy-L-tyrosine carboxy-lyase
1030	9803	3HPCOAHYD	3-hydroxyisobutyryl-Coenzyme A hydrolase
1031	10754	3HPPD	3-hydroxypropionate dehydrogenase
1032	9578	3HXKYNDCL	3-Hydroxykynurenamine decarboxy-lyase
1033	9582	3HXKYNOXDA	3-Hydroxykynurenamine:oxygen oxidoreductase(deaminating)(flavin-containing)
1034	9434	3M4HDXPAC	3-Methoxy-4-hydroxyphenylacetaldehyde:NAD+ oxidoreductase
1035	14512	3MLDAt	3MLDA extracellular transport via diffusion
1036	13267	3MOBt2im	3-methyl-2-oxobutanoate mitochondrial transport via proton symport
1037	13265	3MOPt2im	3-Methyl-2-oxopentanoate mitochondrial transport via proton symport
1038	11598	3MOX4HOXPGALDOX	3-Methoxy-4-hydroxyphenylglycolaldehyde:NAD+ oxidoreductase
1039	9450	3MOX4HOXPGALDOX(NADP)	3-Methoxy-4-hydroxyphenylglycolaldehyde:NADP+ oxidoreductase
1040	11387	3MOXTYROX	3-Methoxytyramine:oxygen oxidoreductase (deaminating)
1041	12645	3NTD7I	3'-nucleotidase (AMP), lysosome
1042	14612	3SALAASPM	cysteinesulfinate-aspartate mitochondrial shuttle
1043	9859	3SALACBOXL	3-Sulfino-L-alanine carboxy-lyase
1044	14770	3SALAOX	cysteinesulfinic acid oxidase
1045	14567	3SALATAi	3-sulfino-alanine transaminase (irreversible)
1046	14566	3SALATAim	3-sulfino-alanine transaminase (irreversible), mitochondrial
1047	11474	3SPYRSP	3-sulfinopyruvate hydrolase (spontaneous reaction)
1048	14771	3SPYRSPm	3-sulfinopyruvate hydrolase (spontaneous reaction), mitochondrial
1049	9406	41R1H2MAE12BOOX	4-[(1R)-1-Hydroxy-2-(methylamino)ethyl]-1,2-benzenediol:oxygen oxidoreductase(deaminating)(flavin-containing)
1050	12098	41R2A1H12BOOX	4-[(1R)-2-Amino-1-hydroxyethyl]-1,2-benzenediol:oxygen oxidoreductase(deaminating)(flavin-containing)
1051	9431	42A12BOOX	4-(2-Aminoethyl)-1,2-benzenediol:oxygen oxidoreductase(deaminating)(flavin-containing)
1052	1683	4ABUTm	4-aminobutanoate mitochondrial transport via diffusion
1053	14222	4HBZCOAFm	4-hydroxybenzoyl-CoA formation
1054	14227	4HBZFm	4-hydroxybenzoate formation
1055	19710	4HDEBRISOQUINEt	xenobiotic transport
1056	1845	4HGLSDm	L-4-hydroxyglutamate semialdehyde dehydrogenase, mitochondrial

Column	Reaction #	Abbreviation	Reaction Name
1057	9452	4HOXPACDOX(NADP)	4-Hydroxyphenylacetaldehyde:NADP+ oxidoreductase
1058	13266	4MOPt2im	4-methyl-2-oxopentanoate mitochondrial transport via proton symport
1059	19711	4MTOLBUTAMIDEte	xenobiotic transport
1060	19712	4NPHSFte	xenobiotic transport
1061	12105	4NPHSULT	4-Nitrophenol Sulfotransferase
1062	19700	4NPHte	xenobiotic transport
1063	10954	4PYRDX	4-Pyridoxal secretion
1064	19767	5ADTSTSTERONEGLCte	glucuronidated compound transport
1065	19744	5ADTSTSTERONEGLCtr	glucuronidated compound transport
1066	20336	5ADTSTSTERONESULT	5alpha-Dihydrotestosterone sulfotransferase
1067	20338	5ADTSTSTERONESte	sulfonated testosterone transport
1068	20021	5ADTSTSTERONEte	5 alpha dihydrotestosterone transport
1069	14985	5ADTSTSTERONEtr	5 alpha dihydrotestosterone intracellular transport
1070	1760	5AOPtm	5-Aminolevulinate mitochondrial transport
1071	14888	5DHFtl	5-glutamyl-DHF transport, lysosomal
1072	14839	5FTHFt2	5-formyltetrahydrofolate transport via anion exchange
1073	9579	5HLTDL	5-Hydroxy-L-tryptophan decarboxy-lyase
1074	19713	5HOMEPRAZOLEte	xenobiotic transport
1075	9604	5HOXINDACTO2OX	5-Hydroxyindoleacetaldehyde:oxygen oxidoreductase
1076	9586	5HOXINDACTOX	5-Hydroxyindoleacetaldehyde:NAD+ oxidoreductase
1077	9587	5HOXINDACTOXm	5-Hydroxyindoleacetaldehyde:NAD+ oxidoreductase (mito)
1078	9584	5HOXINOXDA	5-Hydroxytryptamine:oxygen oxidoreductase(deaminating)(flavin-containing)
1079	9610	5HTRPDOX	5-Hydroxy-L-tryptophan:oxygen 2,3-dioxygenase (indole-decyclizing)
1080	11930	5HTRPVESSEC	5-hydroxy-L-tryptophan secretion via secretory vesicle (ATP driven)
1081	9577	5HXKYNDCL	5-Hydroxykynurenamine decarboxy-lyase
1082	9581	5HXKYNXDA	5-Hydroxykynurenamine:oxygen oxidoreductase(deaminating)(flavin-containing)
1083	14835	5MTHFt	5-Methyltetrahydrofolate transport via receptor binding and protolysis
1084	14838	5MTHFt2	5-methyltetrahydrofolate transport via anion exchange
1085	14891	5THFtl	5-glutamyl-THF transport, lysosomal
1086	14884	5THFtm	5-glutamyl-THF transport,m mitochondrial
1087	14889	6DHFtl	6-glutamyl-DHF transport, lysosomal
1088	14885	6DHFtm	6-glutamyl-DHF transport,m mitochondrial
1089	19747	6HTSTSTERONEte	hydroxylated testosterone transport
1090	19746	6HTSTSTERONEtr	hydroxylated testosterone transport
1091	14893	6THFtl	6-glutamyl-THF transport, lysosomal
1092	14883	6THFtm	6-glutamyl-THF transport,m mitochondrial
1093	14707	7DHCHSTEROLtr	cholesterol precursor intracellular transport
1094	14890	7DHFtl	7-glutamyl-DHF transport, lysosomal
1095	14882	7DHFtm	7-glutamyl-DHF transport,m mitochondrial
1096	14892	7THFtl	7-glutamyl-THF transport, lysosomal
1097	14881	7THFtm	7-glutamyl-THF transport,m mitochondrial
1098	11392	A4GALTC	Lactosylceramide 4-alpha-galactosyltransferase
1099	11071	A4GALTg	Lactosylceramide 4-alpha-galactosyltransferase
1100	8691	A4GNT1g	alpha 1,4-N-acetylglucosaminyltransferase, Golgi apparatus
1101	8689	A4GNT2g	alpha 1,4-N-acetylglucosaminyltransferase, Golgi apparatus
1102	10757	AACOAT	Acetoacetyl-CoA:acetate CoA-transferase

Column	Reaction #	Abbreviation	Reaction Name
1103	11706	AACTOOR	Aminoacetone:oxygen oxidoreductase(deaminating)(flavin-containing)
1104	14676	AACTm	Aminoacetone transport (mitochondrial)
1105	10901	AAPSAS	AAPSAS
1106	10886	AASAD3	L-aminoadipate-semialdehyde dehydrogenase (NADH)
1107	11477	AASAD3m	L-aminoadipate-semialdehyde dehydrogenase (NADH), mitochondrial
1108	10888	AATAi	2-aminoadipate transaminase, irreversible
1109	14603	ABO1g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1110	14609	ABO2g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1111	14629	ABO3g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1112	14630	ABO4g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1113	14637	ABO5g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1114	14643	ABO6g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1115	14647	ABO7g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1116	14649	ABO8g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1117	14664	ABO9g	ABO blood group (transferase A, alpha 1-3-N-acetylgalactosaminyltransferase; transferase B, alpha 1-3-galactosyltransferase)
1118	9373	ABTArm	4-aminobutyrate transaminase, reversible (mitochondrial)
1119	10157	ABTD	L-arabinitol 4-dehydrogenase
1120	19569	ABTi	L-arabinitol transport via passive diffusion
1121	1267	ABUTD	Aminobutyraldehyde dehydrogenase
1122	11687	ABUTt2r	4-aminobutyrate reversible transport in via proton symport
1123	11688	ABUTt2rL	4-aminobutyrate reversible transport in via proton symport (lysosome)
1124	11936	ABUTt4(2)r	4-aminobutyrate reversible transport in via sodium symport (1:2)
1125	2	ACACT1	acetyl-CoA C-acetyltransferase
1126	10919	ACACT10m	acetyl-CoA C-acetyltransferase, mitochondrial
1127	1498	ACACT1r	acetyl-CoA C-acetyltransferase
1128	3474	ACACT1rm	acetyl-CoA C-acetyltransferase, mitochondrial
1129	9730	ACACT1x	acetyl-CoA C-acetyltransferase, mitochondrial
1130	3081	ACACT4p	acetyl-CoA C-acetyltransferase (octanoyl-CoA), peroxisomal
1131	2077	ACACT5p	acetyl-CoA C-acyltransferase (decanoyl-CoA), peroxisomal
1132	2076	ACACT6p	acetyl-CoA C-acetyltransferase (dodecanoyl), peroxisomal
1133	3078	ACACT7p	acetyl-CoA acyltransferase (tetradecanoyl-CoA), peroxisomal

Column	Reaction #	Abbreviation	Reaction Name
1134	2074	ACACT8p	acetyl-CoA acyltransferase (hexadecanoyl-CoA), peroxisomal
1135	3077	ACACT9p	acetyl-CoA acyltransferase (tetracosanoyl-CoA), peroxisomal
1136	2375	ACACt2	acetoacetate transport via proton symport
1137	5495	ACACt2m	Acetoacetate mitochondrial transport via H+ symport
1138	20150	ACACtx	acetoacetate intracellular transport unknown mechanism
1139	1564	ACALDt	acetaldehyde reversible transport
1140	5533	ACALDtm	acetaldehyde mitochondrial diffusion
1141	19463	ACALDtx	acetaldehyde peroxisomal diffusion
1142	32	ACCOAC	acetyl-CoA carboxylase
1143	8385	ACCOACm	Acetyl-Coa carboxylase, beta isoform
1144	3258	ACCOAL	acetate-CoA ligase (ADP-forming)
1145	8420	ACCOALm	acetate-CoA ligase (AMP-forming)
1146	12539	ACCOAgt	acetyl-coa transport
1147	1534	ACCOAtn	acetyl-CoA transport, nuclear
1148	12540	ACCOAtr	acetyl-coa transport
1149	12480	ACETONEt2	acetone transport via proton symport
1150	14988	ACETONEt2m	acetone mitochondrial transport via proton symport
1151	20126	ACGAGBSIDEtg	acgagbside_hs intracellular transport
1152	20127	ACGAGBSIDEtl	acgagbside_hs intracellular transport
1153	19660	ACGALFUCGALACGALF UC12GAL14ACGLCGALG LUSIDEte	blood group intracellular transport
1154	20162	ACGALFUCGALACGALF UC12GAL14ACGLCGALG LUSIDEtg	blood group intracellular transport
1155	19661	ACGALFUCGALACGALF UCGALACGLCGAL14AC GLCGALGLUSIDEte	blood group intracellular transport
1156	20163	ACGALFUCGALACGALF UCGALACGLCGAL14AC GLCGALGLUSIDEtg	blood group intracellular transport
1157	10648	ACGALK	N-acetylgalactosamine kinase
1158	10649	ACGALK2	N-acetylgalactosamine kinase (ITP)
1159	20149	ACGALtlg	N-acetyl-galactosamine intracellular transport
1160	14918	ACGALtly	N-acetyl-galactosamine lysosomal efflux
1161	10642	ACGAM2E	N-acetylglucosamine 2-epimerase
1162	10569	ACGAM6PSi	N-acetylglucosamine-6-phosphate synthase
1163	9377	ACGAMK	N-acetylglucosamine kinase
1164	1447	ACGAMPM	phosphoacetylglucosamine mutase
1165	14919	ACGAMtly	N-acetyl-glucosamine lysosomal efflux
1166	20128	ACGBGBSIDEtg	acgbgbside_hs intracellular transport
1167	20129	ACGBGBSIDEtl	acgbgbside_hs intracellular transport
1168	11054	ACGPID	N-acetylglucosaminylphosphatidylinositol deacetylase
1169	3464	ACGSm	N-acteylglutamate synthase, mitochondrial
1170	11897	ACHEe	Acetylcholinesterase
1171	11935	ACHVESSEC	Acetylcholine secretion via secretory vesicle (ATP driven)
1172	19523	ACHtn	Acetylcholin transport, nuclear through pores
1173	9535	ACITL	ATP-Citrate lyase
1174	20223	ACN13ACNGALGBSIDEte	acn13acngalgbside_hs transport
1175	20207	ACN13ACNGALGBSIDEtg	acn13acngalgbside_hs intracellular transport
1176	20224	ACN23ACNGALGBSIDEte	acn23acngalgbside transport
1177	20208	ACN23ACNGALGBSIDEtg	acn23acngalgbside intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
1178	19663	ACNACNGAL14ACGLCG ALGLUSIDEte	blood group intracellular transport
1179	20164	ACNACNGAL14ACGLCG ALGLUSIDEtg	blood group intracellular transport
1180	20225	ACNACNGALGBSIDEte	acnacngalgbside_hs transport
1181	20209	ACNACNGALGBSIDEtg	acnacngalgbside_hs intracellular transport
1182	10595	ACNAM9PL	N-Acetylneuraminate 9-phosphate pyruvate-lyase (pyruvate-phosphorylating)
1183	10634	ACNAM9PL2	N-Acetylneuraminate 9-phosphate pyruvate-lyase (pyruvate-phosphorylating)
1184	10644	ACNAMPH	N-Acetylneuraminate 9-phosphate phosphohydrolase
1185	13785	ACNAMlt	N-acetylneuraminate transport into lysosome
1186	15230	ACNAMtn	N-acetylneuraminate nuclear import
1187	19665	ACNGALACGLCGAL14A CGLCGALGLUSIDEte	blood group intracellular transport
1188	20165	ACNGALACGLCGAL14A CGLCGALGLUSIDEtg	blood group intracellular transport
1189	10637	ACNMLr	N-Acetylneuraminate lyase (reversible)
1190	10914	ACOAD10m	acyl-CoA dehydrogenase (2-methylbutanoyl-CoA), mitochondrial
1191	10437	ACOAD1fm	acyl-CoA dehydrogenase (butanoyl-CoA), mitochondrial
1192	10333	ACOAD8m	acyl-CoA dehydrogenase (isovaleryl-CoA), mitochondrial
1193	10916	ACOAD9m	acyl-CoA dehydrogenase (isobutyryl-CoA), mitochondrial
1194	9596	ACOAHi	acetyl-CoA hydrolase
1195	2063	ACOA07p	acyl-CoA oxidase (hexadecanoyl-CoA), peroxisomal
1196	3280	ACOATA	Acetyl-CoA ACP transacylase
1197	3511	ACODA	acetylornithine deacetylase
1198	285	ACONT	aconitase
1199	241	ACONTm	Aconitate hydratase
1200	13931	ACOX22x	acyl-Coenzyme A oxidase 2, branched chain
1201	9713	ACOX2x	acyl-Coenzyme A oxidase 2, branched chain
1202	120	ACPI(FMN)	acid phosphatase (FMN)
1203	2996	ACRNtm	O-acetylcarnitine transport into mitochondria via diffusion
1204	291	ACS	acetyl-CoA synthetase
1205	7891	ACS2	acetyl-CoA synthase (propionate)
1206	9605	ACSOMT	S-Adenosyl-L-methionine:N-acetylserotonin O-methyltransferase
1207	9606	ACSRNMT	S-Adenosyl-L-homocysteine:N-acetylserotonin O-methyltransferase
1208	699	ACSm	acetyl-CoA synthetase
1209	14068	ACTLMO	acetol monooxygenase
1210	14063	ACTNMO	acetone monooxygenase
1211	7129	ACYP	acylphosphatase
1212	2190	ACt2m	acetate mitochondrial transport via proton symport
1213	1557	ACt2r	acetate reversible transport via proton symport
1214	20295	ACtg	acetate transport, Golgi apparatus
1215	3513	ADA	Adenosine deaminase
1216	9856	ADAe	Adenosine deaminase, extracellular
1217	10758	ADCim	Acetoacetate decarboxylation (irreversible), mitochondrial
1218	12546	ADEt	adenine reversible transport, cytosol
1219	12575	ADEtl	adenine facilitated transport from lysosome
1220	19740	ADHAPtx	intracellular transport (peroxisome)
1221	181	ADK1	adenylate kinase
1222	1572	ADK1m	adenylate kinase, mitochondrial
1223	4682	ADK3	adenylate kinase (GTP)

Column	Reaction #	Abbreviation	Reaction Name
1224	1573	ADK3m	adenylate kinase (GTP)
1225	6806	ADKd	adenylate kinase (d form)
1226	303	ADMDC	adenosylmethionine decarboxylase
1227	2539	ADNCYC	adenylate cyclase
1228	179	ADNK1	adenosine kinase
1229	20320	ADNK1m	adenosine kinase, mitochondrial
1230	12541	ADNt	adenosine facilitated transport in cytosol
1231	12054	ADNt4	adenosine transport (Na/Adn cotransport)
1232	12090	ADNt5	adenosine transport (1:2 Na/Adn cotransport)
1233	12579	ADNtl	adenosine facilitated transport from lysosome
1234	12146	ADNtm	adenosine facilitated transport in mitochondria
1235	9700	ADPGLC	ADPglucose diphosphatase
1236	9701	ADPMAN	ADPmannose diphosphatase
1237	2835	ADPRDP	ADPribose diphosphatase
1238	9699	ADPRDPm	ADPribose diphosphatase (mitochondrial)
1239	15046	ADPRIBt	ADPribose transport
1240	178	ADPT	adenine phosphoribosyltransferase
1241	13546	ADPtx	ADP transporter, peroxisomal
1242	14279	ADRNCOAtx	fatty acid intracellular transport
1243	19102	ADRNCPT1	carnitine O-palmitoyltransferase
1244	19121	ADRNCPT2	carnitine transferase
1245	19083	ADRNCRNt	transport into the mitochondria (carnitine)
1246	11932	ADRNLVESSECC	Adrenaline secretion via secretory vesicle (ATP driven)
1247	12457	ADRNt	fatty acid transport via diffusion
1248	10024	ADSELK	adenylyl-selenate kinase
1249	2867	ADSK	adenylyl-sulfate kinase
1250	393	ADSL1	adenylosuccinate lyase
1251	394	ADSL2	adenylosuccinate lyase
1252	3516	ADSS	adenylosuccinate synthase
1253	19701	AFLATOXINte	xenobiotic transport
1254	11444	AG13T10g	N-acetylglucosaminyltransferase, Golgi apparatus
1255	11445	AG13T11g	N-acetylglucosaminyltransferase, Golgi apparatus
1256	11446	AG13T12g	N-acetylglucosaminyltransferase, Golgi apparatus
1257	11447	AG13T13g	N-acetylglucosaminyltransferase, Golgi apparatus
1258	11448	AG13T14g	N-acetylglucosaminyltransferase, Golgi apparatus
1259	11449	AG13T15g	N-acetylglucosaminyltransferase, Golgi apparatus
1260	11521	AG13T16g	N-acetylglucosaminyltransferase, Golgi apparatus
1261	11524	AG13T17g	N-acetylglucosaminyltransferase, Golgi apparatus
1262	11527	AG13T18g	N-acetylglucosaminyltransferase, Golgi apparatus
1263	11424	AG13T1g	N-acetylglucosaminyltransferase, Golgi apparatus
1264	11426	AG13T2g	N-acetylglucosaminyltransferase, Golgi apparatus
1265	11430	AG13T3g	N-acetylglucosaminyltransferase, Golgi apparatus
1266	11408	AG13T4g	N-acetylglucosaminyltransferase, Golgi apparatus

Column	Reaction #	Abbreviation	Reaction Name
1267	11437	AG13T5g	N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase, Golgi apparatus
1268	11440	AG13T6g	N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase, Golgi apparatus
1269	11441	AG13T7g	N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase, Golgi apparatus
1270	11442	AG13T8g	N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase, Golgi apparatus
1271	11443	AG13T9g	N-acetyllactosaminide beta-1,3-N-acetylglucosaminyltransferase, Golgi apparatus
1272	3518	AGDC	N-acetylglucosamine-6-phosphate deacetylase
1273	10803	AGLPC	alkyl acylglycerol phosphocholine transferase
1274	10800	AGLPED	alkyl acyl glycerophosphoethanolamine desaturase
1275	14715	AGLPET	alkyl acylglycerol phosphoethanolamine transferase
1276	10790	AGLPH	alkyl glycerol phosphate hydrolase
1277	10787	AGLPR	alkyl glycerol phosphate reductase
1278	10789	AGLPT	alkyl glycerol phosphate acyltransferase
1279	20198	AGMTm	agmatinase (m)
1280	14783	AGPAT1	1-acylglycerol-3-phosphate O-acyltransferase 1
1281	1338	AGPRim	N-acetyl-g-glutamyl-phosphate reductase, irreversible, mitochondrial
1282	10783	AGPSx	alkylglycerone phosphate synthase
1283	10786	AGPex	alkyl glycerol phosphate transport
1284	14006	AGTim	alanine-glyoxylate transaminase (irreversible), mitochondrial
1285	14008	AGTix	alanine-glyoxylate transaminase (irreversible), (peroxisomal)
1286	19766	AHANDROSTANGLCte	glucuronidated compound transport
1287	19748	AHANDROSTANGLCtr	glucuronidated compound transport
1288	366	AHC	adenosylhomocysteinase
1289	2264	AHCYStn	S-adenosyl-L-homocysteine nuclear transport
1290	20879	AHCYStr	S-Adenosyl-L-homocysteine intracellular diffusion
1291	8534	AHEXASE2ly	beta-N-acetylhexosaminidase, lysosomal
1292	8535	AHEXASEly	beta-N-acetylhexosaminidase, lysosomal
1293	396	AICART	phosphoribosylaminoimidazolecarboxamide formyltransferase
1294	1429	AIRCt	phosphoribosylaminoimidazole carboxylase
1295	4072	AKGDm	2-oxoglutarate dehydrogenase
1296	4314	AKGMALtm	alpha-ketoglutarate/malate transporter
1297	12174	AKGt4_3	AKG transport via sodium symport
1298	15151	AKGtp	AKG transporter, peroxisome
1299	13839	AKR1C1	aldo-keto reductase family 1, member C1 (chlordecone reductase; 3-alpha hydroxysteroid dehydrogenase, type I; dihydrodiol dehydrogenase 4)
1300	9654	AKR1C41	aldo-keto reductase family 1, member C4 (chlordecone reductase; 3-alpha hydroxysteroid dehydrogenase, type I; dihydrodiol dehydrogenase 4)
1301	9656	AKR1C42	aldo-keto reductase family 1, member C4 (chlordecone reductase; 3-alpha hydroxysteroid dehydrogenase, type I; dihydrodiol dehydrogenase 4)
1302	9652	AKR1D	aldo-keto reductase family 1, member D1 (delta 4-3-ketosteroid-5-beta-reductase)
1303	9653	AKR1D2	aldo-keto reductase family 1, member D1 (delta 4-3-ketosteroid-5-beta-reductase)
1304	11849	ALAASNNaEx	L-alanine/L-asparagine Na-dependent exchange (Ala-L in)
1305	11836	ALACYSNaEx	L-alanine/L-cysteine Na-dependent exchange (Ala-L in)

Column	Reaction #	Abbreviation	Reaction Name
1306	11798	ALADGLNexR	L-alanine/glutamine reversible exchange
1307	11797	ALADGLYexR	D-alanine/glycine reversible exchange
1308	11847	ALAGLNNaEx	L-alanine/L-glutamine Na-dependent exchange (Ala-L in)
1309	11796	ALAGLNexR	L-alanine/glutamine reversible exchange
1310	11795	ALAGLYexR	L-alanine/glycine reversible exchange
1311	298	ALAR	alanine racemase
1312	11834	ALASERNaEx	L-alanine/L-serine Na-dependent exchange (Ala-L in)
1313	1818	ALASm	5-aminolevulinatase synthase
1314	299	ALATA_L	L-alanine transaminase
1315	11838	ALATHRNaEx	L-alanine/L-threonine Na-dependent exchange (Ala-L in)
1316	1357	ALAt2r	L-alanine reversible transport via proton symport
1317	11681	ALAt2rL	L-alanine reversible transport via proton symport (lysosome)
1318	1422	ALA4	Alanine-Sodium symporter
1319	11672	ALAtN1	Alanine transport (Na, H coupled)
1320	220	ALCD1	alcohol dehydrogenase (methanol)
1321	14167	ALCD21_D	alcohol dehydrogenase (D-1,2-propanediol)
1322	14166	ALCD21_L	alcohol dehydrogenase (L-1,2-propanediol)
1323	14169	ALCD22_D	alcohol dehydrogenase (D-lactaldehyde)
1324	14170	ALCD22_L	alcohol dehydrogenase (L-lactaldehyde)
1325	1211	ALCD2if	alcohol dehydrogenase, forward rxn (ethanol -> acetaldehyde)
1326	9528	ALCD2yf	alcohol dehydrogenase (ethanol, NADP), forward reaction
1327	2522	ALDD19x	aldehyde dehydrogenase (phenylacetaldehyde, NAD)
1328	9491	ALDD19x(P)	aldehyde dehydrogenase (phenylacetaldehyde, NADP)
1329	2391	ALDD20x	aldehyde dehydrogenase (indole-3-acetaldehyde, NAD)
1330	2392	ALDD20xm	aldehyde dehydrogenase (indole-3-acetaldehyde, NAD), mitochondrial
1331	14870	ALDD21	aldehyde dehydrogenase (pristanal, NAD)
1332	248	ALDD2x	aldehyde dehydrogenase (acetaldehyde, NAD)
1333	1524	ALDD2xm	aldehyde dehydrogenase (acetylaldehyde, NAD), mitochondrial
1334	249	ALDD2y	aldehyde dehydrogenase (acetaldehyde, NADP)
1335	19776	ALDSTRNte	aldosterone transport
1336	19775	ALDSTRNtm	aldosterone intracellular transport
1337	6820	ALKP	alkaline phosphatase
1338	11422	ALOX12	Arachidonate 12-lipoxygenase
1339	11423	ALOX12R	Arachidonate 12-lipoxygenase R
1340	10213	ALOX15	Arachidonate 15-lipoxygenase
1341	11421	ALOX5	Arachidonate 5-lipoxygenase
1342	19797	ALOX52	Arachidonate 5-lipoxygenase
1343	14752	ALR	Aldose reductase
1344	14160	ALR2	aldose reductase (methylglyoxal)
1345	14161	ALR3	aldose reductase (acetol)
1346	1395	AM6SAD	aminomuconate-semialdehyde dehydrogenase
1347	13927	AMACR2p	alpha-methylacyl-CoA racemase (reductase)
1348	13928	AMACR2r	alpha-methylacyl-CoA racemase (reductase)
1349	9673	AMACRp	alpha-methylacyl-CoA racemase
1350	9675	AMACRr	alpha-methylacyl-CoA racemase
1351	2615	AMANK	N-acetyl-D-mannosamine kinase
1352	2664	AMCOXO	2-aminomuconate reductase
1353	20880	AMETr	S-Adenosyl-L-methionine intracellular diffusion
1354	12111	AMETt2m	S-Adenosyl-L-methionine reversible transport, mitochondrial
1355	2265	AMETtn	S-adenosyl-L-methionine nuclear transport
1356	3569	AMPDA	Adenosine monophosphate deaminase

Column	Reaction #	Abbreviation	Reaction Name
1357	10876	AMPTASECG	alanyl aminopeptidase (cys-gly)
1358	10875	AMPTASECGe	alanyl aminopeptidase (cys-gly) (e)
1359	15149	AMPtp	AMP transporter, peroxisome
1360	13988	AMPtr	AMP transporter, endoplasmic reticulum
1361	10083	AMY1e	alpha-amylase, extracellular (strch1 -> strch2)
1362	10084	AMY2e	alpha-amylase, extracellular (glygn2 -> glygn4)
1363	19765	ANDRSTRNGLCte	glucuronidated compound transport
1364	20020	ANDRSTRNte	androsterone transport
1365	14986	ANDRSTRNtr	androsterone intracellular transport
1366	19702	ANTIPYRENEte	xenobiotic transport
1367	14657	AOBUTDsm	L-2-amino-3-oxobutanoate decarboxylation, mitochondrial
1368	10031	AP4AH1	Ap4A hydrolase, asymmetrically
1369	20181	APAT2rm	3-Aminopropanoate:2-oxoglutarate aminotransferase (m)
1370	20197	APNNOXte	xenobiotic transport
1371	14765	APOC-LYS-BTNP	proteolysis of apoC-Lys-btn
1372	14763	APOC-LYS-BTNPm	proteolysis of apoC-Lys-btn, mitochondrial
1373	14762	APOCF	Apocarboxylase formation
1374	14764	APOCFm	Apocarboxylase formation, mitochondrial
1375	20196	APPNNte	xenobiotic transport
1376	20022	APRGSTRNte	hydroxyprogesterone transport
1377	2980	APRTO2	N-acetylputrescine: oxygen oxidoreductase (deaminating)
1378	14690	AQCOBALt	Aquacob(III)alamin uptake
1379	2401	ARAB-Lt	L-arabinoase extracellular transport
1380	2051	ARABR	arabinose reductase
1381	19032	ARACHCOAtx	fatty acid intracellular transport
1382	19070	ARACHCPT1	carnitine transferase
1383	19071	ARACHCPT2	carnitine transferase
1384	19069	ARACHCRNt	transport into the mitochondria (carnitine)
1385	19043	ARACHDCOAtx	fatty acid intracellular transport
1386	12455	ARACHDt2	fatty acid transport via diffusion
1387	19800	ARACHDtr	intracellular transport
1388	12456	ARACHt	fatty acid transport via diffusion
1389	11475	ARGDCm	arginine decarboxylase (m)
1390	11878	ARGLYSex	Arginine/Lysine exchanger (Arg in)
1391	373	ARGN	arginase
1392	9719	ARGNm	arginase (m)
1393	2851	ARGSL	argininosuccinate lyase
1394	306	ARGSS	argininosuccinate synthase
1395	11703	ARGt4	L-arginine transport in via sodium symport
1396	11695	ARGtiDF	L-arginine transport via diffusion (extracellular to cytosol)
1397	5289	ARGtm	arginine mitochondrial transport via ornithine carrier
1398	11201	ARSA	Arylsulfatase A
1399	13646	ARTCOAL1	R group coenzyme a ligase
1400	13647	ARTCOAL2	R group coenzyme a ligase
1401	13648	ARTCOAL3	R group coenzyme a ligase
1402	14297	ARTFR11	R group artificial flux
1403	14298	ARTFR12	R group artificial flux (C16:1)
1404	18759	ARTFR13	R group artificial flux
1405	14311	ARTFR202	R group artificial flux (C18:3, n-3)
1406	14314	ARTFR203	R group artificial flux
1407	14313	ARTFR204	R group artificial flux
1408	14315	ARTFR205	R group artificial flux
1409	14316	ARTFR206	R group artificial flux
1410	14317	ARTFR207	R group artificial flux
1411	14318	ARTFR208	R group artificial flux
1412	14319	ARTFR209	R group artificial flux

Column	Reaction #	Abbreviation	Reaction Name
1413	14320	ARTFR210	R group artificial flux
1414	14321	ARTFR211	R group artificial flux
1415	14323	ARTFR212	R group artificial flux
1416	14324	ARTFR213	R group artificial flux
1417	14330	ARTFR31	R group artificial flux
1418	14331	ARTFR32	R group artificial flux
1419	14332	ARTFR33	R group artificial flux
1420	14333	ARTFR34	R group artificial flux
1421	14335	ARTFR41	R group artificial flux
1422	14336	ARTFR42	R group artificial flux
1423	14337	ARTFR43	R group artificial flux
1424	14338	ARTFR44	R group artificial flux
1425	14339	ARTFR45	R group artificial flux
1426	14340	ARTFR46	R group artificial flux
1427	14342	ARTFR51	R group artificial flux
1428	14343	ARTFR52	R group artificial flux
1429	14344	ARTFR53	R group artificial flux
1430	14345	ARTFR54	R group artificial flux
1431	14346	ARTFR55	R group artificial flux
1432	14347	ARTFR56	R group artificial flux
1433	14348	ARTFR57	R group artificial flux
1434	14350	ARTFR61	R group artificial flux
1435	13651	ARTPLM1	R group to palmitate conversion
1436	14736	ARTPLM1m	R group to palmitate conversion
1437	13653	ARTPLM2	R group to palmitate conversion
1438	14737	ARTPLM2m	R group to palmitate conversion
1439	13655	ARTPLM3	R group to palmitate conversion
1440	14738	ARTPLM3m	R group to palmitate conversion
1441	14377	ASAH1	N-acylsphingosine amidohydrolase
1442	10200	ASCB0X	ascorbic acid oxidase
1443	12131	ASCBt	L-ascorbate transport via facilitated diffusion
1444	12130	ASCBt4	L-ascorbate transport via proton symport
1445	11850	ASNALANaEx	L-alanine/L-asparagine Na-dependent exchange (Asn-L in)
1446	11858	ASNCYSNaEx	L-cysteine/L-asparagine Na-dependent exchange (Asn-L in)
1447	11864	ASNGLNNaEx	L-glutamine/L-asparagine Na-dependent exchange (Asn-L in)
1448	9381	ASNNm	L-asparaginase (mitochondrial)
1449	259	ASNS1	asparagine synthase (glutamine-hydrolysing)
1450	11854	ASNSERNaEx	L-serine/L-asparagine Na-dependent exchange (Asn-L in)
1451	11862	ASNTHRNAEx	L-threonine/L-asparagine Na-dependent exchange (Asn-L in)
1452	11691	ASNt4	L-asparagine transport in via sodium symport
1453	11674	ASNtN1	Asparagine transport (Na, H coupled)
1454	11989	ASNtm	L-asparagine transport, mitochondrial
1455	3426	ASP1DC	aspartate 1-decarboxylase
1456	9421	ASPCTr	aspartate carbamoyltransferase (reversible)
1457	11822	ASPDt6	D-aspartate transport via Na, H symport and K antiport
1458	11973	ASPDxt	D-aspartate transport, peroxisomal
1459	5291	ASPGLUm	aspartate-glutamate mitochondrial shuttle
1460	14515	ASPNA1m	aspartate N-acetyltransferase, mitochondrial
1461	260	ASPTA	aspartate transaminase
1462	1453	ASPTAm	aspartate transaminase
1463	11821	ASPt6	L-aspartate transport via Na, H symport and K antiport
1464	20199	ATP1ter	ADP/ATP transporter, endoplasmic reticulum
1465	15056	ATP2ter	AMP/ATP transporter, endoplasmic reticulum

Column	Reaction #	Abbreviation	Reaction Name
1466	10439	ATPH1e	ATP diphosphohydrolase
1467	10441	ATPH2e	ATP diphosphohydrolase
1468	4621	ATPS4m	ATP synthase (four protons for one ATP)
1469	18553	ATPase1	V-type ATPase, H ⁺ transporting, lysosomal
1470	2423	ATPtm	ADP/ATP transporter, mitochondrial
1471	14149	ATPtn	ATP diffusion in nucleus
1472	13545	ATPtx	ATP transporter, peroxisomal
1473	11414	AVITE1t	alpha-Tocopherol (Vit. E) transport
1474	11413	AVITE2t	alpha-tocotrienol (Vit. E) transport
1475	8438	A_MANASE	alpha-mannosidase
1476	8533	A_MANASEly	alpha-mannosidase, lysosomal
1477	11078	B3GALT3g	Beta-1,3-galactosyltransferase 3
1478	11132	B3GALT41g	Beta-1,3-galactosyltransferase 4
1479	11133	B3GALT42g	Beta-1,3-galactosyltransferase 4
1480	11134	B3GALT43g	Beta-1,3-galactosyltransferase 4
1481	11135	B3GALT44g	Beta-1,3-galactosyltransferase 4
1482	11081	B3GALT5g	Beta-1,3-galactosyltransferase 5
1483	14594	B3GALTg	Beta galactosyltransferase
1484	14627	B3GNT11g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 1
1485	14670	B3GNT12g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 1
1486	14621	B3GNT310g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1487	14632	B3GNT311g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1488	14639	B3GNT312g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1489	14644	B3GNT313g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1490	14661	B3GNT314g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1491	14672	B3GNT315g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1492	11061	B3GNT31g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1493	11062	B3GNT32g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1494	11063	B3GNT33g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1495	11117	B3GNT34g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1496	11067	B3GNT35g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1497	11068	B3GNT36g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1498	11116	B3GNT37g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1499	11140	B3GNT38g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1500	11263	B3GNT39g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 3, Golgi apparatus
1501	14592	B3GNT51g	UDP-GlcNAc:betaGal beta-1,3-N-acetylglucosaminyltransferase 5
1502	13899	BAAT1x	bile acid Coenzyme A: amino acid N-acyltransferase
1503	13900	BAAT2x	bile acid Coenzyme A: amino acid N-acyltransferase

Column	Reaction #	Abbreviation	Reaction Name
1504	13937	BAAT3x	bile acid Coenzyme A: amino acid N-acyltransferase
1505	13965	BAAT4x	bile acid Coenzyme A: amino acid N-acyltransferase
1506	13966	BAAT5x	bile acid Coenzyme A: amino acid N-acyltransferase
1507	5659	BACCL	biotin-[acetyl-CoA-carboxylase] ligase
1508	10498	BACCLm	biotin-[acetyl-CoA-carboxylase] ligase, mitochondrial
1509	11921	BALAVECSEC	B-alanine secretion via secretory vesicle (ATP driven)
1510	20188	BALAtmr	Beta-alanine reversible mitochondrial transport (diffusion)
1511	9767	BAMPPALDOX	beta-Aminopropion aldehyde:NAD+ oxidoreductase
1512	9766	BAMPPALDOXm	beta-Aminopropion aldehyde:NAD+ oxidoreductase (m)
1513	10956	BBHOX	4-Trimethylammoniobutanoate,2-oxoglutarate:oxygen oxidoreductase (3-hydroxylating)
1514	11010	BCDO	beta-Carotene dioxygenase
1515	11053	BDG2HCGHD	beta-D-Glucosyl-2-coumarinate glucohydrolase
1516	5490	BDHm	(R)-3-Hydroxybutanoate:NAD+ oxidoreductase
1517	7333	BDMT_L	GDPmannose:chitobiosyldiphosphodolichol beta-D-mannosyltransferase (liver)
1518	7334	BDMT_U	GDPmannose:chitobiosyldiphosphodolichol beta-D-mannosyltransferase (uterus)
1519	2506	BETALDHx	betaine-aldehyde dehydrogenase
1520	13252	BETALDHxm	betaine-aldehyde dehydrogenase, mitochondrial
1521	5493	BHBt	(R)-3-Hydroxybutanoate transport via H+ symport
1522	5494	BHBtm	(R)-3-Hydroxybutanoate mitochondrial transport via H+ symport
1523	9853	BHMT	betaine-homocysteine S-methyltransferase
1524	12277	BILDGLCURt	bilirubin beta-diglucuronide transport via bicarbonate countertransport
1525	19769	BILDGLCURte	bilirubin beta-diglucuronide transport MDR
1526	19752	BILDGLCURtr	glucuronidated compound transport
1527	12276	BILGLCURt	bilirubin monoglucuronide transport via bicarbonate countertransport
1528	19770	BILGLCURte	bilirubin monoglucuronide transport MDR
1529	19786	BILGLCURtr	glucuronidated compound transport
1530	5596	BILIREd	Nad(p)h biliverdin reductase
1531	12275	BILIRUBt2	bilirubin transport via bicarbonate countertransport
1532	14198	BILIRUBtr	lipid, flip-flop intracellular transport
1533	14767	BIOCYTtn	biocytin transport, nuclear
1534	11304	BMTer_L	B mannosyltransferase, endoplasmic reticulum
1535	11349	BMTer_U	B mannosyltransferase, endoplasmic reticulum
1536	351	BPNT	3',5'-bisphosphate nucleotidase
1537	15235	BPNT2	3',5'-bisphosphate nucleotidase (paps)
1538	10494	BTND1	biotinidase (biotin)
1539	14766	BTND1n	biotinidase (biotin), nuclear
1540	10491	BTNDe	biotinidase (biotin), extracellular
1541	12132	BTNDm	biotinidase (biotin), mitochondrial
1542	14755	BTNPL	holocarboxylase synthetase (biotin protein ligase)
1543	14756	BTNPLm	holocarboxylase synthetase (biotin protein ligase), mitochondrial
1544	1750	BTNt2	Biotin reversible transport via proton symport
1545	14774	BTNt2m	Biotin reversible transport via proton symport, mitochondria
1546	10480	BTNt3i	Biotin transport via sodium symport
1547	14017	BTNt4i	Biotin uptake (antiport)
1548	14768	BTNtn	Biotin transport, nuclear
1549	19604	BUP2	beta-ureidopropionase (D-3-amino-isobutanoate forming)
1550	14990	BUTt2m	Butyrate mitochondrial transport via proton symport, reversible

Column	Reaction #	Abbreviation	Reaction Name
1551	2611	BUTt2r	Butyrate transport via proton symport, reversible
1552	11415	BVITEt	beta-Tocopherol (Vit. E) transport
1553	20878	BZt	benzoate transport (diffusion)
1554	13982	BZtr	Benzene transporter, endoplasmic reticulum
1555	8536	B_MANNASEly	beta-mannosidase, lysosomal
1556	13155	C110CPT2m	C110 transport into the mitochondria
1557	9754	C14STRr	C-14 sterol reductase
1558	4094	C160CPT1	carnitine O-palmitoyltransferase
1559	4093	C160CPT2	C160 transport into the mitochondria
1560	4104	C160CRNt	C160 transport into the mitochondria
1561	12961	C161CPT1	carnitine O-palmitoyltransferase
1562	20156	C161CPT12	carnitine O-palmitoyltransferase
1563	12962	C161CPT2	C161 transport into the mitochondria
1564	20157	C161CPT22	C161 transport into the mitochondria
1565	20158	C161CRN2t	C161 transport into the mitochondria
1566	12963	C161CRNt	C161 transport into the mitochondria
1567	4095	C180CPT1	carnitine O-stearoyl transferase
1568	4101	C180CPT2	carnitine O-stearoyl transferase
1569	4103	C180CRNt	C180 transport into the mitochondria
1570	4100	C181CPT1	carnitine octadecenoyl transferase
1571	4195	C181CPT2	carnitine octadecenoyl transferase
1572	4102	C181CRNt	C181 transport into the mitochondria
1573	4203	C204CPT1	carnitine C20:4 transferase
1574	4204	C204CPT2	arachidonic acid transport into the mitochondria
1575	4201	C204CRNt	arachidonic acid transport into the mitochondria
1576	14282	C226COAtx	fatty acid intracellular transport
1577	4206	C226CPT1	carnitine C22:6 transferase
1578	4207	C226CPT2	C226 transport into the mitochondria
1579	4205	C226CRNt	C226 transport into the mitochondria
1580	11033	C2M26DCOAHLM	cis-2-Methyl-5-isopropylhexa-2,5-dienoyl-CoA hydro-lyase (m)
1581	11044	C2M26DCOAHLX	cis-2-Methyl-5-isopropylhexa-2,5-dienoyl-CoA hydro-lyase (x)
1582	11410	C3STDH1Pr	C-3 sterol dehydrogenase (4-methylzymosterol)
1583	9756	C3STDH1r	C-3 sterol dehydrogenase (4-methylzymosterol)
1584	9762	C3STKR2r	C-3 sterol keto reductase (zymosterol)
1585	9755	C4STMO1r	C-4 sterol methyl oxidase (4,4-dimethylzymosterol)
1586	11411	C4STMO2Pr	C-4 methyl sterol oxidase
1587	9761	C4STMO2r	C-4 methyl sterol oxidase
1588	15219	CAATPS	Ca ATPase
1589	12621	CAMPt	cAMP transport (ATP-dependent)
1590	11002	CAROTr	beta-carotene transport via diffusion
1591	20194	CARVEOLte	xenobiotic transport
1592	19462	CAT2p	catalase A, peroxisomal (ethanol)
1593	4414	CATm	catalase
1594	3223	CATp	catalase A, peroxisomal
1595	12697	CAt7r	calcium / sodium antiporter (1:3), reversible
1596	14693	CBL2OR	NADH:cob(II)alamine oxidoreductase
1597	14694	CBL2tm	Cob(II)alamine transport, mitochondrial
1598	14689	CBLATm	cob(I)alamine adenosyltransferase, mitochondrial
1599	19467	CBPPer	Carbamoyl phosphate phosphotransferase, endoplasmic reticulum
1600	2852	CBPS	carbamoyl-phosphate synthase (glutamine-hydrolysing)
1601	9380	CBPSam	carbamoyl-phosphate synthase (ammonia) (mitochondrial)
1602	19464	CBPter	carbamoyl phosphate transport, endoplasmic reticulum
1603	11884	CBR1	Carbonyl reductase [NADPH] 1

Column	Reaction #	Abbreviation	Reaction Name
1604	11885	CBR2	Carbonyl reductase [NADPH] 1
1605	11399	CCA_D3t	Calcitroic acid transport from cytosol
1606	11397	CCA_D3tm	Calcitroic acid transport from mitochondria
1607	10937	CDIPTr	phosphatidylinositol synthase (Homo sapiens)
1608	19810	CDPDAGtm	intracellular transport
1609	10564	CDS	phosphatidate cytidyltransferase
1610	10565	CDSm	phosphatidate cytidyltransferase
1611	10537	CEPTC	choline phosphotransferase
1612	10538	CEPTE	ethanolamine phosphotransferase
1613	11204	CERK	Ceramide kinase
1614	13387	CERT1gt	ceramide transport protein
1615	13388	CERT1rt	ceramide transport protein
1616	13389	CERT2gt	ceramide transport protein
1617	13390	CERT2rt	ceramide transport protein
1618	11955	CGLY3(2)	Cys-Gly transport in via proton symport
1619	12622	CGMPt	cGMP transport (ATP-dependent)
1620	9565	CH25H	cholesterol 25-hydroxylase
1621	11892	CHAT	Choline O-acetyltransferase
1622	11893	CHATn	Choline O-acetyltransferase
1623	11899	CHLP	choline phosphate phosphatase
1624	2382	CHLPCTD	choline phosphate cytididyltransferase
1625	13321	CHLtm	choline transport via diffusion (cytosol to mitochondria)
1626	12266	CHOLATet	cholate transport via bicarbonate countertransport
1627	12616	CHOLATet2	cholate transport via sodium cotransport
1628	12667	CHOLATet3	ABC bile acid transporter
1629	9847	CHOLD2m	choline dehydrogenase (FAD acceptor), mitochondrial
1630	2383	CHOLK	Choline kinase
1631	20346	CHOLPtg	choline phosphate intracellular transport
1632	20345	CHOLPtI	choline phosphate intracellular transport
1633	12129	CHOLt4	choline, sodium cotransport
1634	20154	CHOLtg	choline intracellular transport
1635	19524	CHOLtn	Choline transport, nuclear through pores
1636	20155	CHOLtr	choline intracellular transport
1637	12197	CHOLtu	Choline uniport
1638	19773	CHSTEROLSULT	steroid sulfotransferase
1639	12591	CHSTEROLt	cholesterol efflux (ATP depedent)
1640	13535	CHSTEROLt1	cholesterol intracellular transport
1641	13536	CHSTEROLt2	cholesterol intracellular transport
1642	13537	CHSTEROLt3	cholesterol intracellular transport
1643	12601	CHSTEROLtg	cholesterol efflux (ATP depedent), golgi
1644	13713	CHTNASE	chitinase
1645	13712	CHTNASEe	chitinase, extracellular
1646	2302	CITL	Citrate lyase
1647	10811	CITMCOAHm	L-Citramalyl-CoA hydro-lyase, mitochondrial
1648	10812	CITMCOALm	L-Citramalyl-CoA pyruvate-lyase
1649	5288	CITRtm	citruilline mitochondrial transport via proton antiport
1650	12166	CITt4_2	citrate transport via sodium symport
1651	12171	CITt4_4	citrate transport via sodium symport
1652	763	CITtam	citrate transport, mitochondrial
1653	878	CITtbm	citrate transport, mitochondrial
1654	4525	CK	ATP Creatine kinase
1655	9725	CKc	ATP Creatine kinase (c)
1656	12365	CLFORtex	chloride transport via formate countertransport
1657	12367	CLFORtex2	chloride transport via formate countertransport (2:1)
1658	12368	CLHCO3tex2	chloride transport via bicarbonate countertransport (2:1)
1659	12363	CLHCOtex	chloride transport via bicarbonate countertransport

Column	Reaction #	Abbreviation	Reaction Name
1660	12364	CLI2tex	chloride transport via iodide countertransport
1661	12369	CLOHtex2	chloride transport via hydroxide countertransport (2:1)
1662	12366	CLOXAtex2	chloride transport via oxalate countertransport (2:1)
1663	14281	CLPNDCOAtx	fatty acid intracellular transport
1664	19107	CLPNDPCPT1	carnitine O-palmitoyltransferase
1665	19126	CLPNDPCPT2	carnitine transferase
1666	19088	CLPNDCRNt	transport into the mitochondria (carnitine)
1667	12461	CLPNDt	fatty acid transport via diffusion
1668	10866	CLS_hs	cardiolipin synthase (homo sapiens)
1669	12141	CMPACNAtg	CMP-Sia Golgi transport via CMP antiport
1670	15228	CMPACNAtn	CMP-Sia nuclear export
1671	10638	CMPSAS	CMP sialic acid synthase
1672	10639	CMPSASn	CMP sialic acid synthase, nuclear
1673	1296	CO2t	CO2 transporter via diffusion
1674	2244	CO2ter	CO2 endoplasmic reticular transport via diffusion
1675	2157	CO2tg	CO2 Golgi transport
1676	2756	CO2tm	CO2 transport (diffusion), mitochondrial
1677	1278	CO2tn	CO2 nuclear transport via diffusion
1678	2150	CO2tp	CO2 peroxisomal transport
1679	14655	COAtl	CoA transport in lysosome via diffusion
1680	4074	COAtm	CoA transporter
1681	1535	COAtn	coenzyme A transport, nuclear
1682	1317	COAtp	coenzyme A transport, peroxisomal
1683	13989	COAtr	COA transporter, endoplasmic reticulum
1684	11139	COKECBESr	Carboxylesterase (cocaine) (er)
1685	11131	COQ3m	methyltransferase COQ3
1686	11120	COQ5m	Ubiquinone biosynthesis methyltransferase COQ5
1687	11118	COQ6m	Ubiquinone biosynthesis monooxygenase COQ6
1688	11128	COQ7m	Ubiquinone biosynthesis COQ7
1689	8571	CORE2GTg	Core 2 acetylglucosaminyltransferase, Golgi apparatus
1690	8575	CORE3GTg	Core 3 beta-GlcNAc-transferase, Golgi apparatus
1691	8576	CORE4GTg	Core 4 beta6-GalNAc-transferase, Golgi apparatus
1692	8606	CORE5GTg	Core 5 alpha-GalNAc-transferase, Golgi apparatus
1693	8577	CORE6GTg	Core 6 beta-GlcNAc-transferase A, Golgi apparatus
1694	8607	CORE7GTg	Core 7 alpha-GalNAc-transferase, Golgi apparatus
1695	8608	CORE8GTg	N-acetylgalactosamine 3-alpha-galactosyltransferase, Golgi apparatus
1696	14225	COUCOAFm	p-coumaroyl-CoA formation
1697	19703	COUMARINte	xenobiotic transport
1698	8578	COt	CO transporter via diffusion
1699	9960	CPCTDTX	choline-phosphate cytidyltransferase
1700	1650	CPPPGO	coproporphyrinogen oxidase (O2 required)
1701	11947	CREATt4(2)r	Creatine transport (sodium symport) (2:1)
1702	14382	CREATmdiffir	Creatine transport to/from mitochondria via diffusion
1703	20203	CRMPte	crmp_hs transport
1704	15148	CRNCAR3tp	carnitine-propcarnitine carrier, peroxisomal
1705	3221	CRNCARtp	carnitine-acetylcarnitine carrier, peroxisomal
1706	2971	CRNt	L-carnitine reversible transport
1707	12201	CRNtHa	L-carnitine outward transport (H+ antiport)
1708	1518	CRNtim	L-carnitine transport out of mitochondria via diffusion
1709	12199	CRNtuIR	L-carnitine inward uniport
1710	12202	CRNtuNa	L-carnitine inward transport by Na+ symport
1711	13158	CRNtx	carnitine transport peroxisome to mitochondria
1712	14453	CRTNsyn	Creatinine synthase
1713	19792	CRTSLtm	cortisol intracellular transport
1714	19791	CRTSLtr	cortisol intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
1715	19793	CRTSTRNtm	corticosterone intracellular transport
1716	19794	CRTSTRNtr	corticosterone intracellular transport
1717	12462	CRVNCtr	fatty acid transport via diffusion
1718	14403	CSAPASEly	chondroitin sulfate A proteoglycan protease, lysosome (endosome)
1719	14412	CSBPASEly	chondroitin sulfate B proteoglycan protease, lysosome (endosome)
1720	14418	CSCPASEly	chondroitin sulfate C proteoglycan protease, lysosome (endosome)
1721	14428	CSDPASEly	chondroitin sulfate D proteoglycan protease, lysosome (endosome)
1722	14438	CSEPASEly	chondroitin sulfate E proteoglycan protease, lysosome (endosome)
1723	8427	CSNAT2m	carnitine O-acyltransferase, mitochondrial
1724	13157	CSNAT2x	carnitine dimethyl nonanoyl transferase, reversible, peroxisomal
1725	20844	CSNAT3x	carnitine O-acyltransferase, peroxisomal
1726	9423	CSNATer	carnitine O-acyltransferase, endoplasmic reticulum
1727	8411	CSNATm	carnitine O-acyltransferase, mitochondrial
1728	4168	CSNATp	carnitine O-acyltransferase, reverse direction, peroxisomal
1729	4163	CSNATr	carnitine O-acyltransferase
1730	3526	CSND	Cytosine deaminase
1731	12552	CSNt	cytosine transport via facilitated diffusion
1732	14949	CSPG_At	chondroitin sulfate A transport, golgi to extracellular
1733	14954	CSPG_Atly	chondroitin sulfate A transport, extracellular to lysosome
1734	14950	CSPG_Bt	chondroitin sulfate B transport, golgi to extracellular
1735	14955	CSPG_Btly	chondroitin sulfate B transport, extracellular to lysosome
1736	14951	CSPG_Ct	chondroitin sulfate C transport, golgi to extracellular
1737	14956	CSPG_Ctly	chondroitin sulfate C transport, extracellular to lysosome
1738	14952	CSPG_Dt	chondroitin sulfate D transport, golgi to extracellular
1739	14957	CSPG_Dtly	chondroitin sulfate D transport, extracellular to lysosome
1740	14953	CSPG_Et	chondroitin sulfate E transport, golgi to extracellular
1741	14958	CSPG_Etly	chondroitin sulfate E transport, extracellular to lysosome
1742	12	CSm	citrate synthase
1743	3571	CTPS1	CTP synthase (NH ₃)
1744	2696	CTPS2	CTP synthase (glutamine)
1745	14148	CTPtn	CTP diffusion in nucleus
1746	11817	CYANSTm	Cyanide sulfurtransferase, mitochondrial
1747	20242	CYANt	Cyanide transport via diffusion (extracellular to cytosol)
1748	20243	CYANtm	Cyanide transport via diffusion (mitochondrial)
1749	4924	CYOOm3	cytochrome c oxidase, mitochondrial Complex IV
1750	4545	CYOR-u10m	ubiquinol-6 cytochrome c reductase, Complex III
1751	11837	CYSALANaEx	L-alanine/L-cysteine Na-dependent exchange (Cys-L in)
1752	14685	CYSAMO	Cysteamine oxygenase
1753	11857	CYSASNNaEx	L-cysteine/L-asparagine Na-dependent exchange (Cys-L in)
1754	11855	CYSLNNaEx	L-cysteine/L-glutamine Na-dependent exchange (Cys-L in)
1755	11808	CYSLTH	Glutathione:cystine oxidoreductase
1756	11801	CYSLUexR	L-cysteine/L-glutamine reversible exchanger
1757	11772	CYSLYex	L-cysteine/glycine exchanger
1758	11802	CYSLYexR	L-cysteine/glycine reversible exchanger
1759	11813	CYSLYSL	L-Cystine Lysteine-lyase (deaminating)
1760	5800	CYSO	cysteine oxidase
1761	11841	CYSSERNaEx	L-serine/L-cysteine Na-dependent exchange (Cys-L in)
1762	11815	CYSTA	cysteine transaminase

Column	Reaction #	Abbreviation	Reaction Name
1763	11816	CYSTAm	cysteine transaminase (mitochondrial)
1764	1592	CYSTGL	cystathionine g-lyase
1765	11881	CYSTGLUex	L-cystine/L- glutamate exchanger
1766	11846	CYSTHRNaEx	L-cysteine/L-threonine Na-dependent exchange (Cys-L in)
1767	1588	CYSTS	cystathionine beta-synthase
1768	11880	CYSTSERex	L-cystine/glycine exchanger (cystine in)
1769	11952	CYS4	L-cysteine reversible transport via sodium symport
1770	11929	CYStec	L-cysteine transport via diffusion (extracellular to cytosol)
1771	3527	CYTD	cytidine deaminase
1772	438	CYTDK1	cytidine kinase (ATP)
1773	20319	CYTDK2m	cytidine kinase (ATP), mitochondrial
1774	10099	CYTDn	cytidine deaminase, nuclear
1775	12544	CYTDt	cytidine facilitated transport in cytosol
1776	7882	CYTDt4	cytidine transport in via sodium symport
1777	12144	CYTDt5	cytidine transport (1:2 Na/cytd cotransport)
1778	12574	CYTDtl	Cytidine facilitated transport from lysosome
1779	12150	CYTDtm	cytidine facilitated transport in mitochondria
1780	19530	CYTDtn	cytidine transport in nucleus
1781	184	CYTK1	cytidylate kinase (CMP)
1782	10261	CYTK10	cytidylate kinase (CMP,dGTP)
1783	10262	CYTK10n	cytidylate kinase (CMP,dGTP),nuclear
1784	10265	CYTK11	cytidylate kinase (dCMP,dGTP)
1785	10266	CYTK11n	cytidylate kinase (dCMP,dGTP),nuclear
1786	10269	CYTK12	cytidylate kinase (dCMP,dCTP)
1787	10270	CYTK12n	cytidylate kinase (dCMP,dCTP),nuclear
1788	10271	CYTK13	cytidylate kinase (dCMP,dATP)
1789	10272	CYTK13n	cytidylate kinase (dCMP,dATP),nuclear
1790	10273	CYTK14	cytidylate kinase (dCMP,UTP)
1791	10274	CYTK14n	cytidylate kinase (dCMP,CTP),nuclear
1792	20318	CYTK1m	cytidylate kinase (CMP),mitochondrial
1793	10230	CYTK1n	cytidylate kinase (CMP),nuclear
1794	185	CYTK2	cytidylate kinase (dCMP)
1795	10231	CYTK2n	cytidylate kinase (dCMP),nuclear
1796	10077	CYTK3	cytidylate kinase (CMP)(GTP)
1797	10236	CYTK3n	cytidylate kinase (dCMP,CTP),nuclear
1798	10078	CYTK4	cytidylate kinase (dCMP)(GTP)
1799	10248	CYTK4n	cytidylate kinase (dCMP,GTP),nuclear
1800	10249	CYTK5	cytidylate kinase (dCMP)
1801	10252	CYTK5n	cytidylate kinase (CMP),nuclear
1802	10254	CYTK6	cytidylate kinase (CMP,CTP)
1803	10253	CYTK6n	cytidylate kinase (CMP,CTP),nuclear
1804	10255	CYTK7	cytidylate kinase (CMP,UTP)
1805	10256	CYTK7n	cytidylate kinase (CMP,UTP),nuclear
1806	10257	CYTK8	cytidylate kinase (CMP,dATP)
1807	10258	CYTK8n	cytidylate kinase (CMP,dATP),nuclear
1808	10259	CYTK9	cytidylate kinase (CMP,dCTP)
1809	10260	CYTK9n	cytidylate kinase (CMP,dCTP),nuclear
1810	19605	D-3AIBt	D-3-amino-isobutyrate transport
1811	2056	D-LACt2	D-lactate transport via proton symport
1812	1078	D-LACtm	D-lactate transport, mitochondrial
1813	19601	D3AIBTm	D-3-Amino-isobutanoate:pyruvate aminotransferase, mitochondrial
1814	3514	DADA	Deoxyadenosine deaminase
1815	9855	DADAE	Deoxyadenosine deaminase, extracellular
1816	160	DADNK	deoxyadenosine kinase
1817	10407	DADNt4	deoxyadenosine transport via diffusion

Column	Reaction #	Abbreviation	Reaction Name
1818	10902	DAGK_hs	Diacylglycerol phosphate kinase (homo sapiens)
1819	10903	DAGKn_hs	Diacylglycerol phosphate kinase (homo sapiens)
1820	20130	DAG_HSter	diacylglycerol ER export
1821	11515	DALAOXx	D-Alanine Oxidase (x)
1822	1322	DALAt2r	D-alanine transport via proton symport
1823	11684	DALAt2rL	D-alanine transport via proton symport (lysosome)
1824	11516	DALAx	D-Alanine transport to peroxisome
1825	10870	DARGOp	D-arginine oxidase, perioxosomal
1826	10205	DASCBH	L-Dehydroascorbate lactonohydrolase
1827	10203	DASCBR	dehydroascorbate reductase
1828	11972	DASPO1p	D-aspartate oxidase, peroxisomal
1829	14132	DATPtn	dATP diffusion in nucleus
1830	13239	DCIm	dodecenoyl-Coenzyme A delta isomerase
1831	20249	DCK1m	Deoxycytidine kinase, mitochondrial (ATP)
1832	9845	DCK1n	Deoxycytidine kinase, nuclear (ATP)
1833	9846	DCK2n	Deoxycytidine kinase, nuclear (UTP)
1834	3567	DCMPDA	dCMP deaminase
1835	14280	DCSPTNICOAtx	fatty acid intracellular transport
1836	19106	DCSPTN1CPT1	carnitine O-palmitoyltransferase
1837	19125	DCSPTN1CPT2	carnitine transferase
1838	19087	DCSPTN1CRNt	transport into the mitochondria (carnitine)
1839	12460	DCSPTN1t	fatty acid transport via diffusion
1840	1483	DCT	Dopachrome tautomerase
1841	14135	DCTPtn	dCTP diffusion in nucleus
1842	3528	DCYTD	deoxycytidine deaminase
1843	10098	DCYTDn	deoxycytidine deaminase, nuclear
1844	10409	DCYTt	deoxycytidine transport via diffusion
1845	13838	DDPGAm	2-dehydro-3-deoxy-phosphogluconate aldolase, mitochondrial
1846	12283	DEBRISOQUINEt	debrisoquine uniport
1847	14239	DECDPtm	lipid, flip-flop intracellular transport
1848	7531	DEDOLP1_L	dehydrodolichol diphosphate phosphatase (liver)
1849	7548	DEDOLP1_U	dehydrodolichol diphosphate phosphatase (uterus)
1850	7540	DEDOLP2_L	dehydrodolichol phosphate phosphatase (liver)
1851	7550	DEDOLP2_U	dehydrodolichol phosphate phosphatase (uterus)
1852	7544	DEDOLR_L	dehydrodolichol reductase (liver)
1853	7551	DEDOLR_U	dehydrodolichol reductase (uterus)
1854	10335	DESAT16_2	palmitoyl-CoA desaturase (n-C16:0CoA -> n-C16:1CoA)
1855	10346	DESAT18_10	fatty acyl-CoA desaturase (n-C18:2CoA -> n-C18:3CoA)
1856	10336	DESAT18_3	stearoyl-CoA desaturase (n-C18:0CoA -> n-C18:1CoA)
1857	10337	DESAT18_4	stearoyl-CoA desaturase (n-C18:0CoA -> n-C18:1CoA)
1858	10338	DESAT18_5	stearoyl-CoA desaturase (n-C18:0CoA -> n-C18:1CoA)
1859	10340	DESAT18_6	fatty acyl-CoA desaturase (n-C18:1CoA -> n-C18:2CoA)
1860	10341	DESAT18_7	fatty acyl-CoA desaturase (n-C18:1CoA -> n-C18:2CoA)
1861	10342	DESAT18_8	fatty acyl-CoA desaturase (n-C18:1CoA -> n-C18:2CoA)
1862	10348	DESAT18_9	fatty acyl-CoA desaturase (n-C18:2CoA -> n-C18:3CoA)
1863	10354	DESAT20_1	fatty acyl-CoA desaturase (n-C20:3CoA -> n-C20:4CoA)
1864	10357	DESAT20_2	fatty acyl-CoA desaturase (n-C20:4CoA -> n-C20:5CoA)
1865	10362	DESAT22_1p	fatty acyl-CoA desaturase (n-C22:4CoA -> n-C22:5CoA)
1866	14107	DESAT22_2p	fatty acyl-CoA desaturase (n-C22:5CoA -> n-C22:6CoA)
1867	14278	DESAT24_1	fatty acyl-CoA desaturase (n-C24:5CoA -> n-C24:6CoA)
1868	14782	DGAT	diacylglycerol acyltransferase
1869	19650	DGCHOLte	bile acid intracellular transport
1870	19649	DGCHOLtx	bile acid intracellular transport
1871	2814	DGK1	deoxyguanylate kinase (dGMP:ATP)
1872	20315	DGK2m	deoxyguanylate kinase (dGMP:dATP) (mitochondrial)

Column	Reaction #	Abbreviation	Reaction Name
1873	4500	DGNSKm	deoxyguanosine kinase
1874	10410	DGSNt	deoxyguanosine transport via diffusion
1875	20316	DGSNtm	deoxyguanosine transport in mitochondria
1876	14133	DGTPtn	dGTP diffusion in nucleus
1877	10154	DGULND	dehydro-L-gulonate decarboxylase
1878	11913	DHAAt1r	dehydroascorbate transport (uniport)
1879	14356	DHAPA	dihydroxyacetone phosphate acyltransferase
1880	14357	DHAPAx	dihydroxyacetone phosphate acyltransferase
1881	14186	DHCHOLESTANATEtm	lipid, flip-flop intracellular transport
1882	9779	DHCR241r	24-dehydrocholesterol reductase [Precursor]
1883	9780	DHCR242r	24-dehydrocholesterol reductase [Precursor]
1884	9781	DHCR243r	24-dehydrocholesterol reductase [Precursor]
1885	9777	DHCR71r	7-dehydrocholesterol reductase
1886	9778	DHCR72r	7-dehydrocholesterol reductase
1887	10891	DHCRD1	dihydroceramide desaturase
1888	10892	DHCRD2	dihydroceramide desaturase
1889	11094	DHDPBMTm	dihydroxydecaprenylbenzoate methyltransferase
1890	12069	DHEASULT	Dehydroepiandrosterone sulfotransferase
1891	12269	DHEASt	dehydroepiandrosterone sulfate transport via bicarbonate countertransport
1892	19777	DHEAStr	dheas intracellular transport
1893	77	DHFR	dihydrofolate reductase
1894	14904	DHFtl	dihydrofolate reversible lysosomal transport
1895	1758	DHFtm	dihydrofolate reversible mitochondrial transport
1896	12084	DHORD9	dihydroorotic acid dehydrogenase (quinone10)
1897	444	DHORTS	dihydroorotase
1898	92	DHPM1	dihydropyrimidinase (5,6-dihydrouracil)
1899	61	DHPM2	dihydropyrimidinase (dihydrothymine)
1900	14579	DHPR	6,7-dihydropteridine reductase
1901	14582	DHPR2	6,7-dihydropteridine reduction
1902	19533	DIDPtn	dIDP nuclear transport
1903	20226	DIGALSGALSIDEte	digalsgalside_hs transport
1904	20210	DIGALSGALSIDEtg	digalsgalside_hs intracellular transport
1905	20137	DIGALSIDEtg	digalside_hs intracellular transport
1906	20136	DIGALSIDEtl	digalside_hs intracellular transport
1907	10412	DINt	deoxyinosine transport via diffusion
1908	19534	DITPtn	dITP nuclear transport
1909	1631	DKMPPD	2,3-diketo-5-methylthio-1-phosphopentane degradation reaction
1910	19100	DLNLGCPT1	carnitine O-palmitoyltransferase
1911	19119	DLNLGCPT2	carnitine transferase
1912	19081	DLNLGCRNt	transport into the mitochondria (carnitine)
1913	12464	DLNLGt	fatty acid transport via diffusion
1914	19714	DMANTIPYRINete	xenobiotic transport
1915	108	DMATT	dimethylallyltranstransferase
1916	9743	DMATTx	dimethylallyltranstransferase
1917	11701	DMGDHm	dimethylglycine dehydrogenase, mitochondrial
1918	13323	DMGtm	dimethylglycine transport via diffusion (cytosol to mitochondria)
1919	20832	DMHPTCRNCPT1	carnitine fatty-acyl transferase
1920	20339	DMHPTCRNCPT2	2,6 dimethylheptanoly CoA carnitine transferase
1921	20340	DMHPTCRNt	2,6 dimethylheptanoyl crn transport
1922	20341	DMHPTCRNte	2,6 dimethylheptanoyl carnitine transport
1923	760	DM_nadh	demand NADH
1924	13541	DM_nadh(m)	demand NADH(m)
1925	761	DM_nadph	NADPH demand

Column	Reaction #	Abbreviation	Reaction Name
1926	2796	DNADDP	Deamido NAD diphosphatase
1927	19528	DNADtn	dNAD transport, nuclear through pore
1928	11357	DNAMTSEn	DNA (cytosine-5-)-methyltransferase, nucleus
1929	10183	DNAMTn	DNA (cytosine-5-)-methyltransferase, nucleus
1930	11183	DNDPt10m	dADP transport via dCDP antiport
1931	11184	DNDPt11m	dADP transport via dGDP antiport
1932	11185	DNDPt12m	dADP transport via ADP antiport
1933	11186	DNDPt13m	dADP transport via ATP antiport
1934	11187	DNDPt14m	dUDP transport via dTDP antiport
1935	11188	DNDPt15m	dUDP transport via dGDP antiport
1936	11189	DNDPt16m	dUDP transport via dADP antiport
1937	11190	DNDPt17m	dUDP transport via dCDP antiport
1938	11191	DNDPt18m	dUDP transport via ADP antiport
1939	11193	DNDPt19m	dUDP transport via ATP antiport
1940	11165	DNDPt1m	dATP transport via ADP antiport
1941	11209	DNDPt20m	dTDP transport via ATP antiport
1942	11210	DNDPt21m	dTDP transport via ADP antiport
1943	11211	DNDPt22m	dTDP transport via dUDP antiport
1944	11212	DNDPt23m	dTDP transport via dGTP antiport
1945	11214	DNDPt24m	dTDP transport via dADP antiport
1946	11215	DNDPt25m	dTDP transport via dCDP antiport
1947	11216	DNDPt26m	dCDP transport via dUDP antiport
1948	11217	DNDPt27m	dCDP transport via dTDP antiport
1949	11218	DNDPt28m	dCDP transport via dGDP antiport
1950	11219	DNDPt29m	dCDP transport via dADP antiport
1951	11166	DNDPt2m	dATP transport via ATP antiport
1952	11220	DNDPt30m	dCDP transport via ADP antiport
1953	11221	DNDPt31m	dCDP transport via ATP antiport
1954	11222	DNDPt32m	dGDP transport via ATP antiport
1955	11223	DNDPt33m	dGDP transport via dUDP antiport
1956	11224	DNDPt34m	dGDP transport via dTDP antiport
1957	11225	DNDPt35m	dGDP transport via dADP antiport
1958	11226	DNDPt36m	dGDP transport via dCDP antiport
1959	11227	DNDPt37m	dUTP transport via dTDP antiport
1960	11229	DNDPt38m	dUTP transport via dUDP antiport
1961	11230	DNDPt39m	dUTP transport via dGDP antiport
1962	11176	DNDPt3m	dATP transport via dCDP antiport
1963	11231	DNDPt40m	dUTP transport via dADP antiport
1964	11232	DNDPt41m	dUTP transport via dCDP antiport
1965	11233	DNDPt42m	dUTP transport via ADP antiport
1966	11234	DNDPt43m	dUTP transport via ATP antiport
1967	11235	DNDPt44m	dTTP transport via ATP antiport
1968	11236	DNDPt45m	dTTP transport via ADP antiport
1969	11237	DNDPt46m	dTTP transport via dUDP antiport
1970	11238	DNDPt47m	dTTP transport via dTDP antiport
1971	11239	DNDPt48m	dTTP transport via dGDP antiport
1972	11240	DNDPt49m	dTTP transport via dADP antiport
1973	11175	DNDPt4m	dATP transport via dUDP antiport
1974	11241	DNDPt50m	dTTP transport via dCDP antiport
1975	11242	DNDPt51m	dCTP transport via dCDP antiport
1976	11243	DNDPt52m	dCTP transport via dUDP antiport
1977	11244	DNDPt53m	dCTP transport via dGDP antiport
1978	11245	DNDPt54m	dCTP transport via dADP antiport
1979	11246	DNDPt55m	dCTP transport via ADP antiport
1980	11247	DNDPt56m	dCTP transport via ATP antiport
1981	11248	DNDPt57m	dGTP transport via ATP antiport

Column	Reaction #	Abbreviation	Reaction Name
1982	11249	DNDPt58m	dGTP transport via ADP antiport
1983	11250	DNDPt59m	dGTP transport via dADP antiport
1984	11174	DNDPt5m	dATP transport via dTDP antiport
1985	11251	DNDPt60m	dGTP transport via dUDP antiport
1986	11252	DNDPt61m	dGTP transport via dTDP antiport
1987	11253	DNDPt62m	dGTP transport via dGDP antiport
1988	11254	DNDPt63m	dGTP transport via dCDP antiport
1989	11173	DNDPt6m	dATP transport via dGDP antiport
1990	11177	DNDPt7m	dATP transport via dADP antiport
1991	11181	DNDPt8m	dADP transport via dUDP antiport
1992	11182	DNDPt9m	dADP transport via dTDP antiport
1993	10207	DOGULND1	2,3-dioxo-L-gulonate decarboxylase (L-lyxonate-forming)
1994	10208	DOGULND2	2,3-dioxo-L-gulonate decarboxylase (L-xylonate-forming)
1995	10224	DOGULNO1	2,3-dioxo-L-gulonate:hydrogen peroxide oxidoreductase
1996	10227	DOGULNO2	2,3-dioxo-L-gulonate:hydrogen peroxide oxidoreductase
1997	7593	DOLASNT_Ler	Dolichyl-diphosphooligosaccharide:protein-L-asparagine oligopolysaccharidotransferase (liver)
1998	7594	DOLASNT_Uer	Dolichyl-diphosphooligosaccharide:protein-L-asparagine oligopolysaccharidotransferase (uterus)
1999	7304	DOLDPP_Ler	Dolichyl-diphosphate phosphohydrolase, human (liver)
2000	7305	DOLDPP_Uer	Dolichyl-diphosphate phosphohydrolase, human (uterus)
2001	7346	DOLGLCP_Lter	Dolichyl beta-D-glucosyl phosphate flippase (liver)
2002	7347	DOLGLCP_Uter	Dolichyl beta-D-glucosyl phosphate flippase (uterus)
2003	7307	DOLGPP_Ler	Dolichyl-beta-D-glucosyl-phosphate dolichylphosphohydrolase (liver)
2004	7308	DOLGPP_Uer	Dolichyl-beta-D-glucosyl-phosphate dolichylphosphohydrolase (uterus)
2005	7297	DOLICHOL_Lter	dolichol diffusion, human (liver)
2006	7298	DOLICHOL_Uter	dolichol diffusion, human (uterus)
2007	7296	DOLK_L	Dolichol kinase, human (liver)
2008	7299	DOLK_U	Dolichol kinase, human (uterus)
2009	7344	DOLMANP_Lter	dolichol-phosphate mannose flippase (liver)
2010	7345	DOLMANP_Uter	dolichol-phosphate mannose flippase (uterus)
2011	7662	DOLPGT1_Ler	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (liver)
2012	7660	DOLPGT1_Uer	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (uterus)
2013	7658	DOLPGT2_Ler	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (liver)
2014	7655	DOLPGT2_Uer	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (uterus)
2015	7651	DOLPGT3_Ler	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (liver)
2016	7650	DOLPGT3_Uer	dolichyl-phosphate-glucose-glycolipid alpha-glucosyltransferase (uterus)
2017	7301	DOLPH_Ler	Dolichol-phosphate phosphohydrolase, human (liver)
2018	7303	DOLPH_Uer	Dolichol-phosphate phosphohydrolase, human (uterus)
2019	7649	DOLPMT1_Ler	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (liver)
2020	7648	DOLPMT1_Uer	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (uterus)
2021	7647	DOLPMT2_Ler	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (liver)
2022	7646	DOLPMT2_Uer	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (uterus)

Column	Reaction #	Abbreviation	Reaction Name
2023	7645	DOLPMT3_Ler	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (liver)
2024	7644	DOLPMT3_Uer	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (uterus)
2025	7643	DOLPMT4_Ler	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (liver)
2026	7642	DOLPMT4_Uer	dolichyl-phosphate-mannose-glycolipid alpha-mannosyltransferase (uterus)
2027	7313	DOLPMT_L	Dolichyl-phosphate D-mannosyltransferase (liver)
2028	7314	DOLPMT_U	Dolichyl-phosphate D-mannosyltransferase (uterus)
2029	7311	DOLP_Lter	dolichol phosphate flippase (liver)
2030	7312	DOLP_Uter	dolichol phosphate flippase (uterus)
2031	12099	DOPABMO	dopamine beta-monoxygenase
2032	10562	DOPACHRMISO	L-dopachrome isomerase 1
2033	11384	DOPAMT	Dopamine:amet O-methyltransferase
2034	10561	DOPAQNISO1	Dopaquinone isomerase 1
2035	19420	DOPASFt	Dopamine 3-O-sulfate transport (diffusion)
2036	12103	DOPASULT	Dopamine Sulfotransferase
2037	11931	DOPAVESSEC	Dopamine secretion via secretory vesicle (ATP driven)
2038	11938	DOPA4(2)r	Dopamine reversible transport in via sodium symport (1:2)
2039	12192	DOPA4tu	Dopamine uniport
2040	10871	DORNOp	D-ornithine oxidase, perioxosomal
2041	2790	DPCOAK	dephospho-CoA kinase
2042	14679	DPCOAPP	pyrophosphatase (dephospho-CoA)
2043	14686	DPCOAtl	dephospho-CoA transport from lysosome via diffusion
2044	3110	DPGM	Diphosphoglyceromutase
2045	755	DPGase	Diphosphoglycerate phosphatase
2046	11095	DPHMBDCm	3-Decaprenyl-4-hydroxy-5-methoxybenzoate decarboxylation
2047	9736	DPMVDx	diphosphomevalonate decarboxylase
2048	14238	DPSS	decaprenyl synthase
2049	10268	DPROOp	D-proline oxidase, perioxosomal
2050	2023	DRBK	Deoxyribokinase
2051	20140	DRIBt	deoxyribose transport via diffusion
2052	4640	DRPA	deoxyribose-phosphate aldolase
2053	14373	DSAT	dihydrosphingosine N-acyltransferase
2054	19535	DTDPTn	dTDP nuclear transport
2055	2815	DTMPK	dTMP kinase
2056	14134	DTTPtn	dTTP diffusion in nucleus
2057	19545	DUDPTn	dUDP nuclear transport
2058	2271	DUMPtn	dUMP nuclear transport
2059	9523	DURAD	dihydrouracil dehydrogenase (NADP)
2060	9524	DURAD2	dihydrothymine dehydrogenase (NADP)
2061	2691	DURIK1	deoxyuridine kinase (ATP:Deoxyuridine)
2062	10100	DURIK1m	deoxyuridine kinase (ATP:Deoxyuridine), mitochondrial
2063	1084	DURIPP	deoxyuridine phosphorylase
2064	10413	DURIt	deoxyuridine transport via diffusion
2065	19532	DURItm	deoxyuridine transport in nucleus
2066	4502	DUTPDPm	dUTP diphosphatase
2067	10101	DUTPDPn	dUTP diphosphatase, nuclear
2068	19715	EAFLATOXINte	xenobiotic transport
2069	19724	EBASTINEOHte	xenobiotic transport
2070	19726	EBASTINEOHtr	xenobiotic transport
2071	19723	EBASTINEte	xenobiotic transport
2072	19725	EBASTINEtr	xenobiotic transport
2073	9768	EBP1r	3-beta-hydroxysteroid-delta(8),delta(7)-isomerase

Column	Reaction #	Abbreviation	Reaction Name
2074	9769	EBP2r	3-beta-hydroxysteroid-delta(8),delta(7)-isomerase
2075	11284	ECGISO	Ecgonine isomerase (ER)
2076	10910	ECOAH12m	3-hydroxyacyl-CoA dehydratase (3-hydroxyisobutyryl-CoA) (mitochondria)
2077	9503	ECOAH1m	3-hydroxyacyl-CoA dehydratase (3-hydroxybutanoyl-CoA) (mitochondria)
2078	9504	ECOAH1x	3-hydroxyacyl-CoA dehydratase (3-hydroxybutanoyl-CoA) (perioxisome)
2079	10917	ECOAH9m	2-Methylprop-2-enoyl-CoA (2-Methylbut-2-enoyl-CoA), mitochondrial
2080	11281	EGMESTr	ecgonine methyl esterase (ER)
2081	1844	EHGLAT	L-erythro-4-Hydroxyglutamate:2-oxoglutarate aminotransferase
2082	13890	EHGLAT2m	L-erythro-4-Hydroxyglutamate:2-oxoglutarate aminotransferase 2, mitochondrial
2083	1842	EHGLATm	L-erythro-4-Hydroxyglutamate:2-oxoglutarate aminotransferase, mitochondrial
2084	19101	EICOSTETCPT1	carnitine O-palmitoyltransferase
2085	19120	EICOSTETCPT2	carnitine transferase
2086	19082	EICOSTETCRNt	transport into the mitochondria (carnitine)
2087	12467	EICOSTETt	fatty acid transport via diffusion
2088	19093	ELAIDCPT1	carnitine O-palmitoyltransferase
2089	19112	ELAIDCPT2	carnitine transferase
2090	19074	ELAIDCRNt	transport into the mitochondria (carnitine)
2091	12450	ELAIDt	fatty acid transport via diffusion
2092	8433	ENGASE	endo-beta-N-acetylglucosaminidase
2093	8450	ENGASE2	endo-beta-N-acetylglucosaminidase
2094	8537	ENGASE2ly	endo-beta-N-acetylglucosaminidase, lysosomal
2095	14457	ENGASE3ly	endo-beta-N-acetylglucosaminidase, lysosomal
2096	8538	ENGASEly	endo-beta-N-acetylglucosaminidase, lysosomal
2097	8099	ENMAN1g	Endomannosidase (glc1man-producing), Golgi apparatus
2098	8095	ENMAN2g	Endomannosidase (glc2man-producing), Golgi apparatus
2099	8093	ENMAN3g	Endomannosidase (glc3man-producing), Golgi apparatus
2100	8120	ENMAN4g	Endomannosidase (m6masnC-producing), Golgi apparatus
2101	8123	ENMAN5g	Endomannosidase (m6masnB2-producing), Golgi apparatus
2102	8124	ENMAN6g	Endomannosidase (m5masnB1-producing), Golgi apparatus
2103	266	ENO	enolase
2104	9952	EPCTX	ethanolamine-phosphate cytidyltransferase
2105	12270	ESTRADIOLGLCt	estradiol glucuronide transport via bicarbonate countertransport
2106	12623	ESTRADIOLGLCt2	17-beta-D-glucuronide transport (ATP-dependent)
2107	19753	ESTRADIOLGLCtr	glucuronidated compound transport
2108	14982	ESTRADIOLtr	estradiol intracellular transport
2109	19764	ESTRIOLGLCte	glucuronidated compound transport
2110	19754	ESTRIOLGLCtr	glucuronidated compound transport
2111	14987	ESTRIOLtr	estriol intracellular transport
2112	12670	ESTRONEGLCt	ABC transporter
2113	19756	ESTRONEGLCtr	glucuronidated compound transport
2114	12271	ESTRONESt	estrone 3-sulfate transport via bicarbonate countertransport
2115	12620	ESTRONESt2	estrone-3-sulfate transport via sodium cotransport
2116	14983	ESTRONEtr	estrone intracellular transport
2117	12070	ESTSULT	Estrogen sulfotransferase
2118	11580	ETF	electron transfer flavoprotein
2119	11581	ETFQO	Electron transfer flavoprotein-ubiquinone oxidoreductase
2120	2384	ETHAK	Ethanolamine kinase

Column	Reaction #	Abbreviation	Reaction Name
2121	11900	ETHP	ethanolamine phosphate phosphatase
2122	19461	ETOHMO	ethanol monooxygenase
2123	1558	ETOHt	ethanol reversible transport
2124	20151	ETOHtx	ethanol reversible peroxisomal transport
2125	9639	FIPGT	fucose-1-phosphate guanylyltransferase
2126	7758	F6Tg	glycoprotein 6-alpha-L-fucosyltransferase
2127	3282	FA120ACPH	fatty-acyl-ACP hydrolase
2128	3283	FA140ACPH	fatty-acyl-ACP hydrolase
2129	3285	FA141ACPH	fatty-acyl-ACP hydrolase
2130	3286	FA160ACPH	fatty-acyl-ACP hydrolase
2131	3289	FA161ACPH	fatty-acyl-ACP hydrolase
2132	3287	FA180ACPH	fatty-acyl-ACP hydrolase
2133	3290	FA181ACPH	fatty-acyl-ACP hydrolase
2134	13580	FA1821ACPH	fatty-acyl-ACP hydrolase
2135	13581	FA1822ACPH	fatty-acyl-ACP hydrolase
2136	3291	FA182ACPH	fatty-acyl-ACP hydrolase
2137	8130	FACOAL140i	fatty-acid--CoA ligase (tetradecanoate)
2138	14860	FACOAL150	fatty-acid--CoA ligase
2139	4318	FACOAL160i	C160 fatty acid activation
2140	2894	FACOAL161	fatty-acid--CoA ligase (hexadecenoate)
2141	14861	FACOAL170	fatty-acid--CoA ligase
2142	4319	FACOAL180i	C180 fatty acid activation
2143	10279	FACOAL1812	fatty-acid--CoA ligase
2144	10280	FACOAL1813	fatty-acid--CoA ligase
2145	4320	FACOAL181i	C181 fatty acid activation
2146	13577	FACOAL1821	fatty-acid--CoA ligase
2147	10284	FACOAL1822	fatty-acid--CoA ligase
2148	10298	FACOAL1831	fatty-acid--CoA ligase
2149	10299	FACOAL1832	fatty-acid--CoA ligase
2150	10297	FACOAL184	fatty-acid--CoA ligase
2151	14871	FACOAL191	fatty-acid--CoA ligase
2152	10286	FACOAL200	fatty-acid--CoA ligase
2153	10295	FACOAL203	fatty-acid--CoA ligase
2154	10355	FACOAL204	fatty-acid--CoA ligase
2155	10356	FACOAL2042	fatty-acid--CoA ligase
2156	4321	FACOAL204i	arachidonic acid activation
2157	10296	FACOAL205	fatty-acid--CoA ligase
2158	13149	FACOAL206	fatty-acid--CoA ligase
2159	10287	FACOAL224	fatty-acid--CoA ligase
2160	10291	FACOAL2251	fatty-acid--CoA ligase
2161	10292	FACOAL2252	fatty-acid--CoA ligase
2162	14108	FACOAL226	fatty-acid--CoA ligase
2163	4395	FACOAL226i	C226 fatty acid activation
2164	10294	FACOAL240	fatty-acid--CoA ligase
2165	10289	FACOAL241	fatty-acid--CoA ligase
2166	10360	FACOAL244_1	fatty-acid--CoA ligase
2167	10358	FACOAL245_1	fatty-acid--CoA ligase
2168	10359	FACOAL245_2	fatty-acid--CoA ligase
2169	10361	FACOAL246_1	fatty-acid--CoA ligase
2170	10290	FACOAL260	fatty-acid--CoA ligase (n-C26:0)
2171	10777	FACOAL40im	fatty-acid--CoA ligase (butanoate), mitochondrial
2172	8128	FACOAL80i	fatty-acid--CoA ligase (octanoate)
2173	139	FADDP	FAD diphosphatase
2174	13981	FADH2tru	FADH2 transporter, endoplasmic reticulum
2175	13548	FADH2tx	FADH2 transporter, peroxisomal
2176	13976	FADtru	FAD transporter, endoplasmic reticulum

Column	Reaction #	Abbreviation	Reaction Name
2177	13547	FADtx	FAD transporter, peroxisomal
2178	14286	FAEL183	fatty-acyl-CoA elongation (n-C18:3CoA)
2179	14288	FAEL184	fatty-acyl-CoA elongation (n-C20:4CoA)
2180	14287	FAEL204	fatty-acyl-CoA elongation (n-C20:4CoA)
2181	14289	FAEL205	fatty-acyl-CoA elongation (n-C20:5CoA)
2182	11774	FAH1	Fatty acid omega-hydroxylase
2183	11776	FAH2	Fatty acid omega-hydroxylase
2184	11778	FAH3	Fatty acid omega-hydroxylase
2185	2373	FALDH	formaldehyde dehydrogenase
2186	20846	FALDtly	formaldehyde transport via diffusion (lysosomal)
2187	20465	FALDtm	formaldehyde transport via diffusion (mitochondrial)
2188	13160	FAOXC11	Beta oxidation of long chain fatty acid
2189	20831	FAOXC140	Beta oxidation of long chain fatty acid
2190	14353	FAOXC150m	Beta oxidation of long chain fatty acid (odd chain)
2191	4214	FAOXC160	Beta oxidation of long chain fatty acid
2192	18979	FAOXC16080m	Beta oxidation of long chain fatty acid
2193	19002	FAOXC16080x	Beta oxidation of long chain fatty acid
2194	20159	FAOXC161802m	Beta oxidation fatty acid
2195	18978	FAOXC16180m	Beta oxidation fatty acid
2196	14354	FAOXC170m	Beta oxidation of long chain fatty acid (odd chain)
2197	4216	FAOXC180	Beta oxidation of long chain fatty acid
2198	18995	FAOXC180x	Beta oxidation of long chain fatty acid
2199	18988	FAOXC1811601m	Beta oxidation fatty acid
2200	18989	FAOXC1811602m	Beta oxidation fatty acid
2201	18990	FAOXC1811603m	Beta oxidation fatty acid
2202	18986	FAOXC182806m	Beta oxidation of fatty acid
2203	18987	FAOXC18280m	Beta oxidation of fatty acid
2204	18984	FAOXC183803m	Beta oxidation of fatty acid
2205	19011	FAOXC183806m	Beta oxidation of fatty acid
2206	19001	FAOXC183806x	Beta oxidation of long chain fatty acid
2207	19009	FAOXC18480m	Beta oxidation of fatty acid
2208	19000	FAOXC18480x	Beta oxidation of long chain fatty acid
2209	18980	FAOXC200180m	Beta oxidation of long chain fatty acid
2210	18998	FAOXC200180x	Beta oxidation of long chain fatty acid
2211	18983	FAOXC2031836m	Beta oxidation of fatty acid
2212	4285	FAOXC204	Beta oxidation of long chain fatty acid
2213	18981	FAOXC204184m	Beta oxidation fatty acid
2214	19006	FAOXC2051843m	Beta oxidation of fatty acid
2215	18970	FAOXC2051843x	Beta oxidation of long chain fatty acid
2216	19008	FAOXC2242046m	Beta oxidation of long chain fatty acid
2217	18999	FAOXC2242046x	Beta oxidation of long chain fatty acid
2218	19010	FAOXC2251836m	Beta oxidation of fatty acid
2219	18968	FAOXC2251836x	Beta oxidation of long chain fatty acid
2220	19154	FAOXC2252053m	Beta oxidation of long chain fatty acid
2221	18997	FAOXC2252053x	Beta oxidation of long chain fatty acid
2222	4284	FAOXC226	Beta oxidation of long chain fatty acid
2223	19005	FAOXC226205m	Beta oxidation of long chain fatty acid
2224	18967	FAOXC226205x	Beta oxidation of long chain fatty acid
2225	19004	FAOXC240200x	Beta oxidation of long chain fatty acid
2226	19003	FAOXC241181x	Beta oxidation of long chain fatty acid
2227	18991	FAOXC2442246x	Beta oxidation of long chain fatty acid
2228	18993	FAOXC2452253x	Beta oxidation of long chain fatty acid
2229	18992	FAOXC2452256x	Beta oxidation of long chain fatty acid
2230	18994	FAOXC246226x	Beta oxidation of long chain fatty acid
2231	18996	FAOXC260240x	Beta oxidation of long chain fatty acid
2232	8333	FAOXC80	Beta oxidation of med/long chain fatty acid

Column	Reaction #	Abbreviation	Reaction Name
2233	3049	FAS100COA	fatty acyl-CoA synthase (n-C10:0CoA)
2234	3051	FAS120COA	fatty-acyl-CoA synthase (n-C12:0CoA)
2235	3052	FAS140COA	fatty-acyl-CoA synthase (n-C14:0CoA)
2236	3053	FAS160COA	fatty-acyl-CoA synthase (n-C16:0CoA)
2237	3055	FAS180COA	fatty-acyl-CoA synthase (n-C18:0CoA)
2238	3050	FAS80COA_L	fatty acyl-CoA synthase (n-C8:0CoA), lumped reaction
2239	12555	FATP1t	fatty acid electroneutral transport
2240	12556	FATP2t	fatty acid electroneutral transport
2241	12557	FATP3t	fatty acid electroneutral transport
2242	12558	FATP4t	fatty acid electroneutral transport
2243	12559	FATP5t	fatty acid electroneutral transport
2244	12560	FATP6t	fatty acid electroneutral transport
2245	12561	FATP7t	fatty acid electroneutral transport
2246	12562	FATP8t	fatty acid electroneutral transport
2247	12563	FATP9t	fatty acid electroneutral transport
2248	268	FBA	fructose-bisphosphate aldolase
2249	2403	FBA2	D-Fructose 1-phosphate D-glyceraldehyde-3-phosphate-lyase
2250	13867	FBA4	D-Fructose 1-phosphate D-glyceraldehyde-3-phosphate-lyase
2251	19626	FBA5	D-Tagatose 1-phosphate D-glyceraldehyde-3-phosphate-lyase
2252	263	FBP	fructose-bisphosphatase
2253	1040	FBP26	Fructose-2,6-bisphosphate 2-phosphatase
2254	1784	FCLTm	Ferrochelataase, mitochondrial
2255	14878	FCOAH	formyl coa hydrolase
2256	2846	FDH	formate dehydrogenase
2257	13175	FE2t	iron (II) transport
2258	4033	FE2tm	iron (II) transport
2259	13197	FE3R2e	Fe(III) reduction (ascorbate)
2260	9641	FK	Fucokinase
2261	2371	FKYNH	N-Formyl-L-kynurenine amidohydrolase
2262	140	FMNAT	FMN adenyltransferase
2263	8693	FOLR2	folate reductase
2264	14836	FOLt2	folate transport via anion exchange
2265	14879	FORMCOAtx	formyl coa transport
2266	14916	FORt2m	formate mitochondrial transport
2267	13990	FORtr	FOR transporter, endoplasmic reticulum
2268	19511	FORtrn	Formate transport, nuclear
2269	11740	FPGS	folylpolyglutamate synthetase
2270	11741	FPGS2	folylpolyglutamate synthetase
2271	11744	FPGS2m	folylpolyglutamate synthetase, mitochondrial
2272	11742	FPGS3	folylpolyglutamate synthetase
2273	11745	FPGS3m	folylpolyglutamate synthetase, mitochondrial
2274	11746	FPGS4	folylpolyglutamate synthetase (DHF)
2275	11755	FPGS4m	folylpolyglutamate synthetase (DHF), mitochondrial
2276	11747	FPGS5	folylpolyglutamate synthetase (DHF)
2277	11756	FPGS5m	folylpolyglutamate synthetase (DHF), mitochondrial
2278	11748	FPGS6	folylpolyglutamate synthetase (DHF)
2279	11757	FPGS6m	folylpolyglutamate synthetase (DHF), mitochondrial
2280	11749	FPGS7	folylpolyglutamate synthetase (10fthf)
2281	11752	FPGS7m	folylpolyglutamate synthetase (10fthf), mitochondrial
2282	11750	FPGS8	folylpolyglutamate synthetase (10fthf)
2283	11753	FPGS8m	folylpolyglutamate synthetase (10fthf), mitochondrial
2284	11751	FPGS9	folylpolyglutamate synthetase (10fthf)
2285	11754	FPGS9m	folylpolyglutamate synthetase (10fthf), mitochondrial

Column	Reaction #	Abbreviation	Reaction Name
2286	11743	FPGSm	folypolyglutamate synthetase, mitochondrial
2287	18424	FRDPtc	lipid, flip-flop intracellular transport
2288	12678	FRDPtr	lipid, flip-flop intracellular transport
2289	110	FRTT	farnesyltranstransferase
2290	11909	FRUt1r	D-fructose transport in via uniport
2291	12126	FRUt4	D-fructose transport via sodium cotransport
2292	6137	FT	farnesyltranstransferase (trans,trans,cis-geranylgeranyl diphosphate-generating)
2293	11759	FTCD	formimidoyltransferase cyclodeaminase
2294	3757	FTHFCL	5-formethyltetrahydrofolate cyclo-ligase
2295	11758	FTHFDH	formyltetrahydrofolate dehydrogenase
2296	4043	FTHFL	formate-tetrahydrofolate ligase
2297	4042	FTHFLm	formate-tetrahydrofolate ligase, mitochondrial
2298	19667	FUC13GALACGLCGAL14 ACGLCGALGLUSIDEte	blood group intracellular transport
2299	20166	FUC13GALACGLCGAL14 ACGLCGALGLUSIDEtg	blood group intracellular transport
2300	19669	FUC14GALACGLCGALGL USIDEte	blood group intracellular transport
2301	20167	FUC14GALACGLCGALGL USIDEtg	blood group intracellular transport
2302	19671	FUCACGALFUCGALACG LCGALGLUSIDEte	blood group intracellular transport
2303	20168	FUCACGALFUCGALACG LCGALGLUSIDEtg	blood group intracellular transport
2304	19673	FUCACNGAL14ACGLCGA LGLUSIDEte	blood group intracellular transport
2305	20169	FUCACNGAL14ACGLCGA LGLUSIDEtg	blood group intracellular transport
2306	19675	FUCACNGALACGLCGAL GLUSIDEte	blood group intracellular transport
2307	20170	FUCACNGALACGLCGAL GLUSIDEtg	blood group intracellular transport
2308	14588	FUCASE2e	alpha-fucosidase, extracellular
2309	14455	FUCASE2ly	alpha-fucosidase, lysosomal
2310	8452	FUCASEe	alpha-fucosidase, extracellular
2311	8539	FUCASEly	alpha-fucosidase, lysosomal
2312	19677	FUCFUC12GAL14ACGLC GALGLUSIDEte	blood group intracellular transport
2313	20171	FUCFUC12GAL14ACGLC GALGLUSIDEtg	blood group intracellular transport
2314	19679	FUCFUC132GALACGLCG AL14ACGLCGALGLUSID Ete	blood group intracellular transport
2315	20172	FUCFUC132GALACGLCG AL14ACGLCGALGLUSID Etg	blood group intracellular transport
2316	19681	FUCFUCFUCGALACGLC1 3GALACGLCGAL14ACGL CGALGLUSIDEte	blood group intracellular transport
2317	20173	FUCFUCFUCGALACGLC1 3GALACGLCGAL14ACGL CGALGLUSIDEtg	blood group intracellular transport
2318	19686	FUCFUCFUCGALACGLC GAL14ACGLCGALGLUSI DEte	blood group intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
2319	20174	FUCFUCFUCGALACGLC GAL14ACGLCGALGLUSI DEtg	blood group intracellular transport
2320	19688	FUCFUCGALACGLCGAL GLUSIDEte	blood group intracellular transport
2321	20175	FUCFUCGALACGLCGAL GLUSIDEtg	blood group intracellular transport
2322	19690	FUCGAL14ACGLCGALGL USIDEte	blood group intracellular transport
2323	20176	FUCGAL14ACGLCGALGL USIDEtg	blood group intracellular transport
2324	19692	FUCGALFUCGALACGLC GALGLUSIDEte	blood group intracellular transport
2325	20177	FUCGALFUCGALACGLC GALGLUSIDEtg	blood group intracellular transport
2326	20227	FUCGALGBSIDEte	fucgalgbside_hs transport
2327	20211	FUCGALGBSIDEtg	fucgalgbside_hs intracellular transport
2328	14921	FUCtly	L-fucose efflux from lysosome
2329	542	FUM	fumarase
2330	2670	FUMAC	fumarylacetoacetase
2331	20297	FUMSO3tm	Fumarate:sulfite antiport, mitochondrial
2332	20298	FUMSO4tm	Fumarate:sulfate antiport, mitochondrial
2333	20247	FUMTSULtm	Fumarate:thiosulfate antiport, mitochondrial
2334	544	FUMm	fumarase, mitochondrial
2335	8364	FUMtm	fumarate transport, mitochondrial
2336	11070	FUT11g	Galactoside 2-alpha-L-fucosyltransferase 1
2337	14599	FUT12g	Galactoside 2-alpha-L-fucosyltransferase 1
2338	14622	FUT14g	Galactoside 2-alpha-L-fucosyltransferase 1
2339	14635	FUT15g	Galactoside 2-alpha-L-fucosyltransferase 1
2340	14642	FUT16g	Galactoside 2-alpha-L-fucosyltransferase 1
2341	14645	FUT17g	Galactoside 2-alpha-L-fucosyltransferase 1
2342	14663	FUT18g	Galactoside 2-alpha-L-fucosyltransferase 1
2343	14595	FUT31g	fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) 1
2344	14598	FUT32g	fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) 1
2345	14604	FUT33g	fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) 1
2346	14605	FUT34g	fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) 1
2347	14606	FUT35g	fucosyltransferase 3 (galactoside 3(4)-L-fucosyltransferase, Lewis blood group included) 1
2348	14674	FUT910g	Alpha-(1,3)-fucosyltransferase
2349	14675	FUT911g	Alpha-(1,3)-fucosyltransferase
2350	14623	FUT91g	Alpha-(1,3)-fucosyltransferase
2351	14626	FUT92g	Alpha-(1,3)-fucosyltransferase
2352	14633	FUT93g	Alpha-(1,3)-fucosyltransferase
2353	14651	FUT94g	Alpha-(1,3)-fucosyltransferase
2354	14653	FUT95g	Alpha-(1,3)-fucosyltransferase
2355	14665	FUT96g	Alpha-(1,3)-fucosyltransferase
2356	14668	FUT97g	Alpha-(1,3)-fucosyltransferase
2357	14669	FUT98g	Alpha-(1,3)-fucosyltransferase
2358	14673	FUT99g	Alpha-(1,3)-fucosyltransferase
2359	7336	G12MT1_L	Glycolipid 1,2-alpha-D-mannosyltransferase (liver)
2360	7337	G12MT1_U	Glycolipid 1,2-alpha-D-mannosyltransferase (uterus)
2361	7338	G12MT2_L	Glycolipid 1,2-alpha-D-mannosyltransferase (liver)

Column	Reaction #	Abbreviation	Reaction Name
2362	7339	G12MT2_U	Glycolipid 1,2-alpha-D-mannosyltransferase (uterus)
2363	7340	G13MT_L	Glycolipid 1,3-alpha-D-mannosyltransferase (liver)
2364	7341	G13MT_U	Glycolipid 1,3-alpha-D-mannosyltransferase (uterus)
2365	11452	G14T10g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2366	11453	G14T11g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2367	11454	G14T12g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2368	11455	G14T13g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2369	11456	G14T14g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2370	11457	G14T15g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2371	11458	G14T16g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2372	11460	G14T17g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2373	11519	G14T18g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2374	11523	G14T19g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2375	11526	G14T20g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2376	11530	G14T21g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2377	11395	G14T2g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2378	11425	G14T3g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2379	11429	G14T4g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2380	11432	G14T5g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2381	11436	G14T6g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2382	11439	G14T7g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2383	11450	G14T8g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2384	11451	G14T9g	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase, Golgi
2385	7760	G14Tg	beta-N-acetylglucosaminylglycopeptide beta-1,4-galactosyltransferase
2386	7342	G16MT_L	Glycolipid 1,6-alpha-D-mannosyltransferase (liver)
2387	7343	G16MT_U	Glycolipid 1,6-alpha-D-mannosyltransferase (uterus)
2388	8152	G1M6MASNB1terg	g1m6masnB1 endoplasmic reticulum to Golgi transport
2389	8119	G1M7MASNBterg	g1m7masnC endoplasmic reticulum to Golgi transport
2390	8118	G1M7MASNCterg	g1m7masnC endoplasmic reticulum to Golgi transport
2391	7753	G1M8MASNterg	g1m8masn transport from endoplasmic reticulum to Golgi apparatus
2392	2487	G1PTT	glucose-1-phosphate thymidyltransferase
2393	8090	G2M8MASNterg	g2m8masn transport from endoplasmic reticulum to Golgi apparatus

Column	Reaction #	Abbreviation	Reaction Name
2394	8091	G3M8MASNterg	g3m8masn transport from endoplasmic reticulum to Golgi apparatus
2395	257	G3PD1	glycerol-3-phosphate dehydrogenase (NAD)
2396	13392	G3PD2m	glycerol-3-phosphate dehydrogenase (FAD), mitochondrial
2397	3649	G5SADrm	L-glutamate 5-semialdehyde dehydratase, reversible, mitochondrial
2398	3635	G5SADs	L-glutamate 5-semialdehyde dehydratase (spontaneous)
2399	9628	G5SDym	glutamate-5-semialdehyde dehydrogenase (m)
2400	246	G6PDA	glucosamine-6-phosphate deaminase
2401	9551	G6PDH1er	glucose-6-phosphate dehydrogenase, endoplasmic reticulum
2402	10043	G6PDH1rer	glucose-6-phosphate dehydrogenase, endoplasmic reticulum
2403	2941	G6PDH2r	glucose 6-phosphate dehydrogenase
2404	10042	G6PDH2rer	glucose 6-phosphate dehydrogenase, endoplasmic reticulum
2405	6036	G6PPer	glucose-6-phosphate phosphatase, edoplasmic reticular
2406	2341	G6Pter	glucose 6-phosphate endoplasmic reticular transport via diffusion
2407	11922	GABAVESSEC	GABA secretion via secretory vesicle (ATP driven)
2408	9723	GACMTRc	guanidinoacetate N-methyltransferase (c)
2409	11292	GACPAILter	glucosaminyl-acylphosphatidylinositol ER flippase
2410	11198	GAL3ST11	Galactosylceramide sulfotransferase
2411	11199	GAL3ST12	Galactosylceramide sulfotransferase
2412	20228	GALACGLCGALGBSIDEte	galacglcgalgbside_hs transport
2413	20212	GALACGLCGALGBSIDEtg	galacglcgalgbside_hs intracellular transport
2414	14473	GALASE10ly	beta-galactosidase, lysosomal
2415	14474	GALASE11ly	beta-galactosidase, lysosomal
2416	14475	GALASE12ly	beta-galactosidase, lysosomal
2417	14476	GALASE13ly	beta-galactosidase, lysosomal
2418	14495	GALASE14ly	beta-galactosidase, lysosomal
2419	14497	GALASE15ly	beta-galactosidase, lysosomal
2420	14526	GALASE16ly	beta-galactosidase, lysosomal
2421	14527	GALASE17ly	beta-galactosidase, lysosomal
2422	14528	GALASE18ly	beta-galactosidase, lysosomal
2423	14529	GALASE19ly	beta-galactosidase, lysosomal
2424	8540	GALASE1ly	beta-galactosidase, lysosomal
2425	14530	GALASE20ly	beta-galactosidase, lysosomal
2426	14460	GALASE3ly	beta-galactosidase, lysosomal
2427	14464	GALASE4ly	beta-galactosidase, lysosomal
2428	14468	GALASE5ly	beta-galactosidase, lysosomal
2429	14469	GALASE6ly	beta-galactosidase, lysosomal
2430	14470	GALASE7ly	beta-galactosidase, lysosomal
2431	14471	GALASE8ly	beta-galactosidase, lysosomal
2432	14472	GALASE9ly	beta-galactosidase, lysosomal
2433	11262	GALC	Galactocerebrosidase
2434	19694	GALFUC12GAL14ACGLC GALGLUSIDEte	blood group intracellular transport
2435	20178	GALFUC12GAL14ACGLC GALGLUSIDEtg	blood group intracellular transport
2436	19696	GALFUCGALACGLCGAL 14ACGLCGALGLUSIDEte	blood group intracellular transport
2437	20179	GALFUCGALACGLCGAL 14ACGLCGALGLUSIDEtg	blood group intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
2438	19698	GALGALFUCFUCGALAC GLCGALACGLCGAL14AC GLCGALGLUSIDEte	blood group intracellular transport
2439	20180	GALGALFUCFUCGALAC GLCGALACGLCGAL14AC GLCGALGLUSIDEtg	blood group intracellular transport
2440	20229	GALGALGALTHCRMte	galgalgalthcrm_hs transport
2441	20213	GALGALGALTHCRMtg	galgalgalthcrm_hs intracellular transport
2442	20138	GALGLUSIDEtg	galgluside_hs intracellular transport
2443	20135	GALGLUSIDEtl	galgluside_hs intracellular transport
2444	11098	GALGT1	Beta-1,4 N-acetylgalactosaminyltransferase
2445	11099	GALGT2	Beta-1,4 N-acetylgalactosaminyltransferase
2446	11100	GALGT3	Beta-1,4 N-acetylgalactosaminyltransferase
2447	11101	GALGT4	Beta-1,4 N-acetylgalactosaminyltransferase
2448	2818	GALK	galactokinase
2449	11559	GALNACT1g	UDPGal-chondroitin acetylgalactosaminyltransferase I, Golgi
2450	11566	GALNACT2g	uridine diphosphoacetylgalactosamine-chondroitin acetylgalactosaminyltransferase II, Golgi
2451	11571	GALNACT3g	uridine diphosphoacetylgalactosamine-chondroitin acetylgalactosaminyltransferase II, Golgi
2452	11575	GALNACT4g	uridine diphosphoacetylgalactosamine-chondroitin acetylgalactosaminyltransferase II, Golgi
2453	11595	GALNACT5g	uridine diphosphoacetylgalactosamine-chondroitin acetylgalactosaminyltransferase II, Golgi
2454	8565	GALNTg	GalNAc transferase, Golgi apparatus
2455	9927	GALOR	D-Galactose:NADP+ 1-oxidoreductase
2456	20331	GALSIDEtg	galactocerebroside intracellular transport
2457	20877	GALSIDEtl	galactocerebroside intracellular transport
2458	199	GALT	galactose-1-phosphate uridylyltransferase
2459	11556	GALT2g	UDP-D-galactose:galactosylxylose galactosyltransferase, Golgi apparatus
2460	11552	GALTg	UDP-D-galactose:D-xylose galactosyltransferase, Golgi apparatus
2461	201	GALU	UTP-glucose-1-phosphate uridylyltransferase
2462	11908	GALt1r	galactose transport (uniport)
2463	11964	GALt2_2	D-galactose transport via proton symport
2464	12124	GALt4	galactose transport via sodium symport
2465	11962	GALt4_2	galactose transport via sodium symport
2466	14923	GALty	galactose efflux from lysosome
2467	10095	GAMYe	glucoamylase, extracellular (glygn5 -> malt)
2468	11907	GAMt1r	glucosamine transport (uniport)
2469	11359	GAO1	Ganglioside O-acetylation
2470	12547	GAO1g	Ganglioside O-acetylation
2471	11361	GAO2	Ganglioside O-acetylation
2472	12550	GAO2g	Ganglioside O-acetylation
2473	2841	GAPD	glyceraldehyde-3-phosphate dehydrogenase
2474	3637	GARFT	phosphoribosylglycinamide formyltransferase
2475	8541	GASNASE2ly	glycosylasparaginase, lysosomal
2476	14456	GASNASE3ly	glycosylasparaginase, lysosomal
2477	8542	GASNASEly	glycosylasparaginase, lysosomal
2478	11394	GBA	Glucosylceramidase
2479	11261	GBA1	Glucosylceramidase
2480	11076	GBGT1	globoside alpha-1,3-N-acetylgalactosaminyltransferase 1
2481	20328	GBSIDEte	globoside transport
2482	20327	GBSIDEtl	globoside intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
2483	1967	GCALDD	Glycolaldehyde dehydrogenase
2484	10519	GCALDDm	Glycolaldehyde dehydrogenase, mitochondrial
2485	3714	GCC2am	glycine-cleavage complex (lipoamide), mitochondrial
2486	3713	GCC2bim	glycine-cleavage system (lipoamide) irreversible, mitochondrial
2487	2283	GCC2cm	glycine-cleavage complex (lipoamide), mitochondrial
2488	3715	GCCam	glycine-cleavage complex (lipoylprotein), mitochondrial
2489	3716	GCCbim	glycine-cleavage complex (lipoylprotein) irreversible, mitochondrial
2490	2282	GCCcm	glycine-cleavage complex (lipoylprotein), mitochondrial
2491	12267	GCHOLAt	glycocholate transport via bicarbonate countertransport
2492	12618	GCHOLAt2	glycocholate transport via sodium cotransport
2493	12669	GCHOLAt3	ABC bile acid transporter
2494	19651	GCHOLAtc	bile acid intracellular transport
2495	19652	GCHOLAtx	bile acid intracellular transport
2496	14660	GCNTg	N-acetyllactosaminide beta-1,6-N-acetylglucosaminyl-transferase
2497	20230	GD1B2te	gd1b2_hs transport
2498	20214	GD1B2tg	gd1b2_hs intracellular transport
2499	20231	GD1Cte	gd1c_hs transport
2500	20215	GD1Ctg	gd1c_hs intracellular transport
2501	19653	GDCHOLAtc	bile acid intracellular transport
2502	19654	GDCHOLAtx	bile acid intracellular transport
2503	12156	GDPFUCtg	GDPFuc Golgi transport via CMP antiport
2504	20334	GDPtg	GDP intracellular transport
2505	3537	GF6PTA	glutamine-fructose-6-phosphate transaminase
2506	5638	GFUCS	GDP-L-fucose synthase
2507	14854	GGH-10FTHF5GLUe	Gamma-glutamyl hydrolase (10FTHF5GLU), extracellular
2508	14855	GGH-10FTHF5GLU1	Gamma-glutamyl hydrolase (10FTHF5GLU), lysosomal
2509	14856	GGH-10FTHF6GLUe	Gamma-glutamyl hydrolase (10FTHF6GLU), extracellular
2510	14857	GGH-10FTHF6GLU1	Gamma-glutamyl hydrolase (10FTHF6GLU), lysosomal
2511	14859	GGH-10FTHF7GLUe	Gamma-glutamyl hydrolase (10FTHF7GLU), extracellular
2512	14858	GGH-10FTHF7GLU1	Gamma-glutamyl hydrolase (10FTHF7GLU), lysosomal
2513	14848	GGH-5DHF	Gamma-glutamyl hydrolase (5DHF), extracellular
2514	14849	GGH-5DHF1	Gamma-glutamyl hydrolase (5DHF), lysosomal
2515	14847	GGH-5THF	Gamma-glutamyl hydrolase (5THF), extracellular
2516	14846	GGH-5THF1	Gamma-glutamyl hydrolase (5THF), lysosomal
2517	14850	GGH-6DHF	Gamma-glutamyl hydrolase (6DHF), extracellular
2518	14851	GGH-6DHF1	Gamma-glutamyl hydrolase (6DHF), lysosomal
2519	14845	GGH-6THF	Gamma-glutamyl hydrolase (6THF), extracellular
2520	14844	GGH-6THF1	Gamma-glutamyl hydrolase (6THF), lysosomal
2521	14852	GGH-7DHF	Gamma-glutamyl hydrolase (7DHF), extracellular
2522	14853	GGH-7DHF1	Gamma-glutamyl hydrolase (7DHF), lysosomal
2523	14843	GGH-7THF	Gamma-glutamyl hydrolase (7THF), extracellular
2524	14842	GGH-7THF1	Gamma-glutamyl hydrolase (7THF), lysosomal
2525	11537	GGLUCT	gamma-glutamylcyclotransferase
2526	10093	GGNG	glycogenin self-glucosylation
2527	10002	GGT5r	Gamma-glutamyltransferase 5
2528	19812	GGT6	Gamma-glutamyltransferase
2529	7410	GGT_L	geranylgeranyltransferase (liver)
2530	7546	GGT_U	geranylgeranyltransferase (uterus)
2531	1584	GHMT2r	glycine hydroxymethyltransferase, reversible
2532	1583	GHMT2rm	glycine hydroxymethyltransferase, reversible, mitochondrial
2533	11404	GHMT3	glycine hydroxymethyltransferase
2534	11405	GHMT3m	glycine hydroxymethyltransferase, mitochondrial

Column	Reaction #	Abbreviation	Reaction Name
2535	186	GK1	guanylate kinase (GMP:ATP)
2536	20323	GK1m	guanylate kinase (GMP:ATP), mitochondrial
2537	10177	GLACO	D-Glucuronolactone:NAD+ oxidoreductase
2538	10178	GLACOm	D-Glucuronolactone:NAD+ oxidoreductase, mitochondrial
2539	13768	GLACter	D-glucurono-6,3-lactone transport, endoplasmic reticulum
2540	11275	GLAI	galactosidase, alpha
2541	11264	GLB1	Beta-galactosidase
2542	10067	GLBRAN	1,4-alpha-glucan branching enzyme (glygn1 -> glygn2)
2543	11722	GLCAASE1ly	beta-glucuronidase, lysosomal
2544	14406	GLCAASE4ly	beta-glucuronidase, lysosomal
2545	14422	GLCAASE5ly	beta-glucuronidase, lysosomal
2546	14436	GLCAASE6ly	beta-glucuronidase, lysosomal
2547	14448	GLCAASE7ly	beta-glucuronidase, lysosomal
2548	14549	GLCAASE8ly	beta-glucuronidase, lysosomal
2549	14552	GLCAASE9ly	beta-glucuronidase, lysosomal
2550	11626	GLCAE1g	chondroitin-glucuronate 5-epimerase
2551	11627	GLCAE2g	heparosan-N-sulfate-glucuronate 5-epimerase
2552	11565	GLCAT2g	chondroitin glucuronyltransferase II, Golgi apparatus
2553	11570	GLCAT3g	chondroitin glucuronyltransferase II, Golgi apparatus
2554	11574	GLCAT4g	chondroitin glucuronyltransferase II, Golgi apparatus
2555	11594	GLCAT5g	chondroitin glucuronyltransferase II, Golgi apparatus
2556	11612	GLCAT6g	heparan glucuronyltransferase II
2557	11617	GLCAT7g	heparan glucuronyltransferase II
2558	11618	GLCAT8g	heparan glucuronyltransferase II
2559	11619	GLCAT9g	heparan glucuronyltransferase II
2560	11557	GLCATg	UDP-D-glucuronate:galactosylgalactosylxylose glucuronosyltransferase, Golgi apparatus
2561	11812	GLCMter	glucose transport via membrane vesicle
2562	11715	GLCNACASE1ly	alpha-N-acetylglucosaminidase, lysosomal
2563	11720	GLCNACASE2ly	alpha-N-acetylglucosaminidase, lysosomal
2564	11730	GLCNACASE3ly	alpha-N-acetylglucosaminidase, lysosomal
2565	11731	GLCNACASE4ly	alpha-N-acetylglucosaminidase, lysosomal
2566	11766	GLCNACASE5ly	alpha-N-acetylglucosaminidase, lysosomal
2567	11624	GLCNACDASg	GlcNAc N-deacetylase / N-sulfotransferase
2568	7329	GLCNACPT_L	UDP-GlcNAc:dolichol-phosphate GlcNAc phosphotransferase (liver)
2569	7330	GLCNACPT_U	UDP-GlcNAc:dolichol-phosphate GlcNAc phosphotransferase (uterus)
2570	14968	GLCNACT1g	alpha-N-acetylglucosaminyltransferase I, Golgi apparatus
2571	11613	GLCNACT2g	alpha-N-acetylglucosaminyltransferase II
2572	11614	GLCNACT3g	alpha-N-acetylglucosaminyltransferase II
2573	11615	GLCNACT4g	alpha-N-acetylglucosaminyltransferase II
2574	11616	GLCNACT5g	alpha-N-acetylglucosaminyltransferase II
2575	7331	GLCNACT_L	UDP-GlcNAc:N-acetyl-D-glucosaminyl diphosphodolichol N-acetyl-D-glucosaminyltransferase (liver)
2576	7332	GLCNACT_U	UDP-GlcNAc:N-acetyl-D-glucosaminyl diphosphodolichol N-acetyl-D-glucosaminyltransferase (uterus)
2577	13435	GLCURter	glucuronate endoplasmic reticular transport
2578	13784	GLCURtly	glucuronate transport into lysosome
2579	11809	GLCt1r	glucose transport (uniport)
2580	11963	GLCt2_2	D-glucose transport in via proton symport
2581	11967	GLCt2r	D-glucose transport in via proton symport
2582	12112	GLCt4	glucose transport via sodium symport
2583	11961	GLCt4_2	glucose transport via sodium symport
2584	10014	GLCter	glucose transport, endoplasmic reticulum
2585	13532	GLCtg	glucose transport, Golgi apparatus

Column	Reaction #	Abbreviation	Reaction Name
2586	14920	GLCtly	glucose efflux from lysosome
2587	10070	GLDBRAN	glycogen debranching enzyme
2588	10066	GLGNS1	glycogen synthase (ggn -> glygn1)
2589	11848	GLNALANaEx	L-alanine/L-glutamine Na-dependent exchange (Gln-L in)
2590	11863	GLNASNNaEx	L-glutamine/L-asparagine Na-dependent exchange (Gln-L in)
2591	11856	GLNCYSNaEx	L-cysteine/L-glutamine Na-dependent exchange (Gln-L in)
2592	10194	GLNLASEer	gluconolactonase, endoplasmic reticulum
2593	3539	GLNS	glutamine synthetase
2594	11852	GLNSERNaEx	L-serine/L-glutamine Na-dependent exchange (Gln-L in)
2595	11860	GLNTHRNAEx	L-threonine/L-glutamine Na-dependent exchange (Gln-L in)
2596	11698	GLNt4	L-glutamine reversible transport via sodium symport
2597	11673	GLNtN1	Glutamine transport (Na, H coupled)
2598	11980	GLNtm	L-glutamine transport via electroneutral transporter
2599	10068	GLPASE1	glycogen phosphorylase (glygn2 -> dxtrn)
2600	10094	GLPASE2	glycogen phosphorylase (amyls -> glc-D)
2601	10276	GLRASE	glucuronolactone reductase
2602	9630	GLU5Km	glutamate 5-kinase (m)
2603	3540	GLUCYS	gamma-glutamylcysteine synthetase
2604	2960	GLUDC	Glutamate Decarboxylase
2605	9365	GLUDxm	glutamate dehydrogenase (NAD) (mitochondrial)
2606	9366	GLUDym	glutamate dehydrogenase (NADP), mitochondrial
2607	9368	GLUNm	glutaminase (mitochondrial)
2608	3542	GLUPRT	glutamine phosphoribosyldiphosphate amidotransferase
2609	9501	GLUTCOADHm	glutaryl-CoA dehydrogenase (mitochondria)
2610	11910	GLUVESSEC	L-glutamate secretion via secretory vesicle (ATP driven)
2611	1509	GLUt2m	L-glutamate reversible transport via proton symport, mitochondrial
2612	11820	GLUt6	Glutamate transport via Na, H symport and K antiport
2613	14915	GLUt7l	Glutamate transport, lysosomal
2614	19801	GLUtr	intracellular transport
2615	10459	GLXO1	glyoxylate oxidase
2616	13862	GLXO2p	glyoxylate oxidase, peroxisomal
2617	13858	GLXtm	glyoxylate transport, mitochondrial
2618	1526	GLXtp	glyoxylate transport, peroxisomal
2619	9722	GLYAMDTRc	glycine amidinotransferase (c)
2620	9642	GLYATm	glycine C-acetyltransferase
2621	11948	GLYBt4(2)r	Betaine transport (sodium symport) (2:1)
2622	13322	GLYBtm	Glycine betaine transport via diffusion (mitochondria to cytosol)
2623	20239	GLYC-St	L-glycerate export
2624	1930	GLYC3Ptm	glycerol-3-phosphate shuttle
2625	6159	GLYCK2	glycerate kinase
2626	2128	GLYCLTDy	Glycolate dehydrogenase (NADP)
2627	13863	GLYCLTDym	Glycolate dehydrogenase (NADP), mitochondrial
2628	19517	GLYCLTtp	glycolate transport into peroxisome
2629	10489	GLYCTO1p	Glycolate oxidase, peroxisome
2630	1551	GLYct	glycerol transport via channel
2631	4023	GLYctm	glycerol transport
2632	256	GLYK	glycerol kinase
2633	4419	GLYKm	glycerol kinase
2634	455	GLYOX	hydroxyacylglutathione hydrolase
2635	456	GLYOXm	hydroxyacylglutathione hydrolase, mitochondrial
2636	10251	GLYOp	glycine oxidase, perioxosomal
2637	11920	GLYVESSEC	Glycine secretion via secretory vesicle (ATP driven)
2638	1362	GLYt2r	glycine reversible transport via proton symport

Column	Reaction #	Abbreviation	Reaction Name
2639	11683	GLYt2rL	glycine reversible transport via proton symport (lysosome)
2640	11690	GLYt4	glycine transport via sodium symport
2641	11943	GLYt7(211)r	glycine reversible transport via sodium and chloride symport (2:1:1)
2642	11944	GLYt7(311)r	glycine reversible transport via sodium and chloride symport (3:1:1)
2643	4037	GLYtm	glycine passive transport to mitochondria
2644	14021	GLYtp	glycine passive transport to peroxisome
2645	2304	GMAND	GDP-D-mannose dehydratase
2646	3543	GMPR	GMP reductase
2647	2926	GMPS2	GMP synthase
2648	19549	GMPtn	GMP nuclear transport
2649	2843	GND	phosphogluconate dehydrogenase
2650	20143	GNDer	phosphogluconate dehydrogenase, endoplasmic reticulum
2651	9862	GNMT	glycine N-methyltransferase
2652	20233	GP1CALPHAtc	gp1calpha_hs transport
2653	20217	GP1CALPHAtg	gp1calpha_hs intracellular transport
2654	20232	GP1Ctc	gp1c_hs transport
2655	20216	GP1Ctg	gp1c_hs intracellular transport
2656	14777	GPAM_hs	glycerol-3-phosphate acyltransferase
2657	14780	GPAMm_hs	glycerol-3-phosphate acyltransferase
2658	2531	GPDDA1	Glycerophosphodiester phosphodiesterase (Glycerophosphocholine)
2659	11280	GPIAT	glucosaminylphosphatidyl inositol acetyltransferase
2660	11341	GPIDA2er	glycophosphatidylinositol (GPI) deacylase, endoplasmic reticulum
2661	11340	GPIDAer	glycophosphatidylinositol (GPI) deacylase, endoplasmic reticulum
2662	11283	GPIMTer_L	GlcN-acylPI mannosyltransferase, endoplasmic reticulum
2663	11350	GPIMTer_U	GlcN-acylPI mannosyltransferase, endoplasmic reticulum
2664	20235	GQ1BALPHAtc	gq1balpha_hs transport
2665	20219	GQ1BALPHAtg	gq1balpha_hs intracellular transport
2666	20234	GQ1Btc	gq1b_hs transport
2667	20218	GQ1Btg	gq1b_hs intracellular transport
2668	109	GRTT	geranyltranstransferase
2669	9742	GRTTx	geranyltranstransferase
2670	20317	GSNKm	guanosine kinase (mitochondrial)
2671	12542	GSNt	guanosine facilitated transport in cytosol
2672	12095	GSNt4	guanosine transport in via sodium symport
2673	12096	GSNt5	guanosine transport in via sodium (1:2) symport
2674	12578	GSNtl	guanosine facilitated transport from lysosome
2675	12147	GSNtm	guanosine facilitated transport in mitochondria
2676	20236	GT1Ate	gt1a_hs transport
2677	20220	GT1Atg	gt1a_hs intracellular transport
2678	10201	GTHDH	Glutathione dehydrogenase (dehydroascorbate reductase)
2679	1411	GTHO	glutathione oxidoreductase
2680	4913	GTHOm	glutathione oxidoreductase
2681	1410	GTHP	glutathione perioxidase
2682	10878	GTHPe	glutathione peroxidase (e)
2683	4914	GTHPm	glutathione peroxidase, mitochondria
2684	4912	GTHRDt	Glutathione transport into mitochondria
2685	19804	GTHRDtr	glutathione transport via diffusion
2686	3545	GTHS	glutathione synthetase
2687	11539	GTMLTe	g-glutamyltransferase (e)
2688	7819	GTPCI	GTP cyclohydrolase I
2689	11635	GTPCIn	GTP cyclohydrolase I, nuclear

Column	Reaction #	Abbreviation	Reaction Name
2690	14147	GTPtn	GTP diffusion in nucleus
2691	10076	GUACYC	guanylate cyclase
2692	3312	GUAD	guanine deaminase
2693	2808	GUAPRT	guanine phosphoribosyltransferase
2694	2102	GUAt	Guanine transport
2695	13433	GULLACter	gulonolactone endoplasmic reticular transport
2696	10152	GULN3D	L-gulonate 3-dehydrogenase
2697	10189	GULNDer	gulonate dehydrogenase, endoplasmic reticulum
2698	13439	GULNter	L-gulonate endoplasmic reticular export
2699	13430	GUR1PP	Glucuronate 1-phosphate phosphatase
2700	9367	GluForTx	Glutamate formimidoyltransferase
2701	4415	H2CO3D	carboxylic acid dissociation
2702	6253	H2CO3D2	carboxylic acid dissociation
2703	20852	H2CO3D2m	carboxylic acid dissociation, mitochondrial
2704	4417	H2CO3Dm	carboxylic acid dissociation
2705	11302	H2ETer	H2 phosphoethanolaminyl transferase, endoplasmic reticulum
2706	11285	H2MTer_L	H2 mannosyltransferase, endoplasmic reticulum
2707	11351	H2MTer_U	H2 mannosyltransferase, endoplasmic reticulum
2708	13679	H2O2syn	Hydrogen peroxide synthesis (NADPH dependent)
2709	20854	H2O2t	hydrogen peroxide transport via diffusion
2710	13514	H2O2tly	hydrogen peroxide lysosomal transport via diffusion
2711	20853	H2O2tm	hydrogen peroxide mitochondrial transport
2712	19550	H2O2tn	hydrogen peroxide nuclear transport
2713	1282	H2O2tp	hydrogen peroxide peroxisomal transport via diffusion
2714	868	H2Ot	H2O transport via diffusion
2715	2159	H2Oter	H2O endoplasmic reticulum transport
2716	13512	H2Otg	H2O transport, Golgi apparatus
2717	13513	H2Otly	H2O transport, lysosomal
2718	875	H2Otm	H2O transport, mitochondrial
2719	777	H2Otn	H2O transport, nuclear
2720	2153	H2Otp	H2O transport, peroxisomal
2721	11306	H3ETer	H3 phosphoethanolaminyl transferase, endoplasmic reticulum
2722	11305	H3MTer_L	H3 mannosyltransferase, endoplasmic reticulum
2723	11352	H3MTer_U	H3 mannosyltransferase, endoplasmic reticulum
2724	11308	H4ET3er	H4 phosphoethanolaminyl transferase, endoplasmic reticulum
2725	11307	H4ETer	H4 phosphoethanolaminyl transferase, endoplasmic reticulum
2726	11303	H5MTer_L	H5 mannosyltransferase, endoplasmic reticulum
2727	11353	H5MTer_U	H5 mannosyltransferase, endoplasmic reticulum
2728	11309	H6'ET2er	H6' phosphoethanolaminyl transferase, endoplasmic reticulum
2729	11310	H6'ETer	H6' phosphoethanolaminyl transferase, endoplasmic reticulum
2730	11313	H6ET3er	H6 phosphoethanolaminyl transferase, endoplasmic reticulum
2731	11344	H6MTer_L	H6 mannosyltransferase, endoplasmic reticulum
2732	11354	H6MTer_U	H6 mannosyltransferase, endoplasmic reticulum
2733	11315	H7'ETer	H7' phosphoethanolaminyl transferase, endoplasmic reticulum
2734	11338	H7'TAer	H7' transamidase, endoplasmic reticulum
2735	11314	H7ET2er	H7 phosphoethanolaminyl transferase, endoplasmic reticulum
2736	11345	H7MTer_L	H7 mannosyltransferase, endoplasmic reticulum

Column	Reaction #	Abbreviation	Reaction Name
2737	11355	H7Mter_U	H7 mannosyltransferase, endoplasmic reticulum
2738	11346	H8Mter_L	H8 mannosyltransferase, endoplasmic reticulum
2739	11356	H8Mter_U	H8 mannosyltransferase, endoplasmic reticulum
2740	11337	H8TAer	H8 transamidase, endoplasmic reticulum
2741	9505	HACD1m	3-hydroxyacyl-CoA dehydrogenase (acetoacetyl-CoA) (mitochondria)
2742	9506	HACD1x	3-hydroxyacyl-CoA dehydrogenase (acetoacetyl-CoA) (peroxisome)
2743	10918	HACD9m	3-hydroxyacyl-CoA dehydrogenase (2-Methylacetoacetyl-CoA), mitochondrial
2744	14547	HAS1	hyaluronan synthase
2745	14546	HAS2	hyaluronan synthase
2746	14967	HAtly	hyaluronan transport, extracellular to lysosome
2747	11090	HBZOPT10m	Hydroxybenzoate Decaprenyltransferase
2748	2911	HCO3Em	HCO3 equilibration reaction
2749	12045	HCO3_CLt	bicarbonate transport (Cl-/HCO3- exchange)
2750	12049	HCO3_NAt	bicarbonate transport (Na/HCO3 cotransport)
2751	19716	HCOUMARINte	xenobiotic transport
2752	20131	HDCAter	palmitate ER export
2753	12444	HDCAtr	fatty acid transport via diffusion
2754	12445	HDCEAtr	fatty acid transport via diffusion
2755	20160	HDD2COAtx	hdd2coa intracellular transport
2756	19758	HESTRATRIOLte	hydroxylated estrogen derivative transport
2757	19757	HESTRATRIOLtr	hydroxylated estrogen derivative transport
2758	2842	HEX1	hexokinase (D-glucose:ATP)
2759	671	HEX10	hexokinase (D-glucosamine:ATP)
2760	666	HEX4	hexokinase (D-mannose:ATP)
2761	669	HEX7	hexokinase (D-fructose:ATP)
2762	19030	HEXCCOAtx	fatty acid intracellular transport
2763	19092	HEXCCPT1	carnitine O-palmitoyltransferase
2764	19111	HEXCCPT2	carnitine transferase
2765	19073	HEXCCRNt	transport into the mitochondria (carnitine)
2766	12459	HEXCt	fatty acid transport via diffusion
2767	2672	HGNTOR	Homogentisate:oxygen 1,2-oxidoreductase (decyclizing)
2768	10418	HIBDm	3-hydroxyisobutyrate dehydrogenase, mitochondrial
2769	380	HISD	histidase
2770	7384	HISDC	histidine decarboxylase
2771	10535	HISTASE	Histaminase
2772	11934	HISTAVESSEC	Histamine secretion via secretory vesicle (ATP driven)
2773	12193	HISTAtu	Histamine uniport
2774	11700	HISi4	L-histidine transport in via sodium symport
2775	11671	HISiN1	Histidine transport (Na, H coupled)
2776	11696	HISiDF	L-histidine transport via diffusion (extracellular to cytosol)
2777	2668	HKYNH	3-Hydroxy-L-kynurenine hydrolase
2778	7098	HKt	H+/K+ gastric/non-gastric P-ATPase and ABC ATPase
2779	4	HMBS	hydroxymethylbilane synthase
2780	9732	HMGCOARr	Hydroxymethylglutaryl CoA reductase (ir)
2781	9733	HMGCOARx	Hydroxymethylglutaryl CoA reductase (ir)
2782	6785	HMGCOASi	Hydroxymethylglutaryl CoA synthase (ir)
2783	9720	HMGCOASim	Hydroxymethylglutaryl CoA synthase (ir)
2784	1933	HMGCOAtm	Hydroxymethylglutaryl-CoA reversible mitochondrial transport
2785	14000	HMGCOAtx	Hydroxymethylglutaryl-CoA reversible peroxisomal transport
2786	4424	HMGLm	hydroxymethylglutaryl-CoA lyase
2787	9731	HMGLx	hydroxymethylglutaryl-CoA lyase

Column	Reaction #	Abbreviation	Reaction Name
2788	11705	HOMt4	L-homoserine via sodium symport
2789	11915	HOXG	Heme oxygenase 1
2790	14451	HPACtr	hydroxyphenylacetate transport via diffusion
2791	14103	HPCLx	2-hydroxyphytanoyl-CoA lyase
2792	14865	HPDCACRNCPT1	carnitine fatty-acyl transferase
2793	14866	HPDCACRNCPT2	heptadecanoate transport into the mitochondria
2794	14868	HPDCACRNt	heptadecanoate transport into the mitochondria
2795	19805	HPDCAt	fatty acid transport via diffusion
2796	3560	HPROxm	L-hydroxyproline dehydrogenase (NAD), mitochondrial
2797	10518	HPYRDC	hydroxypyruvate decarboxylase
2798	13864	HPYRDCm	hydroxypyruvate decarboxylase, mitochondrial
2799	10505	HPYRR2x	hydroxypyruvate reductase (NADH)
2800	2130	HPYRRy	Hydroxypyruvate reductase (NADPH)
2801	14022	HPYRtp	hydroxypyruvate transport, peroxisomal
2802	15088	HRETNtn	4-hydroxyretinoic acid transport, Nuclear
2803	14390	HS1ly	heparan-N-sulfatase, lysosomal
2804	14395	HS2ly	heparan-N-sulfatase, lysosomal
2805	14396	HS3ly	heparan-N-sulfatase, lysosomal
2806	14397	HS4ly	heparan-N-sulfatase, lysosomal
2807	14575	HSAT1ly	heparan-glucosaminide N-acetyltransferase, lysosomal
2808	14574	HSAT2ly	heparan-glucosaminide N-acetyltransferase, lysosomal
2809	14572	HSAT3ly	heparan-glucosaminide N-acetyltransferase, lysosomal
2810	14571	HSAT4ly	heparan-glucosaminide N-acetyltransferase, lysosomal
2811	11435	HSD11B1r	11-beta-hydroxysteroid dehydrogenase type 1
2812	11434	HSD11B2r	11-beta-hydroxysteroid dehydrogenase type 2
2813	9943	HSD17B1	testicular 17-beta-hydroxysteroid dehydrogenase
2814	14989	HSD17B2r	17-beta-hydroxysteroid dehydrogenase
2815	9966	HSD17B3r	testicular 17-beta-hydroxysteroid dehydrogenase
2816	13934	HSD17B42x	hydroxysteroid (17-beta) dehydrogenase 4
2817	9679	HSD17B4x	hydroxysteroid (17-beta) dehydrogenase 4
2818	9971	HSD17B7r	testicular 17-beta-hydroxysteroid dehydrogenase
2819	14991	HSD17B8r	17-beta-hydroxysteroid dehydrogenase
2820	20867	HSD17B9r	17-beta-hydroxysteroid dehydrogenase (type 7)
2821	20864	HSD3A1r	3 alpha-hydroxysteroid dehydrogenase (type 3)
2822	20865	HSD3A2r	3 alpha-hydroxysteroid dehydrogenase (type 3)
2823	9874	HSD3B11	3 beta-hydroxysteroid dehydrogenase/delta 5-->4-isomerase type I
2824	9967	HSD3B11r	3 beta-hydroxysteroid dehydrogenase/delta 5-->4-isomerase type I
2825	9968	HSD3B12r	3 beta-hydroxysteroid dehydrogenase/delta 5-->4-isomerase type I
2826	9878	HSD3B13	3 beta-hydroxysteroid dehydrogenase/delta 5-->4-isomerase type I
2827	9969	HSD3B13r	3 beta-hydroxysteroid dehydrogenase/delta 5-->4-isomerase type I
2828	20869	HSD3B2r	3 beta-hydroxysteroid dehydrogenase type 1
2829	20870	HSD3B3r	3 beta-hydroxysteroid dehydrogenase type 1
2830	9648	HSD3B7	hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase 7
2831	9649	HSD3B7P	hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase 7
2832	11770	HSPASEly	heparan sulfate proteoglycan protease, lysosome (endosome)
2833	14965	HSPGt	heparan sulfate transport, golgi to extracellular
2834	14966	HSPGtly	heparan sulfate transport, extracellular to lysosome
2835	19718	HTAXOLte	xenobiotic transport

Column	Reaction #	Abbreviation	Reaction Name
2836	12576	HXANtl	hypoxanthine facilitated transport from lysosome
2837	14088	HXANtx	hypoxanthine diffusion in peroxisome
2838	441	HXPRT	hypoxanthine phosphoribosyltransferase (Hypoxanthine)
2839	1732	HYP OE	hypothetical enzyme
2840	11001	HYP TROX	Hypotaurine oxidase
2841	1155	HYX Nt	Hypoxanthine transport
2842	5333	Htm	Uncoupling protein
2843	13967	Htr	H transporter, endoplasmic reticulum
2844	13997	Htx	H transporter, peroxisome
2845	486	ICDHxm	Isocitrate dehydrogenase (NAD+)
2846	3109	ICDH y	isocitrate dehydrogenase (NADP)
2847	489	ICDHyp	Isocitrate dehydrogenase (NADP+)
2848	10041	ICDH yrm	Isocitrate dehydrogenase (NADP+)
2849	13661	IDHPOXOX2b	Iodide:hydrogen-peroxide oxidoreductase 2
2850	9459	IDHPOXOX3	Iodide:hydrogen-peroxide oxidoreductase 3
2851	9461	IDHPOXOX4	Iodide:hydrogen-peroxide oxidoreductase 4
2852	13660	IDHPOXOXb	Iodide:hydrogen-peroxide oxidoreductase
2853	11716	IDO AASE1ly	alpha-L-iduronidase, lysosomal
2854	11735	IDO AASE2ly	alpha-L-iduronidase, lysosomal
2855	11736	IDO AASE3ly	alpha-L-iduronidase, lysosomal
2856	14416	IDO AASE4ly	alpha-L-iduronidase, lysosomal
2857	14925	IDOURtly	iduronate transport into lysosomes
2858	19546	IDPtn	IDP nuclear transport
2859	319	I LETA	isoleucine transaminase
2860	1326	I LETA m	isoleucine transaminase, mitochondrial
2861	11949	I L E t4	L-isoleucine transport in via sodium symport
2862	12595	I L E t5 m	Isoleucine mitochondrial transport
2863	11925	I L E tec	L-isoleucine transport via diffusion (extracellular to cytosol)
2864	9351	I M A C T D	Imidazole acetaldehyde dehydrogenase
2865	9352	I M A C T D _m	Imidazole acetaldehyde dehydrogenase (mito)
2866	399	I M P C	IMP cyclohydrolase
2867	400	I M P D	IMP dehydrogenase
2868	10921	I N O S T O	inositol oxygenase
2869	20321	I N S K m	inosine kinase, mitochondrial
2870	11960	I N S T t2r	inositol transport in via proton symport
2871	12113	I N S T t4	inositol transport via sodium symport
2872	12128	I N S T t4 _2	inositol transport via sodium symport
2873	2574	I N S t	Inosine transport (diffusion)
2874	12093	I N S t4	inosine transport in via sodium symport
2875	12094	I N S t5	inosine transport in via sodium (1:2) symport
2876	12573	I N S t l	inosine facilitated transport from lysosome
2877	12538	I N S t m	inosine facilitated transport in mitochondria
2878	9737	I P D D I x	isopentenyl-diphosphate D-isomerase
2879	6236	I T C O A L 1 m	Itaconate--CoA ligase (GDP-forming), mitochondrial
2880	3271	I T C O A L m	Itaconate--CoA ligase (ADP-forming), mitochondrial
2881	19547	I T P t n	ITP nuclear transport
2882	7861	I Z P N	imidazolonepropionase
2883	12127	I t	Iodide uniport
2884	6648	K A S 8	b-ketoacyl synthetase (palmitate, n-C16:0)
2885	13052	K C C 2 t	K+-Cl- cotransporter (NH4+)
2886	13051	K C C t	K+-Cl- cotransport
2887	10646	K D N H	2-keto-3deoxy-D-glycero-D-galactonic acid phosphohydrolase
2888	9644	K H K	ketoheksokinase
2889	13865	K H K 2	ketoheksokinase (D-xylulose)

Column	Reaction #	Abbreviation	Reaction Name
2890	19624	KHK3	ketoheksokinase (D-tagatose)
2891	14960	KSII_CORE2t	keratan sulfate II (core2) transport, golgi to extracellular
2892	14963	KSII_CORE2tly	keratan sulfate II (core 2) transport, extracellular to lysosome
2893	14961	KSII_CORE4t	keratan sulfate II (core4) transport, golgi to extracellular
2894	14964	KSII_CORE4tly	keratan sulfate II (core 4) transport, extracellular to lysosome
2895	14959	KSIt	keratan sulfate I transport, golgi to extracellular
2896	14962	KSItly	keratan sulfate I transport, extracellular to lysosome
2897	2675	KYN	kynureninase
2898	3489	KYN3OX	kynurenine 3-monooxygenase
2899	9507	KYNAKGAT	L-Kynurenine:2-oxoglutarate aminotransferase
2900	11610	KYNATESYN	4-(2-Aminophenyl)-2,4-dioxobutanoate dehydratase
2901	12674	Kt3g	potassium transport via proton antiport
2902	18718	L-LACDcm	L-Lactate dehydrogenase, cytosolic/mitochondrial
2903	1552	L-LACt2r	L-lactate reversible transport via proton symport
2904	12474	L-LACt4r	L-lactate reversible transport via sodium symport
2905	14450	L-LACtcm	L-lactate transport via diffusion (cytosol to mitochondria)
2906	1295	L-LACtm	L-lactate transport, mitochondrial
2907	9889	LACZe	b-galactosidase, extracellular
2908	9883	LACZly	b-galactosidase, lysosomal
2909	9623	LALDD	D-lactaldehyde dehydrogenase
2910	9624	LALDO	D-Lactaldehyde:NAD+ oxidoreductase (glutathione-formylating)
2911	9625	LALDO2	D-Lactaldehyde:NADP+ 1-oxidoreductase
2912	20016	LALDO2x	D-Lactaldehyde:NAD+ 1-oxidoreductase
2913	14654	LAPCOA1	lysosomal acid phosphorylase (CoA)
2914	2949	LCADi	lactaldehyde dehydrogenase
2915	14171	LCADi_D	lactaldehyde dehydrogenase
2916	14176	LCADi_Dm	lactaldehyde dehydrogenase, mitochondrial
2917	14174	LCADim	lactaldehyde dehydrogenase, mitochondrial
2918	14712	LCAT1e	Lecithin-cholesterol acyltransferase
2919	19513	LCTStg	lactose transport from Golgi to extracellular (via vesicle)
2920	19514	LCTStl	lactose transport from cytosol to lysosome (via autophagocytosis)
2921	14564	LCYSTAT	L-Cysteate:2-oxoglutarate aminotransferase
2922	14565	LCYSTATm	L-Cysteate:2-oxoglutarate aminotransferase, mitochondrial
2923	9860	LCYSTCBOXL	3-Sulfoalanine carboxy-lyase
2924	293	LDH_D	D-lactate dehydrogenase
2925	2847	LDH_L	L-lactate dehydrogenase
2926	4416	LDH_Lm	L-lactate dehydrogenase
2927	19798	LEUKTRA4tr	leukotriene intracellular transport
2928	19799	LEUKTRB4tr	leukotriene intracellular transport
2929	12274	LEUKTRC4t	leukotriene C4 transport via bicarbonate countertransport
2930	19809	LEUKTRD4tr	leukotriene intracellular transport
2931	82	LEUTA	leucine transaminase
2932	705	LEUTAm	leucine transaminase, mitochondrial
2933	11693	LEUt4	L-leucine transport in via sodium symport
2934	12594	LEUt5m	leucine mitochondrial transport
2935	11924	LEUtec	L-leucine transport via diffusion (extracellular to cytosol)
2936	10872	LFORKYNHYD	L-Formylkynurenine hydrolase
2937	19031	LGNCCOAtx	fatty acid intracellular transport
2938	19091	LGNCCPT1	carnitine O-palmitoyltransferase
2939	19110	LGNCCPT2	transport into the mitochondria (carnitine)
2940	19072	LGNCCRNt	transport into the mitochondria (carnitine)
2941	12463	LGNCT	fatty acid transport via diffusion

Column	Reaction #	Abbreviation	Reaction Name
2942	457	LGTHL	lactoylglutathione lyase
2943	20193	LIMNENte	xenobiotic transport
2944	14387	LINKDEG1ly	degradation of proteoglycan linkage region, lysosomal
2945	14417	LINKDEG2ly	degradation of proteoglycan linkage region, lysosomal
2946	14427	LINKDEG3ly	degradation of proteoglycan linkage region, lysosomal
2947	14449	LINKDEG4ly	degradation of proteoglycan linkage region, lysosomal
2948	10481	LIPoi	Lipoate transport via sodium symport
2949	19096	LNELDCCPT1	carnitine O-palmitoyltransferase
2950	19115	LNELDCCPT2	carnitine transferase
2951	19077	LNELDCCRnt	transport into the mitochondria (carnitine)
2952	12454	LNELDCt	fatty acid transport via diffusion
2953	19097	LNLCCPT1	carnitine O-palmitoyltransferase
2954	19116	LNLCCPT2	carnitine transferase
2955	19078	LNLCCRnt	transport into the mitochondria (carnitine)
2956	13579	LNLCT	Linoleic acid (n-C18:2) transport in via diffusion
2957	19099	LNLNCACPT1	carnitine O-palmitoyltransferase
2958	19118	LNLNCACPT2	carnitine transferase
2959	19080	LNLNCACRNt	transport into the mitochondria (carnitine)
2960	12452	LNLNCAAt	fatty acid transport via diffusion
2961	19098	LNLNCGCPT1	carnitine O-palmitoyltransferase
2962	19117	LNLNCGCPT2	carnitine transferase
2963	19079	LNLNCGCRnt	transport into the mitochondria (carnitine)
2964	12451	LNLNCGt	fatty acid transport via diffusion
2965	3410	LNS14DM	cytochrome P450 lanosterol 14-alpha-demethylase (NADP)
2966	9753	LNS14DMr	cytochrome P450 lanosterol 14-alpha-demethylase
2967	9748	LNSTLSr	lanosterol synthase
2968	10860	LPASE	lysophospholipase
2969	9936	LPCOXp	L-pipecolate oxidase, peroxisomal
2970	14378	LPS	lipase
2971	14366	LPS2	lipase
2972	14367	LPS2e	lipase, extracellular
2973	14368	LPS3	lipase
2974	14369	LPS3e	lipase, extracellular
2975	14374	LPS4e	phospholipase
2976	14379	LPSe	lipase
2977	15060	LRAT	Lecithin retinol acyltransferase
2978	15108	LRAT1	Lecithin retinol acyltransferase (11-cis)
2979	15107	LRAT2	Lecithin retinol acyltransferase (9-cis)
2980	11320	LS3	Lumisterol 3 formation
2981	9771	LSTO1r	Lathosterol oxidase
2982	9772	LSTO2r	Lathosterol oxidase
2983	9998	LTA4H	Leukotriene A-4 hydrolase
2984	19811	LTC4CP	Leukotriene C4 carboxypeptidase
2985	19803	LTC4Sr	Leukotriene C4 synthase
2986	19808	LT4DP	Leukotriene D4 dipeptidase
2987	9580	LTDCCL	L-Tryptophan decarboxy-lyase
2988	11026	LYSMTF1n	histone-lysine N-methyltransferase, nuclear
2989	11027	LYSMTF2n	histone-lysine N-methyltransferase, nuclear
2990	11028	LYSMTF3n	histone-lysine N-methyltransferase, nuclear
2991	12661	LYSOXp	L-lysine oxidase, peroxisomal
2992	11953	LYSt4	L-lysine transport in via sodium symport
2993	11697	LYStiDF	L-lysine transport via diffusion (extracellular to cytosol)
2994	12950	LYStip	L-lysine transport, peroxisomal (irreversible)
2995	5290	LYStm	Lysine mitochondrial transport via ornithine carrier
2996	14827	LYStn	L-lysine transport, nuclear
2997	7754	M1316Mg	mannosyl-oligosaccharide 1,3-1,6-alpha-mannosidase

Column	Reaction #	Abbreviation	Reaction Name
2998	7711	M13N2Tg	alpha-1,3-mannosyl-glycoprotein 2-beta-N-acetylglucosaminyltransferase
2999	7770	M13N4Tg	alpha-1,3-mannosyl-glycoprotein 4-beta-N-acetylglucosaminyltransferase
3000	7769	M14NTg	beta-1,4-mannosyl-glycoprotein 4-beta-N-acetylglucosaminyltransferase
3001	7772	M16N4Tg	alpha-1,6-mannosyl-glycoprotein 4-beta-N-acetylglucosaminyltransferase
3002	7771	M16N6Tg	alpha-1,6-mannosyl-glycoprotein 6-beta-N-acetylglucosaminyltransferase
3003	7756	M16NTg	alpha-1,6-mannosyl-glycoprotein 2-beta-N-acetylglucosaminyltransferase
3004	11348	M4ATAer	M4A transamidase, endoplasmic reticulum
3005	11343	M4BET2er	M4B phosphoethanolaminyl transferase, endoplasmic reticulum
3006	11347	M4BTAer	M4B transamidase, endoplasmic reticulum
3007	11342	M4CET3er	M4C phosphoethanolaminyl transferase, endoplasmic reticulum
3008	8051	M4MPDOL_Lter	m4mpdol flippase
3009	8052	M4MPDOL_Uter	m4mpdol flippase
3010	7718	M7MASNBterg	m7masnB transport from endoplasmic reticulum to Golgi apparatus
3011	8054	M8MASNterg	m8masn transport from ER to Golgi apparatus
3012	2669	MACACI	maleylacetoacetate isomerase
3013	9358	MACOXO	3-Methylimidazole acetaldehyde:NAD+ oxidoreductase
3014	20296	MALSO3tm	Malate:sulfite antiport, mitochondrial
3015	20299	MALSO4tm	Malate:sulfate antiport, mitochondrial
3016	690	MALT	alpha-glucosidase
3017	20248	MALTSULtm	Malate:thiosulfate antiport, mitochondrial
3018	9993	MALTe	alpha-glucosidase, extracellular
3019	9992	MALTly	alpha-glucosidase, lysosomal
3020	11912	MALTt1r	maltose transport (uniport)
3021	985	MALtm	malate transport, mitochondrial
3022	2536	MAN1PT2	mannose-1-phosphate guanylyltransferase (GDP)
3023	8116	MAN1_6B1er	mannosidase I, endoplasmic reticulum (g1m6masnB1-producing)
3024	8114	MAN1_7Ber	mannosidase I, endoplasmic reticulum (g1m7masnB-producing)
3025	8117	MAN2_6B1er	mannosidase II, endoplasmic reticulum (g1m6masnB1-producing)
3026	8115	MAN2_7Cer	mannosidase II, endoplasmic reticulum (g1m7masnC-producing)
3027	244	MAN6PI	mannose-6-phosphate isomerase
3028	11905	MANt1r	mannose transport (uniport)
3029	12125	MANt4	D-mannose transport via sodium cotransport
3030	15052	MANter	mannose efflux from endoplasmic reticulum
3031	15051	MANtg	mannose efflux from Golgi apparatus
3032	14924	MANtly	mannose efflux from lysosome
3033	9399	MAOLNOR	monoamine oxidase (L-Normetanephine)
3034	13484	MAOX	Methylamine oxidase
3035	10429	MCCCrn	methylcrotonoyl-CoA carboxylase, mitochondrial
3036	9550	MCD	Malonyl-CoA Decarboxylase cytoplasmic
3037	8386	MCDm	Malonyl-CoA Decarboxylase, mitochondrial
3038	9549	MCDp	Malonyl-CoA Decarboxylase peroxisomal
3039	2250	MCITS	2-methylcitrate synthase
3040	20240	MCLACCYSR	3-mercaptolactate:cysteine reductase

Column	Reaction #	Abbreviation	Reaction Name
3041	10179	MCLOR	3-Mercaptolactate:NAD ⁺ oxidoreductase
3042	3441	MCOATA	Malonyl-CoA-ACP transacylase
3043	3337	MCOATAm	Malonyl-CoA-ACP transacylase, mitochondrial
3044	13722	MCPST	3-mercaptopyruvate sulfurtransferase
3045	541	MDH	malate dehydrogenase
3046	543	MDHm	malate dehydrogenase, mitochondrial
3047	1630	MDRPD	5-Methylthio-5-deoxy-D-ribulose 1-phosphate dehydratase
3048	2942	ME1m	malic enzyme (NAD), mitochondrial
3049	2848	ME2	malic enzyme (NADP)
3050	540	ME2m	malic enzyme (NADP), mitochondrial
3051	10809	MECOALm	mesaconate--CoA ligase (ADP-forming), mitochondrial
3052	10810	MECOAS1m	mesaconate--CoA ligase (GDP-forming)
3053	9609	MELATN23DOX	Melatonin:oxygen 2,3-dioxygenase (indole-decyclizing)
3054	9608	MELATNOX	Melatonin:NADP oxidoreductase
3055	7721	MEOHt2	Methanol diffusion
3056	20845	MEOHtly	Methanol transporter, lysosome
3057	13985	MEOHtr	Methanol transporter, endoplasmic reticulum
3058	20192	MEPIVESSte	metanephrine secretion via secretory vesicle (ATP driven)
3059	20241	MERCOPLACCYSSt	3-mercaptolactate-cysteine disulfide transport, extracellular
3060	10816	MESCOALm	Mesaconyl-CoA pyruvate-lyase
3061	369	METAT	methionine adenosyltransferase
3062	11871	METLEUex	Methionine/Leucine exchange (Met in)
3063	7846	METS	methionine synthase
3064	11699	METt4	L-methionine transport in via sodium symport
3065	11927	METtec	L-methionine transport via diffusion (extracellular to cytosol)
3066	9734	MEVK1x	mevalonate kinase (atp)
3067	7633	MG1er	mannosyl-oligosaccharide glucosidase, endoplasmic reticulum
3068	7634	MG2er	mannosyl-oligosaccharide glucosidase, endoplasmic reticulum
3069	7636	MG3er	mannosyl-oligosaccharide glucosidase, endoplasmic reticulum
3070	10814	MGACONm	methylglutaconase, mitochondrial
3071	10907	MGCHrm	methylglutaconyl-CoA hydratase (reversible), mitochondrial
3072	269	MGSA	methylglyoxal synthase
3073	14084	MGSA2	methylglyoxylate synthase 2 (from g3p)
3074	9356	MHISOR	N-Methylhistamine:oxygen oxidoreductase (deaminating)
3075	10936	MI13456PK	inositol-1,3,4,5,6-pentakisphosphate 2-kinase
3076	19594	MI13456Ptn	inositol 1,3,4,5,6-pentakisphosphate nuclear transport (diffusion)
3077	10980	MI1345PKn	inositol-1,3,4,5-triphosphate 6-kinase, nucleus
3078	10930	MI1345PP	inositol-1,3,4,5-trisphosphate 5-phosphatase
3079	10977	MI1346PKn	inositol-1,3,4,6-tetrakisphosphate 5-kinase, nucleus
3080	19572	MI1346Ptn	1D-myo-Inositol 1,3,4,6-tetrakisphosphate nuclear transport (diffusion)
3081	11035	MI134P4P	inositol-1,3,4-trisphosphate 4-phosphatase
3082	10933	MI134PK	inositol-1,3,4-trisphosphate 6-kinase
3083	10928	MI134PP	inositol-1,3,4-trisphosphate 1-phosphatase
3084	10927	MI13PP	inositol-1,3-bisphosphate 3-phosphatase
3085	10981	MI1456PKn	inositol-1,4,5,6-tetrakisphosphate 3-kinase, nucleus
3086	10978	MI145P6Kn	inositol-1,4,5-triphosphate 6-kinase, nucleus
3087	10932	MI145PK	inositol-1,4,5-trisphosphate 3-kinase
3088	10979	MI145PKn	inositol-1,4,5-trisphosphate 3-kinase, nucleus
3089	10929	MI145PP	inositol-1,4,5-trisphosphate 5-phosphatase

Column	Reaction #	Abbreviation	Reaction Name
3090	11036	MI14P4P	inositol-1,4-bisphosphate 4-phosphatase
3091	10925	MI14PP	inositol-1,4-bisphosphate 1-phosphatase
3092	19573	MI14Ptn	inositol 1,4-bisphosphate nuclear transport (diffusion)
3093	19575	MI1P-Dtn	inositol 1-phosphate nuclear transport (diffusion)
3094	2540	MI1PP	myo-inositol 1-phosphatase
3095	2656	MI1PS	myo-Inositol-1-phosphate synthase
3096	10935	MI3456PK	inositol-3,4,5,6-tetrakisphosphate 1-kinase
3097	10926	MI34PP	inositol-3,4-bisphosphate 4-phosphatase
3098	10923	MI3PP	myo-inositol 3-phosphatase
3099	10924	MI4PP	myo-inositol 4-phosphatase
3100	20161	MICITDr	2-methylisocitrate dehydratase
3101	19592	MINOHPtn	inositol hexakisphosphate nuclear transport (diffusion)
3102	2513	MLTG1	Maltodextrin glucosidase (maltotriose)
3103	9995	MLTG1e	Maltodextrin glucosidase (maltotriose), extracellular
3104	9994	MLTG1ly	Maltodextrin glucosidase (maltotriose), lysosome
3105	7704	MM5ag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3106	7697	MM5bg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3107	7698	MM5cg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3108	7694	MM6B1ag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3109	7695	MM6B1bg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3110	7696	MM6B2g	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3111	7702	MM6ag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3112	7703	MM6bg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3113	7701	MM7Ag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3114	7692	MM7B1g	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3115	7693	MM7B2g	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3116	7700	MM7Cag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3117	7699	MM7Cbg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3118	7689	MM8Ag	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3119	7686	MM8Ber	mannosyl-oligosaccharide 1,2-alpha-mannosidase, endoplasmic reticulum
3120	7690	MM8Cg	mannosyl-oligosaccharide 1,2-alpha-mannosidase, Golgi apparatus
3121	3201	MMCD	Methylmalonyl-CoA decarboxylase
3122	14199	MMCDm	Methylmalonyl-CoA decarboxylase, mitochondrial
3123	14200	MMCDp	Methylmalonyl-CoA decarboxylase, peroxisomal
3124	8367	MMEEm	methylmalonyl-CoA epimerase/racemase
3125	12775	MMMm	methylmalonyl-CoA mutase
3126	4509	MMSAD1m	methylmalonate-semialdehyde dehydrogenase
3127	10821	MMSAD3m	methylmalonate-semialdehyde dehydrogenase (malonic semialdehyde), mitochondrial

Column	Reaction #	Abbreviation	Reaction Name
3128	14096	MMTSADm	malonate-semialdehyde dehydrogenase (acetylating), mitochondrial
3129	14781	MOGAT	monoacylglycerol acyltransferase
3130	7109	MTAP	5'-methylthioadenosine phosphorylase
3131	7850	MTHFC	methenyltetrahydrofolate cyclohydrolase
3132	7852	MTHFCm	methenyltetrahydrofolic acid cyclohydrolase, mitochondrial
3133	7853	MTHFD	methylenetetrahydrofolate dehydrogenase (NADP)
3134	10526	MTHFD2	methylenetetrahydrofolate dehydrogenase (NAD)
3135	10524	MTHFD2m	methylenetetrahydrofolate dehydrogenase (NAD), mitochondrial
3136	7855	MTHFDm	methylenetetrahydrofolate dehydrogenase (NADP), mitochondrial
3137	7858	MTHFR3	5,10-methylenetetrahydrofolate reductase (NADPH)
3138	14750	MTHGXLt	Methylglyoxal transport (cytosol to extracellular)
3139	301	MTRI	5-methylthioribose-1-phosphate isomerase
3140	20461	N2M2NMASt	n2m2nmasn transport, Golgi to extracellular
3141	20462	N2M2NMAStly	n2m2nmasn transport, extracellular to lysosome
3142	8569	N3Tg	N-acetylgalactosamine 3-beta-galactosyltransferase, Golgi apparatus
3143	8609	N4Tg	N-acetylgalactosamine 4-beta-galactosyltransferase, Golgi apparatus
3144	1414	NABTNO	N4-Acetylaminobutanal:NAD+ oxidoreductase
3145	10640	NABTNOm	N4-Acetylaminobutanal:NAD+ oxidoreductase (m)
3146	9353	NACASPAH	N-Acetyl-L-aspartate amidohydrolase
3147	14516	NACASPtM	N-acetyl-L-aspartate transport (mitochondria to cytosol)
3148	20046	NACHEX10ly	beta-N-acetylhexosaminidase, lysosomal
3149	20045	NACHEX11ly	beta-N-acetylhexosaminidase, lysosomal
3150	20048	NACHEX12ly	beta-N-acetylhexosaminidase, lysosomal
3151	20049	NACHEX13ly	beta-N-acetylhexosaminidase, lysosomal
3152	20051	NACHEX14ly	beta-N-acetylhexosaminidase, lysosomal
3153	20052	NACHEX15ly	beta-N-acetylhexosaminidase, lysosomal
3154	20054	NACHEX16ly	beta-N-acetylhexosaminidase, lysosomal
3155	20055	NACHEX17ly	beta-N-acetylhexosaminidase, lysosomal
3156	20057	NACHEX18ly	beta-N-acetylhexosaminidase, lysosomal
3157	20058	NACHEX19ly	beta-N-acetylhexosaminidase, lysosomal
3158	14405	NACHEX1ly	beta-N-acetylhexosaminidase, lysosomal
3159	20060	NACHEX20ly	beta-N-acetylhexosaminidase, lysosomal
3160	20061	NACHEX21ly	beta-N-acetylhexosaminidase, lysosomal
3161	20063	NACHEX22ly	beta-N-acetylhexosaminidase, lysosomal
3162	20024	NACHEX23ly	beta-N-acetylhexosaminidase, lysosomal
3163	20025	NACHEX24ly	beta-N-acetylhexosaminidase, lysosomal
3164	20026	NACHEX25ly	beta-N-acetylhexosaminidase, lysosomal
3165	20027	NACHEX26ly	beta-N-acetylhexosaminidase, lysosomal
3166	14930	NACHEX27ly	beta-N-acetylhexosaminidase, lysosomal
3167	14408	NACHEX2ly	beta-N-acetylhexosaminidase, lysosomal
3168	14413	NACHEX3ly	beta-N-acetylhexosaminidase, lysosomal
3169	14420	NACHEX4ly	beta-N-acetylhexosaminidase, lysosomal
3170	14425	NACHEX5ly	beta-N-acetylhexosaminidase, lysosomal
3171	14430	NACHEX6ly	beta-N-acetylhexosaminidase, lysosomal
3172	14437	NACHEX7ly	beta-N-acetylhexosaminidase, lysosomal
3173	14443	NACHEX8ly	beta-N-acetylhexosaminidase, lysosomal
3174	14444	NACHEX9ly	beta-N-acetylhexosaminidase, lysosomal
3175	14502	NACHEXA10ly	beta-N-acetylhexosaminidase A, lysosomal
3176	14503	NACHEXA11ly	beta-N-acetylhexosaminidase A, lysosomal
3177	14504	NACHEXA12ly	beta-N-acetylhexosaminidase A, lysosomal
3178	14505	NACHEXA13ly	beta-N-acetylhexosaminidase A, lysosomal

Column	Reaction #	Abbreviation	Reaction Name
3179	14506	NACHEXA14ly	beta-N-acetylhexosaminidase A, lysosomal
3180	14507	NACHEXA15ly	beta-N-acetylhexosaminidase A, lysosomal
3181	14508	NACHEXA16ly	beta-N-acetylhexosaminidase A, lysosomal
3182	14509	NACHEXA17ly	beta-N-acetylhexosaminidase A, lysosomal
3183	14510	NACHEXA18ly	beta-N-acetylhexosaminidase A, lysosomal
3184	14511	NACHEXA19ly	beta-N-acetylhexosaminidase A, lysosomal
3185	14410	NACHEXA1ly	beta-N-acetylhexosaminidase A, lysosomal
3186	14536	NACHEXA20ly	beta-N-acetylhexosaminidase A, lysosomal
3187	14537	NACHEXA21ly	beta-N-acetylhexosaminidase A, lysosomal
3188	14540	NACHEXA22ly	beta-N-acetylhexosaminidase A, lysosomal
3189	14414	NACHEXA2ly	beta-N-acetylhexosaminidase A, lysosomal
3190	14421	NACHEXA3ly	beta-N-acetylhexosaminidase A, lysosomal
3191	14426	NACHEXA4ly	beta-N-acetylhexosaminidase A, lysosomal
3192	14431	NACHEXA5ly	beta-N-acetylhexosaminidase A, lysosomal
3193	14432	NACHEXA6ly	beta-N-acetylhexosaminidase A, lysosomal
3194	14446	NACHEXA7ly	beta-N-acetylhexosaminidase A, lysosomal
3195	14447	NACHEXA8ly	beta-N-acetylhexosaminidase A, lysosomal
3196	14501	NACHEXA9ly	beta-N-acetylhexosaminidase A, lysosomal
3197	1796	NACUP	Nicotinic acid uptake
3198	4313	NADH2-u10m	NADH dehydrogenase, mitochondrial
3199	15145	NADHtpu	NADH transporter, peroxisome
3200	13977	NADHtru	NADH transporter, endoplasmic reticulum
3201	33	NADK	NAD kinase
3202	171	NADN	NAD nucleosidase
3203	10515	NADNe	NAD nucleosidase,extracellular
3204	13979	NADPHtru	NADPH transporter, endoplasmic reticulum
3205	13998	NADPHtxu	NADPH transporter, peroxisome
3206	2811	NADPN	NADP nucleosidase
3207	10514	NADPNe	NADP nucleosidase,extracellular
3208	13980	NADPtru	NADP transporter, endoplasmic reticulum
3209	13999	NADPtxu	NADP transporter, peroxisome
3210	37	NADS2	NAD synthase (glutamine-hydrolysing)
3211	19526	NADtn	NAD transport, nuclear through pores
3212	15146	NADtpu	NAD transporter, peroxisome
3213	13974	NADtru	NAD transporter, endoplasmic reticulum
3214	14541	NAGA2ly	N-acetylgalactosaminidase, alpha-
3215	20859	NAGAlby	N-acetylgalactosaminidase, beta-
3216	11074	NAGAlly	N-acetylgalactosaminidase, alpha-
3217	14542	NAGLCAly	N-acetylglucosaminidase, lysosomal
3218	12050	NAHCO3_HCLt	bicarbonate transport (HCl/NaHCO3 exchange)
3219	12115	NAIt	Na+ / iodide cotransport
3220	11965	NAt	sodium transport (uniport)
3221	1085	NAt3_1	sodium proton antiporter (H:NA is 1:1)
3222	12672	NAt3_1g	sodium proton antiporter (H:NA is 1:1)
3223	12617	NAt5	sodium/ammonium proton antiporter
3224	19419	NAtx	sodium transport via diffusion (perioxisome)
3225	9763	NBAHH_ir	Nalpha-(beta-alanyl)-L-histidine hydrolase IR
3226	8202	NCAMUP	Nicotinamide acid uptake
3227	13050	NCCt	Na+-Cl- cotransport
3228	12695	NCKt	Na+/Ca2+-K+ exchange
3229	12696	NCNt	Na+/Ca2+-NH4+ exchange
3230	11147	NDP10ex	nucleoside-diphosphatase (IDP), extracellular
3231	11143	NDP3ex	nucleoside-diphosphatase (GDP), extracellular
3232	801	NDP6	nucleoside-diphosphatase (dCDP)
3233	15237	NDP7er	nucleoside-diphosphatase (UDP), endoplasmic reticulum
3234	11144	NDP7ex	nucleoside-diphosphatase (UDP), extracellular

Column	Reaction #	Abbreviation	Reaction Name
3235	13534	NDP7g	nucleoside-diphosphatase (UDP), Golgi apparatus
3236	803	NDP8	nucleoside-diphosphatase (dUDP)
3237	11149	NDP8ex	nucleoside-diphosphatase (UTP), extracellular
3238	2816	NDPK1	nucleoside-diphosphate kinase (ATP:GDP)
3239	9819	NDPK10	nucleoside-diphosphate kinase (ATP:dIDP)
3240	9827	NDPK10m	nucleoside-diphosphate kinase (ATP:dIDP), mitochondrial
3241	9826	NDPK10n	nucleoside-diphosphate kinase (ATP:dIDP), nuclear
3242	9825	NDPK1m	nucleoside-diphosphate kinase (ATP:GDP), mitochondrial
3243	9820	NDPK1n	nucleoside-diphosphate kinase (ATP:GDP), nuclear
3244	190	NDPK2	nucleoside-diphosphate kinase (ATP:UDP)
3245	9824	NDPK2m	nucleoside-diphosphate kinase (ATP:UDP), mitochondrial
3246	9821	NDPK2n	nucleoside-diphosphate kinase (ATP:UDP), nuclear
3247	191	NDPK3	nucleoside-diphosphate kinase (ATP:CDP)
3248	9828	NDPK3m	nucleoside-diphosphate kinase (ATP:CDP), mitochondrial
3249	9822	NDPK3n	nucleoside-diphosphate kinase (ATP:CDP), nuclear
3250	192	NDPK4	nucleoside-diphosphate kinase (ATP:dTDP)
3251	9830	NDPK4m	nucleoside-diphosphate kinase (ATP:dTDP), mitochondrial
3252	9829	NDPK4n	nucleoside-diphosphate kinase (ATP:dTDP), nuclear
3253	443	NDPK5	nucleoside-diphosphate kinase (ATP:dGDP)
3254	9832	NDPK5m	nucleoside-diphosphate kinase (ATP:dGDP), mitochondrial
3255	9831	NDPK5n	nucleoside-diphosphate kinase (ATP:dGDP), nuclear
3256	132	NDPK6	nucleoside-diphosphate kinase (ATP:dUDP)
3257	9834	NDPK6m	nucleoside-diphosphate kinase (ATP:dUDP), mitochondrial
3258	9833	NDPK6n	nucleoside-diphosphate kinase (ATP:dUDP), nuclear
3259	2801	NDPK7	nucleoside-diphosphate kinase (ATP:dCDP)
3260	9836	NDPK7m	nucleoside-diphosphate kinase (ATP:dCDP), mitochondrial
3261	9835	NDPK7n	nucleoside-diphosphate kinase (ATP:dCDP), nuclear
3262	133	NDPK8	nucleoside-diphosphate kinase (ATP:dADP)
3263	9838	NDPK8m	nucleoside-diphosphate kinase (ATP:dADP), mitochondrial
3264	9837	NDPK8n	nucleoside-diphosphate kinase (ATP:dADP), nuclear
3265	1438	NDPK9	nucleoside-diphosphate kinase (ATP:IDP)
3266	9840	NDPK9m	nucleoside-diphosphate kinase (ATP:IDP), mitochondrial
3267	9839	NDPK9n	nucleoside-diphosphate kinase (ATP:IDP), nuclear
3268	12611	NH4t3r	ammonia transport via proton antiport
3269	19374	NH4tn	ammonia nuclear transport
3270	2280	NH4tp	ammonia peroxisomal transport
3271	13187	NICRNS	NICRNS
3272	19529	NICRNTtn	NICRNT transport, nuclear through pore
3273	19704	NIFEDIPINEte	xenobiotic transport
3274	13053	NKCC2t	Na+-K+-Cl- cotransport (NH4+)
3275	12745	NKCCt	Na+-K+-Cl- cotransport
3276	1811	NMNATm	nicotinamide-nucleotide adenyltransferase, mitochondrial
3277	9544	NMNATn	nicotinamide-nucleotide adenyltransferase
3278	10516	NMNATr	nicotinamide-nucleotide adenyltransferase
3279	143	NMNS	NMN synthetase
3280	19527	NMNtn	NMN transport, nuclear through pore
3281	11089	NMPTRCOX	N-Methylputrescine:oxygen oxidoreductase (deaminating)
3282	173	NNAT	nicotinate-nucleotide adenyltransferase
3283	1810	NNATm	nicotinate-nucleotide adenyltransferase, mitochondrial
3284	9543	NNATn	nicotinate-nucleotide adenyltransferase
3285	6171	NNATr	nicotinate-nucleotide adenyltransferase
3286	2769	NNDPR	nicotinate-nucleotide diphosphorylase (carboxylating)
3287	10512	NNMT	Nicotinamide N-methyltransferase
3288	12097	NORANMT	noradrenaline N-methyltransferase

Column	Reaction #	Abbreviation	Reaction Name
3289	10159	NOS1	Nitric Oxide Synthase (intermediate forming)
3290	10166	NOS2	Nitric Oxide Synthase (NO forming)
3291	6008	NOt	NO transport (diffusion)
3292	13200	NP1	nucleotide phosphatase
3293	19705	NPTHLte	xenobiotic transport
3294	19421	NRPPHRSFt	norepinephrine sulfate transport (diffusion)
3295	12106	NRPPHRSULT	Norepinephrine Sulfotransferase
3296	11933	NRPPHRVESSEC	Noradrenaline secretion via secretory vesicle (ATP driven)
3297	11937	NRPPHRt4(2)r	Norepinephrine reversible transport in via sodium symport (1:2)
3298	12196	NRPPHRtu	Norepinephrine uniport
3299	19035	NRVNCCOAtx	fatty acid intracellular transport
3300	19095	NRVNCCPT1	carnitine O-palmitoyltransferase
3301	19114	NRVNCCPT2	carnitine transferase
3302	19076	NRVNCCRNt	transport into the mitochondria (carnitine)
3303	12458	NRVNCt	fatty acid transport via diffusion
3304	8574	NS26T2g	alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase
3305	8567	NS26Tg	alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase
3306	13188	NT5C	5'-nucleotidase
3307	2697	NTD1	5'-nucleotidase (dUMP)
3308	175	NTD10	5'-nucleotidase (XMP)
3309	176	NTD11	5'-nucleotidase (IMP)
3310	10419	NTD12	5'-nucleotidase (dIMP)
3311	10414	NTD1m	5'-nucleotidase (dUMP),mitochondrial
3312	448	NTD2	5'-nucleotidase (UMP)
3313	10430	NTD2e	5'-nucleotidase (UMP), extracellular
3314	12650	NTD2l	5'-nucleotidase (UMP), lysosome
3315	10416	NTD2m	5'-nucleotidase (UMP), mitochondrial
3316	449	NTD3	5'-nucleotidase (dCMP)
3317	12654	NTD3l	5'-nucleotidase (dCMP), lysosomal
3318	450	NTD4	5'-nucleotidase (CMP)
3319	10431	NTD4e	5'-nucleotidase (CMP), extracellular
3320	12649	NTD4l	5'-nucleotidase (CMP), lysosome
3321	451	NTD5	5'-nucleotidase (dTMP)
3322	12653	NTD5l	5'-nucleotidase (dTMP), lysosomal
3323	10415	NTD5m	5'-nucleotidase (dTMP), mitochondrial
3324	452	NTD6	5'-nucleotidase (dAMP)
3325	12651	NTD6l	5'-nucleotidase (dAMP), lysosome
3326	2698	NTD7	5'-nucleotidase (AMP)
3327	10433	NTD7e	5'-nucleotidase (AMP), extracellular
3328	12646	NTD7l	5'-nucleotidase (AMP), lysosome
3329	453	NTD8	5'-nucleotidase (dGMP)
3330	12652	NTD8l	5'-nucleotidase (dGMP), lysosomal
3331	174	NTD9	5'-nucleotidase (GMP)
3332	10432	NTD9e	5'-nucleotidase (GMP), extracellular
3333	12648	NTD9l	5'-nucleotidase (GMP), lysosome
3334	14816	NTMELYStner	protein trimethyl lysine transport (nucleus to ER)
3335	6225	NTP3e	nucleoside-triphosphatase (GTP)
3336	9745	NTPP10	Nucleoside triphosphate pyrophosphorylase (ditp)
3337	9747	NTPP11	Nucleoside triphosphate pyrophosphorylase (xtp)
3338	9738	NTPP9	Nucleoside triphosphate pyrophosphorylase (itp)
3339	13752	NaKt	Na+/K+ exchanging ATPase
3340	10086	O16G1e	oligo-1,6-glucosidase (glygn4 -> glygn5), extracellular
3341	10090	O16G2e	oligo-1,6-glucosidase (strch2 ->strch3), extracellular
3342	20850	O2St	superoxide anion transport via diffusion (extracellular)
3343	20851	O2Stm	superoxide anion transport via diffusion (mitochondria)

Column	Reaction #	Abbreviation	Reaction Name
3344	20849	O2Stn	superoxide anion transport via diffusion (nucleus)
3345	20848	O2Stx	superoxide anion transport via diffusion (peroxisome)
3346	1298	O2t	o2 transport (diffusion)
3347	2158	O2ter	O2 transport, endoplasmic reticulum
3348	762	O2tm	O2 transport (diffusion)
3349	15238	O2tn	O2 nuclear transport
3350	13516	O2tp	O2 transport, peroxisomal
3351	20237	OAGD3te	oagd3_hs transport
3352	20221	OAGD3tg	oagd3_hs intracellular transport
3353	20238	OAGT3te	oagt3_hs transport
3354	20222	OAGT3tg	oagt3_hs intracellular transport
3355	10993	OBdHc	2-Oxobutanoate dehydrogenase, cytosolic
3356	3992	OCBTm	ornithine carbamoyltransferase, irreversible
3357	8359	OCCOAtm	Octanoyl-CoA transport, diffusion
3358	19037	OCCOAtx	fatty acid intracellular transport
3359	12448	OCDCAttr	fatty acid transport via diffusion
3360	12447	OCDCAttr	fatty acid transport via diffusion
3361	3986	OCOAT1m	3-oxoacid CoA-transferase
3362	8146	OCTAt	Octanoate transport via diffusion
3363	19038	ODECOAtx	fatty acid intracellular transport
3364	10904	OIVD1m	2-oxoisovalerate dehydrogenase (acylating; 4-methyl-2-oxopentanoate), mitochondrial
3365	10905	OIVD2m	2-oxoisovalerate dehydrogenase (acylating; 3-methyl-2-oxobutanoate), mitochondrial
3366	10906	OIVD3m	2-oxoisovalerate dehydrogenase (acylating; 3-methyl-2-oxopentanoate), mitochondrial
3367	19706	OMEPRAZOLEte	xenobiotic transport
3368	446	OMPDC	orotidine-5'-phosphate decarboxylase
3369	19719	ONPHTLte	xenobiotic transport
3370	10877	OPAHir	5-Oxoproline amidohydrolase (ATP-hydrolysing) (ir)
3371	15089	ORETNF	4-oxo-retinoic acid formation (oxidation)
3372	15117	ORETNF2	13-cis-4-oxo-retinoic acid formation (oxidation)
3373	15090	ORETNtm	4-oxo-retinoic acid transport, Nuclear
3374	15121	ORETNtm2	13-cis-4-oxo-retinoic acid transport, Nuclear
3375	1218	ORNDC	Ornithine Decarboxylase
3376	9721	ORNtArm	ornithine transaminase reversible (m)
3377	2435	ORNt3m	ornithine mitochondrial transport via proton antiport
3378	5287	ORNt4m	ornithine mitochondrial transport exchange with citruline
3379	11704	ORNtiDF	ornithine transport via diffusion (extracellular to cytosol)
3380	447	ORPT	orotate phosphoribosyltransferase
3381	12362	OXAHCotex	oxalate transport via bicarbonate countertransport
3382	19516	OXAtp	oxalate transport out of peroxisome
3383	19772	P45011A1m	Cytochrome P450 11A1, mitochondrial [Precursor]
3384	9909	P45011B11m	Steroid 11-beta-hydroxylase
3385	9910	P45011B12m	Steroid 11-beta-hydroxylase
3386	9949	P45011B21m	Steroid 11-beta-hydroxylase
3387	9870	P45017A1r	Cytochrome P450 17A1
3388	9869	P45017A2r	Cytochrome P450 17A1
3389	9937	P45017A3r	Cytochrome P450 17A1
3390	9941	P45017A4r	Cytochrome P450 17A1
3391	9963	P45019A1r	aromatase
3392	9964	P45019A2r	aromatase
3393	11670	P4501B1r	cytochrome P450 1B1
3394	9916	P45021A1r	Steroid 21-hydroxylase
3395	9914	P45021A2r	Steroid 21-hydroxylase

Column	Reaction #	Abbreviation	Reaction Name
3396	9660	P45027A11m	5-beta-cholestane-3-alpha,7-alpha,12-alpha-triol 27-hydroxylase
3397	9665	P45027A12m	5-beta-cholestane-3-alpha,7-alpha,12-alpha-triol 27-hydroxylase
3398	13902	P45027A13m	5-beta-cholestane-3-alpha,7-alpha,12-alpha-triol 27-hydroxylase
3399	13891	P45027A14m	5-beta-cytochrome P450, family 27, subfamily A, polypeptide 1
3400	13907	P45027A15m	5-beta-cytochrome P450, family 27, subfamily A, polypeptide 1
3401	13909	P45027A16m	Cytochrome P450 27
3402	9567	P45027A1m	Cytochrome P450 27
3403	11669	P4502A6	cytochrome P450 2A6
3404	11666	P4502C18	cytochrome P450 2C18
3405	11663	P4502C19	cytochrome P450 2C19
3406	11668	P4502C8	cytochrome P450 2C8
3407	11667	P4502C9	cytochrome P450 2C9
3408	11901	P4502C92	cytochrome P450 2C9
3409	11902	P4502C93	cytochrome P450 2C9
3410	11903	P4502C94	cytochrome P450 2C9
3411	11662	P4502D6	cytochrome P450 2D6
3412	11661	P4502E1	cytochrome P450 2E1
3413	11660	P4502F1	cytochrome P450 2F1
3414	9569	P45039A1r	oxysterol 7-alpha-hydroxylase
3415	11659	P4503A4	cytochrome P450 3A4
3416	11656	P4503A43r	cytochrome p450 P450 3A43
3417	11657	P4503A5	cytochrome P450 3A5
3418	11655	P4503A7r	cytochrome p450 P450 3A7
3419	9563	P45046A1r	cytochrome P450, family 46, subfamily A, polypeptide 1
3420	11609	P4504B1r	cytochrome P450 4B1
3421	11588	P4504F121r	cytochrome p450 4F12/4F2
3422	11589	P4504F122r	cytochrome p450 4F12/4F2
3423	11590	P4504F123r	cytochrome p450 4F12/4F2
3424	11591	P4504F81r	cytochrome p450 4F8
3425	9562	P4507A1r	cytochrome P450, family 7, subfamily A, polypeptide 1
3426	9570	P4507B11r	oxysterol 7alpha-hydroxylase
3427	9571	P4507B12r	oxysterol 7alpha-hydroxylase
3428	9710	P4508B11r	sterol 12-alpha-hydroxylase
3429	9712	P4508B13r	sterol 12-alpha-hydroxylase (nadh)
3430	19866	P450LTB4r	cytochrome p450 leukotriene B4
3431	1470	P450SCC1m	cholesterol monooxygenase
3432	3319	P5CDm	l-pyrroline-5-carboxylate dehydrogenase, mitochondrial
3433	3629	P5CR	pyrroline-5-carboxylate reductase
3434	11289	P5CRm	pyrroline-5-carboxylate reductase (m)
3435	7185	P5CRx	pyrroline-5-carboxylate reductase
3436	11290	P5CRxm	pyrroline-5-carboxylate reductase (m)
3437	3239	PACCOAL	phenylacetate-CoA ligase
3438	12075	PAFH	Platelet-activating factor acetylhydrolase
3439	14980	PAFHe	Platelet-activating factor acetylhydrolase
3440	10807	PAFS	alkyl glycerol phosphocholine acetyl transferase
3441	19571	PAIL45P_HStn	phosphatidylinositol 4,5-bisphosphate nuclear transport (diffusion)
3442	19574	PAIL4P_HStn	phosphatidylinositol 4-phosphate nuclear transport (diffusion)
3443	19591	PAIL_HStn	phosphatidylinositol nuclear transport (diffusion)
3444	14681	PAN4PP	phosphatase (pan4p)

Column	Reaction #	Abbreviation	Reaction Name
3445	12155	PAPStg	3'-Phosphoadenylyl sulfate Golgi transport
3446	15236	PAPtg	adenosine 3',5'-bisphosphate Golgi transport
3447	14999	PA_HSter	phosphatidate scramblase
3448	15000	PA_HSStg	phosphatidate scramblase
3449	19525	PA_HStn	phosphatidate transport, nuclear
3450	15010	PCFLOPm	phosphatidylcholine flippase
3451	11889	PCHOLP_hs	choline phosphatase
3452	11888	PCHOLPg_hs	choline phosphatase
3453	11886	PCHOLPm_hs	choline phosphatase
3454	11887	PCHOLPr_hs	choline phosphatase
3455	14997	PCHOL_HSter	phosphatidylcholine scramblase
3456	14998	PCHOL_HSStg	phosphatidylcholine scramblase
3457	2973	PCLAD	picolinic acid decarboxylase
3458	11406	PCLYSOX	Procollagen-lysine 1, 2-oxoglutarate 5-dioxygenase
3459	14383	PCREATmdiffir	Phosphocreatine transport to/from mitochondria via diffusion
3460	19738	PCRNtc	transport into the cytosol from peroxisome (carnitine)
3461	19739	PCRNtm	transport into the mitochondria from cytosol (carnitine)
3462	5206	PCm	pyruvate carboxylase
3463	12666	PCt	phosphatidylcholine transporter
3464	2655	PDE1	3',5'-cyclic-nucleotide phosphodiesterase
3465	9958	PDE1g	3',5'-cyclic-nucleotide phosphodiesterase, Golgi
3466	4690	PDE4	3',5'-cyclic-nucleotide phosphodiesterase
3467	9959	PDE4g	3',5'-cyclic-nucleotide phosphodiesterase, Golgi
3468	11276	PDE4n	3',5'-cyclic-nucleotide phosphodiesterase, Nucleus
3469	11	PDHm	pyruvate dehydrogenase
3470	1729	PDX5PO	pyridoxine 5'-phosphate oxidase
3471	1821	PDXPP	Pyridoxine 5-phosphate phosphatase
3472	2521	PEAMNO	Phenethylamine oxidase
3473	11288	PECGONCOATr	Pseudoecgonine CoA transferase (ER)
3474	15005	PEFLIP	phosphatidylethanolamine flippase
3475	15007	PEFLIPm	phosphatidylethanolamine flippase
3476	3084	PEPCK	Phosphoenolpyruvate carboxykinase (GTP)
3477	4418	PEPCKm	Phosphoenolpyruvate carboxykinase (GTP)
3478	14775	PEPLYStn	peptide (lysine) nuclear transport via diffusion
3479	20195	PERILLYLte	xenobiotic transport
3480	18982	PEROXx	peroxisomal lumped long chain fatty acid oxidation
3481	2385	PETHCT	phosphoethanolamine cytidyltransferase
3482	19599	PETOHMm_hs	phosphatidylethanolamine N-methyltransferase
3483	19600	PETOHMr_hs	phosphatidylethanolamine N-methyltransferase
3484	14995	PE_HSter	phosphatidylethanolamine scramblase
3485	14996	PE_HSStg	phosphatidylethanolamine scramblase
3486	20872	PE_HStm	phosphatidylethanolamine scramblase
3487	267	PFK	phosphofructokinase
3488	698	PFK26	6-phosphofructo-2-kinase
3489	2865	PGCD	phosphoglycerate dehydrogenase
3490	9973	PGDI	Prostaglandin-H2 D-isomerase [Precursor]
3491	9972	PGDIr	Prostaglandin-H2 D-isomerase [Precursor]
3492	9991	PGESr	Prostaglandin E synthase
3493	271	PGI	glucose-6-phosphate isomerase
3494	9997	PGISr	Prostaglandin I2 synthase
3495	273	PGK	phosphoglycerate kinase
3496	278	PGL	6-phosphogluconolactonase
3497	2286	PGLYCP	Phosphoglycolate phosphatase
3498	9555	PGLer	6-phosphogluconolactonase, endoplasmic reticulum
3499	272	PGM	phosphoglycerate mutase

Column	Reaction #	Abbreviation	Reaction Name
3500	2819	PGMT	phosphoglucomutase
3501	10862	PGPPT	phosphatidyl-CMP: glycerophosphate phosphatidyltransferase
3502	10863	PGPP_hs	Phosphatidylglycerol phosphate phosphatase (homo sapiens)
3503	15226	PGS	Prostaglandin G/H synthase
3504	15227	PGSr	Prostaglandin G/H synthase
3505	11634	PHACCOAGLNAC	Phenylacetyl-CoA:L-glutamine alpha-N-phenylacetyltransferase
3506	3492	PHCDm	L-1-pyrroline-3-hydroxy-5-carboxylate dehydrogenase
3507	3565	PHCHGSm	L-1-Pyrroline-3-hydroxy-5-carboxylate spontaneous conversion to L-4-Hydroxyglutamate semialdehyde, mitochondrial
3508	14513	PHEACGLNt	PHEACGLN extracellular transport via diffusion
3509	14687	PHEMEt	heme transport
3510	8500	PHEMEtm	Heme transport to cytosol
3511	2860	PHETA1	phenylalanine transaminase
3512	9484	PHETA1m	phenylalanine transaminase (m)
3513	14585	PHEHTPTOX2	L-Phenylalanine,tetrahydrobiopterin:oxygen oxidoreductase (4-hydroxylating)
3514	11694	PHEt4	L-phenylalanine transport in via sodium symport
3515	11928	PHEtec	L-phenylalanine transport via diffusion (extracellular to cytosol)
3516	9490	PHYCBOXL	L-Phenylalanine carboxy-lyase
3517	14100	PHYHx	Phytanoyl-CoA dioxygenase, peroxisomal
3518	10501	PHYQt	Phylloquinone transport
3519	19806	PHYTt	fatty acid transport via diffusion
3520	10889	PI345P3P	phosphatidylinositol-3,4,5-trisphosphate 3-phosphatase
3521	19612	PI345P3Pn	phosphatidylinositol-3,4,5-trisphosphate 3-phosphatase, nuclear
3522	11040	PI345P5P	phosphatidylinositol-3,4,5-trisphosphate 5-phosphatase
3523	19611	PI345P5Pn	phosphatidylinositol-3,4,5-trisphosphate 5-phosphatase, nuclear
3524	19617	PI34P3Pn	phosphatidylinositol-3,4-bisphosphate 3-phosphatase, nuclear
3525	19609	PI34P4Pn	phosphatidylinositol-3,4-bisphosphate 4-phosphatase, nuclear
3526	11039	PI34P5K	phosphatidylinositol 3,4-bisphosphate 5-kinase
3527	19610	PI34P5Kn	phosphatidylinositol 3,4-bisphosphate 5-kinase, nuclear
3528	19602	PI35P3P	phosphatidylinositol-3,5-bisphosphate 3-phosphatase
3529	19607	PI3P3Pn	phosphatidylinositol-3-phosphate 3-phosphatase, nuclear
3530	11037	PI3P4K	phosphatidylinositol 3-phosphate 4-kinase
3531	19608	PI3P4Kn	phosphatidylinositol 3-phosphate 4-kinase, nuclear
3532	11043	PI3P5K	phosphatidylinositol 3-phosphate 5-kinase
3533	19603	PI3PP	phosphatidylinositol-3-phosphate 3-phosphatase
3534	10879	PI45P3K	phosphatidylinositol 4,5-bisphosphate 3-kinase
3535	19613	PI45P3Kn	phosphatidylinositol 4,5-bisphosphate 3-kinase, nuclear
3536	11047	PI45P4P	phosphatidylinositol-4,5-bisphosphate 4-phosphatase
3537	10868	PI45P5P	phosphatidylinositol-4,5-bisphosphate 5-phosphatase
3538	19614	PI45P5Pn	phosphatidylinositol-4,5-bisphosphate 5-phosphatase, nuclear
3539	10995	PI45PLC	phosphatidylinositol 4,5-bisphosphate phospholipase C
3540	11023	PI45PLCn	phosphatidylinositol 4,5-bisphosphate phospholipase C, nucleus
3541	10988	PI4P3K	phosphatidylinositol 4-phosphate 3-kinase

Column	Reaction #	Abbreviation	Reaction Name
3542	10989	PI4P3Ker	phosphatidylinositol 4-phosphate 3-kinase, endoplasmic reticulum
3543	19616	PI4P3Kn	phosphatidylinositol 4-phosphate 3-kinase, nuclear
3544	19619	PI4P4Pn	phosphatidylinositol-4-phosphate 4-phosphatase, nuclear
3545	10764	PI4P5K	phosphatidylinositol 4-phosphate 5-kinase
3546	19615	PI4P5Kn	phosphatidylinositol 4-phosphate 5-kinase, nuclear
3547	11020	PI4PLC	phosphatidylinositol 4-phosphate phospholipase C
3548	11022	PI4PLCn	phosphatidylinositol 4-phosphate phospholipase C, nucleus
3549	10922	PI4PP	phosphatidylinositol-4-phosphate 4-phosphatase
3550	11042	PI5P3K	phosphatidylinositol-5-phosphate 3-kinase
3551	11046	PI5P3Ker	phosphatidylinositol-5-phosphate 3-kinase, endoplasmic reticulum
3552	10890	PI5P4K	phosphatidylinositol-5-phosphate 4-kinase
3553	19621	PI5P4Kn	phosphatidylinositol-5-phosphate 4-kinase, nuclear
3554	11051	PIACGT	phosphatidylinositol N-acetylglucosaminyltransferase
3555	10987	PIK3	phosphatidylinositol 3-kinase
3556	10990	PIK3er	phosphatidylinositol 3-kinase, endoplasmic reticulum
3557	19606	PIK3n	phosphatidylinositol 3-kinase, nuclear
3558	10770	PIK4	phosphatidylinositol 4-kinase
3559	19618	PIK4n	phosphatidylinositol 4-kinase, nuclear
3560	11041	PIK5	phosphatidylinositol 5-kinase
3561	19620	PIK5n	phosphatidylinositol 5-kinase, nuclear
3562	10998	PIPLC	phosphatidylinositol phospholipase C
3563	11021	PIPLCn	phosphatidylinositol phospholipase C, nucleus
3564	2757	Pit2m	phosphate transporter, mitochondrial
3565	6677	Pit7	phosphate transport in/out via three Na+ symporter
3566	11904	Pit7ir	phosphate transport in/out via three Na+ symporter (irreversible)
3567	12351	Pit8	phosphate transport in/out via Na+ symporter
3568	12352	Pit9	phosphate transport in/out via two Na+ symporter
3569	10015	Piter	phosphate transport, endoplasmic reticulum
3570	15037	Pitg	phosphate transport, Golgi apparatus
3571	19522	Pitn	phosphate transport, nuclear
3572	13996	Pitx	Phosphate transporter, peroxisome
3573	10805	PLA2	phospholipase A2
3574	10858	PLA2_2	phospholipase A2
3575	12086	PLA2_2e	phospholipase A2
3576	14553	PLYSPSer	protein lysine peptidase (endoplasmic reticulum)
3577	243	PMANM	phosphomannomutase
3578	9735	PMEVKx	phosphomevalonate kinase
3579	10983	PMI12346PH	5-diphosphoinositol-1,2,3,4,6-pentakisphosphate diphosphohydrolase
3580	10986	PMI12346PHn	5-diphosphoinositol-1,2,3,4,6-pentakisphosphate diphosphohydrolase, nuclear
3581	10984	PMI1346PH	diphosphoinositol-1,3,4,6-tetrakisphosphate diphosphohydrolase
3582	10985	PMI1346PHn	diphosphoinositol-1,3,4,6-tetrakisphosphate diphosphohydrolase, nucleus
3583	19036	PMTCOAtx	fatty acid intracellular transport
3584	15045	PNP	purine-nucleoside phosphorylase
3585	7471	PNTEH	Hydrolase Class (RXN R02973)
3586	2788	PNTK	pantothenate kinase
3587	9471	PNTKm	pantothenate kinase (mitochondrial)
3588	10482	PNTOt5	Pantothenate sodium symporter II
3589	295	PPA	inorganic diphosphatase

Column	Reaction #	Abbreviation	Reaction Name
3590	12355	PPA2	inorganic triphosphatase
3591	19518	PPA2m	inorganic triphosphatase, mitochondrial
3592	10451	PPAP	phosphatidic acid phosphatase
3593	10034	PPAer	inorganic diphosphatase, endoplasmic reticulum
3594	458	PPAm	inorganic diphosphatase
3595	15047	PPAn	inorganic diphosphatase, nuclear
3596	8421	PPAt	Propionate transport, diffusion
3597	8422	PPAtm	Propionate transport, diffusion
3598	3553	PPBNGS	porphobilinogen synthase
3599	87	PPCDC	phosphopantothenoylecysteine decarboxylase
3600	4425	PPCOACm	Propionyl-CoA carboxylase, mitochondrial
3601	10750	PPCOAOm	Propanoyl-CoA:FAD 2,3-oxidoreductase, mitochondrial
3602	12665	PPD2CSPp	PPD2CSPp
3603	20257	PPDOx	Propane-1,2-diol:NAD+ 1-oxidoreductase
3604	9633	PPDOy	Propane-1,2-diol:NADP+ 1-oxidoreductase
3605	13983	PPItr	Diphosphate transporter, endoplasmic reticulum
3606	13995	PPItx	Diphosphate transporter, peroxisome
3607	258	PPM	phosphopentomutase
3608	19593	PPMI12346Ptn	5-diphosphatidylinositol pentakisphosphate nuclear transport (diffusion)
3609	19595	PPMI1346Ptn	diphosphatidylinositol tetrakisphosphate nuclear transport (diffusion)
3610	9465	PPNCL3	phosphopantothenate-cysteine ligase
3611	11409	PPOR	Phenylpyruvate:oxygen oxidoreductase (hydroxylating,decarboxylating)
3612	1761	PPPG9tm	protoporphyrinogen IX mitochondrial transport
3613	3296	PPPGOm	protoporphyrinogen oxidase, mitochondrial
3614	19512	PPPItn	Inorganic triphosphate transport through nuclear pore
3615	3556	PRAGSr	phosphoribosylglycinamide synthase
3616	3640	PRAIS	phosphoribosylaminoimidazole synthase
3617	3641	PRASCS	phosphoribosylaminoimidazolesuccinocarboxamide synthase
3618	11975	PRDX	Peroxidase (multiple substrates)
3619	11976	PRDXI	Peroxidase (multiple substrates)
3620	3558	PRFGS	phosphoribosylformylglycinamide synthase
3621	19774	PRGNLONESULT	steroid sulfotransferase
3622	19795	PRGNLONEtm	pregnenolone intracellular transport
3623	19796	PRGNLONEtr	pregnenolone intracellular transport
3624	14873	PRISTANALtx	pristanal peroxisomal transport
3625	14874	PRISTCOAtx	pristcoa peroxisomal transport
3626	15132	PRISTTx	prist peroxisomal transport
3627	3650	PRO1x	proline oxidase (L-proline, NAD)
3628	3652	PRO1xm	proline oxidase (NAD), mitochondrial
3629	10172	PROAKGOX1r	L-Proline,2-oxoglutarate:oxygen oxidoreductase (4-hydroxylating) (ER)
3630	3642	PROD2	Proline dehydrogenase
3631	10169	PROD2m	Proline dehydrogenase (m)
3632	11685	PRODt2r	D-proline reversible transport via proton symport
3633	11686	PRODt2rL	D-proline reversible transport via proton symport (lysosome)
3634	12263	PROSTGD2t	prostaglandin transport via bicarbonate countertransport
3635	12264	PROSTGE1t	prostaglandin transport via bicarbonate countertransport
3636	12625	PROSTGE1t3	prostaglandine E1 transport (ATP-dependent)
3637	12265	PROSTGE2t	prostaglandin transport via bicarbonate countertransport
3638	12279	PROSTGE2t2	prostaglandin uniport
3639	12626	PROSTGE2t3	prostaglandine E2 transport (ATP-dependent)

Column	Reaction #	Abbreviation	Reaction Name
3640	12280	PROSTGF2t	prostaglandin uniport
3641	1368	PROt2r	L-proline reversible transport via proton symport
3642	11682	PROt2rL	L-proline reversible transport via proton symport (lysosome)
3643	1802	PROt4	Na+/Proline-L symporter
3644	11946	PROt4(2)r	Proline transport (sodium symport) (2:1)
3645	1502	PROtm	L-proline transport, mitochondrial
3646	9818	PRPNCOAHYDm	Propenoyl-CoA hydrolase (m)
3647	9817	PRPNCOAHYDx	Propenoyl-CoA hydrolase (x)
3648	343	PRPPS	phosphoribosylpyrophosphate synthetase
3649	11823	PSDm_hs	Phosphatidylserine decarboxylase
3650	913	PSERT	phosphoserine transaminase
3651	15006	PSFLIP	phosphatidylserine flippase
3652	15008	PSFLIPm	phosphatidylserine flippase
3653	4642	PSP_L	phosphoserine phosphatase (L-serine)
3654	10545	PSSA1_hs	Phosphatidylserine synthase homo sapiens
3655	10544	PSSA2_hs	Phosphatidylserine synthase homo sapiens
3656	15001	PS_HSter	phosphatidylserine scramblase
3657	15002	PS_HStg	phosphatidylserine scramblase
3658	14862	PTDCACRNCPT1	carnitine fatty-acyl transferase
3659	14863	PTDCACRNCPT2	pentadecanoate transport into the mitochondria
3660	14867	PTDCACRNt	pentadecanoate transport into the mitochondria
3661	19807	PTDCAt	fatty acid transport via diffusion
3662	13833	PTE2x	peroxisomal acyl-CoA thioesterase
3663	14143	PTE3x	peroxisomal acyl-CoA thioesterase
3664	14144	PTE4x	peroxisomal acyl-CoA thioesterase
3665	14145	PTE5x	peroxisomal acyl-CoA thioesterase
3666	7821	PTHPS	6-pyruvoyltetrahydropterin synthase
3667	11636	PTHPSn	6-pyruvoyltetrahydropterin synthase, nuclear
3668	89	PTPAT	pantetheine-phosphate adenyltransferase
3669	10641	PTRCAT1	Putrescine acetyltransferase
3670	10635	PTRCOX1	Putrescine:oxygen oxidoreductase (deaminating)
3671	134	PUNP1	purine-nucleoside phosphorylase (Adenosine)
3672	135	PUNP2	purine-nucleoside phosphorylase (Deoxyadenosine)
3673	136	PUNP3	purine-nucleoside phosphorylase (Guanosine)
3674	137	PUNP4	purine-nucleoside phosphorylase (Deoxyguanosine)
3675	420	PUNP5	purine-nucleoside phosphorylase (Inosine)
3676	421	PUNP6	purine-nucleoside phosphorylase (Deoxyinosine)
3677	422	PUNP7	purine-nucleoside phosphorylase (Xanthosine)
3678	11316	PVD3	Previtamin D3 formation
3679	11024	PYAM5POr	pyridoxamine 5'-phosphate oxidase
3680	14578	PYAM5Ptm	Pyridoxamine 5'-phosphate transport via diffusion, mitochondrial
3681	1727	PYDAMK	pyridoxamine kinase
3682	10952	PYDAMtr	pyridoxamine transport via diffusion
3683	14577	PYDX5Ptm	Pyridoxal 5'-phosphate transport via diffusion, mitochondrial
3684	10953	PYDXDH	pyridoxal dehydrogenase
3685	3019	PYDXK	pyridoxal kinase
3686	1726	PYDXNK	pyridoxine kinase
3687	10951	PYDXNtr	pyridoxine transport via diffusion
3688	1820	PYDXPP	Pyridoxal 5-phosphate phosphatase
3689	10950	PYDXtr	pyridoxal transport via diffusion
3690	265	PYK	pyruvate kinase
3691	11031	PYLALDOX	Perillyl aldehyde:NAD+ oxidoreductase
3692	11032	PYLALDOXm	Perillyl aldehyde:NAD+ oxidoreductase (m)

Column	Reaction #	Abbreviation	Reaction Name
3693	1083	PYNP2r	pyrimidine-nucleoside phosphorylase (uracil)
3694	876	PYRt2m	pyruvate mitochondrial transport via proton symport
3695	2279	PYRt2p	pyruvate peroxisomal transport via proton symport
3696	1828	PYRt2r	pyruvate reversible transport via proton symport
3697	9495	QUILSYN	Quinolate Synthase (Eukaryotic)
3698	15074	RADH	retinal dehydrogenase
3699	15076	RADH2	retinal dehydrogenase (NADPH)
3700	19520	RADH3	retinal dehydrogenase
3701	19521	RADH4	retinal dehydrogenase (NADPH)
3702	15084	RAHY	retinoic acid hydroxylation (P450)
3703	15097	RAI1	retinal isomerase (11-cis)
3704	15096	RAI2	retinal isomerase (9-cis)
3705	15116	RAI3	13-cis-retinoic acid isomerase
3706	15119	RAI4	13-cis-4-oxo-retinoic acid isomerase
3707	15078	RAtn	Retinoate transport, nuclear
3708	15120	RAtn3	13-cis-retinoic acid transport, nuclear
3709	119	RBFK	riboflavin kinase
3710	255	RBK	ribokinase
3711	54	RBK_D	D-ribulokinase
3712	19568	RBTt	ribitol transport via passive diffusion
3713	11011	RDH1	retinol dehydrogenase (all-trans)
3714	11015	RDH1a	retinol dehydrogenase (all-trans,NADPH)
3715	11013	RDH2	retinol dehydrogenase (9-cis,NADH)
3716	11016	RDH2a	retinol dehydrogenase (9-cis,NADPH)
3717	11014	RDH3	retinol dehydrogenase (11-cis,NADH)
3718	11017	RDH3a	retinol dehydrogenase (11-cis,NADPH)
3719	15154	RDH4	retinol dehydrogenase (13-cis,NADH)
3720	15062	RETFA	retinol acyltransferase
3721	15091	RETFAt	fatty acid retinol efflux
3722	15112	RETFAt1	fatty acid retinol efflux (9-cis)
3723	15111	RETFAt2	fatty acid retinol efflux (11-cis)
3724	15071	RETH	retinyl ester hydrolase
3725	15102	RETH1	retinyl ester hydrolase (9-cis)
3726	15104	RETH1e	retinyl ester hydrolase (9-cis), extracellular
3727	15109	RETH2	retinyl ester hydrolase (11-cis)
3728	15110	RETH2e	retinyl ester hydrolase (11-cis), extracellular
3729	15069	RETHe	retinyl ester hydrolase, extracellular
3730	15100	RETI1	retinol isomerase (11-cis)
3731	15101	RETI2	retinol isomerase (9-cis)
3732	19519	RETI3	retinol isomerase (13-cis)
3733	15087	RETNCOA	Retinoyl CoA formation
3734	15092	RETNGLCt	retinoyl glucuronide efflux
3735	20310	RETNGLCt2	retinoyl glucuronide efflux (13-cis)
3736	20312	RETNGLCt2r	retinoyl glucuronide efflux (13-cis) from ER
3737	20311	RETNGLCtr	retinoyl glucuronide efflux from ER
3738	15113	RETNt	retinoic acid transport
3739	20313	RETNtr	retinoic acid transport in ER
3740	20314	RETNtr2	retinoic acid transport in ER (13-cis)
3741	10968	REt	Retinol transport via facilitated diffusion
3742	9512	RIBFLVt3	riboflavin transport (ATP dependent)
3743	19566	RIBt	ribose transport via diffusion
3744	1554	RIBt2	ribose transport in via proton symporter
3745	423	RNDR1	ribonucleoside-diphosphate reductase (ADP)
3746	424	RNDR2	ribonucleoside-diphosphate reductase (GDP)
3747	425	RNDR3	ribonucleoside-diphosphate reductase (CDP)
3748	426	RNDR4	ribonucleoside-diphosphate reductase (UDP)

Column	Reaction #	Abbreviation	Reaction Name
3749	144	RNMK	ribosylnicotinamide kinase
3750	281	RPE	ribulose 5-phosphate 3-epimerase
3751	280	RPI	ribose-5-phosphate isomerase
3752	14299	RTOT1	R total flux
3753	14325	RTOT2	R total flux
3754	14334	RTOT3	R total flux
3755	14341	RTOT4	R total flux
3756	14349	RTOT5	R total flux
3757	14351	RTOT6	R total flux
3758	14269	RTOTAL2CRNCPT1	carnitine fatty-acyl transferase
3759	14272	RTOTAL2CRNCPT2	R group transport into the mitochondria
3760	14275	RTOTAL2CRNt	R group transport into the mitochondria
3761	14270	RTOTAL3CRNCPT1	carnitine fatty-acyl transferase
3762	14273	RTOTAL3CRNCPT2	R group transport into the mitochondria
3763	14276	RTOTAL3CRNt	R group transport into the mitochondria
3764	14267	RTOTALCRNCPT1	carnitine fatty-acyl transferase
3765	14271	RTOTALCRNCPT2	R group transport into the mitochondria
3766	14274	RTOTALCRNt	R group transport into the mitochondria
3767	14326	RTOT_2	R total flux 2 position
3768	14327	RTOT_3	R total flux 3 position
3769	20325	Rtotaltl	fatty acid intracellular transport
3770	20326	Rtotaltp	fatty acid intracellular transport
3771	11393	S23T2g	beta-galactoside alpha-2,3-sialyltransferase (core 2)
3772	11407	S23T3g	beta-galactoside alpha-2,3-sialyltransferase (complex N-glycan)
3773	11520	S23T4g	beta-galactoside alpha-2,3-sialyltransferase
3774	8573	S23Tg	beta-galactoside alpha-2,3-sialyltransferase (T antigen)
3775	7767	S26Tg	beta-galactoside alpha-2,6-sialyltransferase
3776	15053	S2L2FN2M2MASNt	s2l2fn2m2masn transport, Golgi to extracellular
3777	15049	S2L2FN2M2MASNtly	s2l2fn2m2masn transport, extracellular to lysosome
3778	15050	S2L2N2M2MASNtly	s2l2n2m2masn transport, extracellular to lysosome
3779	11573	S2T1g	chondroitin 2-sulfotransferase, Golgi
3780	11578	S2T2g	chondroitin 2-sulfotransferase, Golgi
3781	11607	S2T3g	uronyl 2-sulfotransferase, Golgi
3782	11629	S2T4g	uronyl 2-sulfotransferase, Golgi
3783	11733	S2TASE1ly	iduronate-2-sulfatase, lysosomal
3784	11734	S2TASE2ly	iduronate-2-sulfatase, lysosomal
3785	14415	S2TASE3ly	iduronate-2-sulfatase, lysosomal
3786	14433	S2TASE4ly	glucuronate-2-sulfatase, lysosomal
3787	14434	S2TASE5ly	glucuronate-2-sulfatase, lysosomal
3788	11678	S3T1g	heparin-glucosamine 3-O-sulfotransferase
3789	11679	S3T2g	heparin-glucosamine 3-O-sulfotransferase
3790	11680	S3T3g	heparin-glucosamine 3-O-sulfotransferase
3791	14402	S3TASE1ly	N-acetylglucosamine-3-sulfatase, lysosomal
3792	14401	S3TASE2ly	N-acetylglucosamine-3-sulfatase, lysosomal
3793	11768	S3TASE3ly	N-acetylglucosamine-3-sulfatase, lysosomal
3794	11564	S4T1g	chondroitin 4-sulfotransferase, Golgi apparatus
3795	11567	S4T2g	chondroitin 4-sulfotransferase, Golgi apparatus
3796	11596	S4T3g	chondroitin 4-sulfotransferase, Golgi apparatus
3797	11600	S4T4g	chondroitin 4-sulfotransferase, Golgi apparatus
3798	11601	S4T5g	chondroitin 4-sulfotransferase, Golgi apparatus
3799	11606	S4T6g	chondroitin 4-sulfotransferase, Golgi apparatus
3800	14404	S4TASE1ly	N-acetylgalactosamine-4-sulfatase, lysosomal
3801	14407	S4TASE2ly	N-acetylgalactosamine-4-sulfatase, lysosomal
3802	14411	S4TASE3ly	N-acetylgalactosamine-4-sulfatase, lysosomal
3803	14439	S4TASE4ly	N-acetylgalactosamine-4-sulfatase, lysosomal

Column	Reaction #	Abbreviation	Reaction Name
3804	14440	S4TASE5ly	N-acetylgalactosamine-4-sulfatase, lysosomal
3805	11466	S6T10g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3806	11467	S6T11g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3807	11468	S6T12g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3808	11469	S6T13g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3809	11470	S6T14g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3810	11471	S6T15g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3811	11525	S6T16g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3812	11529	S6T17g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3813	11531	S6T18g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3814	11569	S6T19g	chondroitin 6-sulfotransferase, Golgi apparatus
3815	11428	S6T1g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3816	11572	S6T20g	chondroitin 6-sulfotransferase, Golgi apparatus
3817	11577	S6T21g	chondroitin 6-sulfotransferase, Golgi apparatus
3818	11593	S6T22g	chondroitin 6-sulfotransferase, Golgi apparatus
3819	11597	S6T23g	chondroitin 6-sulfotransferase, Golgi apparatus
3820	11602	S6T24g	chondroitin 6-sulfotransferase, Golgi apparatus
3821	11630	S6T25g	heparan sulfate 6-sulfotransferase, Golgi apparatus
3822	11431	S6T2g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3823	11433	S6T3g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3824	11438	S6T4g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3825	11461	S6T5g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3826	11462	S6T6g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3827	11463	S6T7g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3828	11464	S6T8g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3829	11465	S6T9g	galactose/N-acetylglucosamine 6-O-sulfotransferase, Golgi apparatus
3830	14459	S6TASE10ly	galactose-6-sulfate sulfatase, lysosomal
3831	14461	S6TASE11ly	N-acetylglucosamine-6-sulfatase, lysosomal
3832	14465	S6TASE12ly	N-acetylglucosamine-6-sulfatase, lysosomal
3833	14477	S6TASE13ly	N-acetylglucosamine-6-sulfatase, lysosomal
3834	14478	S6TASE14ly	N-acetylglucosamine-6-sulfatase, lysosomal
3835	14479	S6TASE15ly	N-acetylglucosamine-6-sulfatase, lysosomal
3836	14480	S6TASE16ly	N-acetylglucosamine-6-sulfatase, lysosomal
3837	14481	S6TASE17ly	N-acetylglucosamine-6-sulfatase, lysosomal
3838	14482	S6TASE18ly	N-acetylglucosamine-6-sulfatase, lysosomal
3839	14483	S6TASE19ly	N-acetylglucosamine-6-sulfatase, lysosomal
3840	14389	S6TASE1ly	N-acetylglucosamine-6-sulfatase, lysosomal
3841	14484	S6TASE20ly	N-acetylglucosamine-6-sulfatase, lysosomal

Column	Reaction #	Abbreviation	Reaction Name
3842	14485	S6TASE21ly	N-acetylglucosamine-6-sulfatase, lysosomal
3843	14519	S6TASE22ly	galactose-6-sulfate sulfatase, lysosomal
3844	14521	S6TASE23ly	N-acetylglucosamine-6-sulfatase, lysosomal
3845	14522	S6TASE24ly	N-acetylglucosamine-6-sulfatase, lysosomal
3846	14523	S6TASE25ly	galactose-6-sulfate sulfatase, lysosomal
3847	14524	S6TASE26ly	N-acetylglucosamine-6-sulfatase, lysosomal
3848	14393	S6TASE2ly	N-acetylglucosamine-6-sulfatase, lysosomal
3849	14394	S6TASE3ly	N-acetylglucosamine-6-sulfatase, lysosomal
3850	14419	S6TASE4ly	N-acetylglucosamine-6-sulfatase, lysosomal
3851	14423	S6TASE5ly	N-acetylglucosamine-6-sulfatase, lysosomal
3852	14429	S6TASE6ly	N-acetylglucosamine-6-sulfatase, lysosomal
3853	14435	S6TASE7ly	N-acetylglucosamine-6-sulfatase, lysosomal
3854	14441	S6TASE8ly	N-acetylglucosamine-6-sulfatase, lysosomal
3855	14442	S6TASE9ly	N-acetylglucosamine-6-sulfatase, lysosomal
3856	10882	SACCD3m	saccharopine dehydrogenase (NADP, L-lysine forming), mitochondrial
3857	10883	SACCD4m	saccharopine dehydrogenase (NAD, L-glutamate forming), mitochondrial
3858	2866	SADT	sulfate adenyltransferase
3859	12100	SALMCOM	S-Adenosyl-L-methionine:catechol O-methyltransferase
3860	11919	SALMCOM2	S-Adenosyl-L-methionine:catechol O-methyltransferase
3861	9355	SAMHISTA	S-Adenosyl-L-methionine:histamine N-tele-methyltransferase
3862	9935	SARCOXp	sarcosine oxidase, peroxisomal
3863	14628	SARCStex	Sarcosine transport (extracellular to cytosol)
3864	14646	SARCStm	Sarcosine transport (mitochondrial)
3865	14638	SARCStp	Sarcosine transport (peroxisomal)
3866	9728	SARDHm	Sarcosine dehydrogenase (m)
3867	5555	SBPP1er	sphingoid base-phosphate phosphatase (sphinganine 1-phosphatase), endoplasmic reticulum
3868	11192	SBPP3er	sphingoid base-phosphate phosphatase (sphinganine 1-phosphatase), endoplasmic reticulum
3869	2050	SBTD_D2	D-sorbitol dehydrogenase (D-fructose producing)
3870	3355	SBTR	D-sorbitol reductase
3871	13147	SCP21x	Sterol carrier protein 2
3872	13148	SCP22x	Sterol carrier protein 2
3873	13935	SCP2x	peroxisomal thiolase 2
3874	13964	SCP3x	peroxisomal thiolase 2
3875	9702	SCPx	peroxisomal thiolase 2
3876	10019	SEAHCYSHYD	Se-Adenosylselenohomocysteine hydrolase
3877	11513	SEAHCYStn	Se-adenosyl-seleno-L-homocysteine nuclear transport
3878	11512	SEASMETtn	Se-adenosyl-seleno-L-methionine nuclear transport
3879	10023	SELADT	selenate adenyltransferase
3880	10025	SELCYSLY	selenocysteine lyase
3881	20665	SELCYSLY2	selenocysteine lyase
3882	10017	SELCYSTGL	selanocystathionine g-lyase
3883	10018	SELCYSTS	selanocystathionine beta-synthase
3884	10022	SELMETAT	selenomethionine adenyltransferase
3885	2456	SELNPS	Selenophosphate synthase
3886	12164	SELt4_3	selenate transport via sodium symport
3887	11835	SERALANaEx	L-alanine/L-serine Na-dependent exchange (Ser-L in)
3888	11853	SERASNNaEx	L-serine/L-asparagine Na-dependent exchange (Ser-L in)
3889	11840	SERCYSNaEx	L-serine/L-cysteine Na-dependent exchange (Ser-L in)
3890	11794	SERDGLNexR	D-Serine/Glutamine reversible exchange
3891	11793	SERDGLYexR	D-Serine/Glycine reversible exchange
3892	11851	SERGLNNaEx	L-serine/L-glutamine Na-dependent exchange (Ser-L in)

Column	Reaction #	Abbreviation	Reaction Name
3893	11792	SERGLNexR	L-Serine/Glutamine reversible exchange
3894	11791	SERGLYexR	L-Serine/Glycine reversible exchange
3895	13491	SERHL	L-Serine hydro-lyase
3896	20496	SERLYSNaex	Serine/Lysine Na-dependent exchange (Ser in)
3897	1878	SERPT	serine C-palmitoyltransferase
3898	11842	SERTHRNaEx	L-serine/L-threonine Na-dependent exchange (Ser-L in)
3899	3430	SERt4	L-serine via sodium symport
3900	11923	SERtN1	Serine transport (Na, H coupled)
3901	14769	SERtp	L-serine transport, peroxisomal
3902	2374	SFGTH	S-Formylglutathione hydralase
3903	20134	SGALSIDEtg	sgalside_hs intracellular transport
3904	20133	SGALSIDEtl	sgalside_hs intracellular transport
3905	11268	SGPL11r	Sphingosine-1-phosphate lyase 1
3906	19742	SGPL12r	Sphingosine-1-phosphate lyase
3907	8434	SIAASE	sialidase
3908	14458	SIAASE2ly	sialidase, lysosomal
3909	14517	SIAASE3ly	sialidase, lysosomal
3910	14518	SIAASE4ly	sialidase, lysosomal
3911	8543	SIAASEly	sialidase, lysosomal
3912	11083	SIAT4Bg	Beta-galactoside alpha-2,3-sialyltransferase, Golgi apparatus
3913	11096	SIAT9g	Lactosylceramide alpha-2,3-sialyltransferase, Golgi apparatus
3914	2395	SLCBK1	sphingolipid long chain base kinase (sphinganine)
3915	14569	SLDt	L-sulfolactate transport (cytosol to extracellular)
3916	8555	SLDx	L-sulfolactate dehydrogenase (NAD+)
3917	14568	SLDxm	L-sulfolactate dehydrogenase (NAD+), mitochondrial
3918	11279	SMPD3g	sphingomyelin phosphodiesterase 3, neutral membrane (neutral sphingomyelinase II)
3919	11159	SMPD3l	sphingomyelin phosphodiesterase 3, neutral membrane (neutral sphingomyelinase II)
3920	20875	SMPD4	sphingomyelinase
3921	11396	SMS	Sphingomyelin synthase (homo sapiens)
3922	12373	SO4CLtex2	sulfate transport via chloride countertransport (2:1)
3923	12361	SO4HCOtex	sulfate transport via bicarbonate countertransport
3924	12370	SO4OXAtex2	sulfate transport via oxalate countertransport (2:1)
3925	12165	SO4t4_2	sulfate transport via sodium symport
3926	12162	SO4t4_3	sulfate transport via sodium symport
3927	14309	SOAT11	sterol O-acyltransferase (acyl-Coenzyme A: cholesterol acyltransferase) 1
3928	14310	SOAT11r	sterol O-acyltransferase (acyl-Coenzyme A: cholesterol acyltransferase) 1
3929	14328	SOAT12	sterol O-acyltransferase (acyl-Coenzyme A: cholesterol acyltransferase) 1
3930	14329	SOAT12r	sterol O-acyltransferase (acyl-Coenzyme A: cholesterol acyltransferase) 1
3931	20876	SPC_HSt	sphingosylphosphorylcholine transport (diffusion)
3932	20204	SPH1Pte	sph1p transport
3933	20205	SPH1Ptr	sph1p intracellular transport
3934	19743	SPHGPtr	sphinganine intracellular transport
3935	19728	SPHINGStl	sphingosine intracellular transport
3936	19727	SPHINGStr	sphingosine intracellular transport
3937	11162	SPHK21c	sphingosine kinase 2
3938	19741	SPHMDAc	sphingomyelin deacylase
3939	20125	SPHMYLNtg	sphingomyelin intracellular transport
3940	20124	SPHMYLNtl	sphingomyelin intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
3941	19729	SPHS1Pte	sphingosine-1-phosphate transport
3942	20206	SPHS1Ptr	sphingosine-1-phosphate transport
3943	11295	SPMDOX	Spermidine:(acceptor) oxidoreductase
3944	312	SPMS	spermidine synthase
3945	2518	SPODM	superoxide dismutase
3946	13662	SPODMe	superoxide dismutase, extracellular
3947	4915	SPODMm	superoxide dismutase
3948	13671	SPODMn	superoxide dismutase, nuclear
3949	13669	SPODMx	superoxide dismutase, peroxisome
3950	11638	SPR	sepiapterin reductase
3951	1342	SPRMS	spermine synthase
3952	14586	SPRn	sepiapterin reductase, nuclear
3953	14005	SPTix	serine-pyruvate aminotransferase (irreversible), peroxisomal
3954	2011	SQLEr	Squalene epoxidase, endoplasmic reticular (NADP)
3955	9744	SQLSr	Squalene synthase
3956	20866	SR5AR2r	3-oxo-5-alpha-steroid 4-dehydrogenase
3957	9965	SR5ARr	3-oxo-5-alpha-steroid 4-dehydrogenase
3958	9611	SRTN23OX	5-Hydroxytryptamine:oxygen 2,3-dioxygenase (indole-decyclizing)
3959	9607	SRTNACT	Acetyl-CoA:aralkylamine N-acetyltransferase
3960	9613	SRTNMTX	S-Adenosyl-L-methionine:amine N-methyltransferase (srtn)
3961	12189	SRTNt6(2)r	Serotonin reversible transport in via sodium symport/potassium antiport (1:2)
3962	12191	SRTNtu	Serotonin uniport
3963	10873	SSALxm	succinate-semialdehyde dehydrogenase (NAD) reversible (mitochondrial)
3964	11126	ST3GAL21g	CMP-N-acetylneuraminate-beta-galactosamide-alpha-2,3-sialyltransferase, Golgi apparatus
3965	11129	ST3GAL22g	CMP-N-acetylneuraminate-beta-galactosamide-alpha-2,3-sialyltransferase, Golgi apparatus
3966	11130	ST3GAL23g	CMP-N-acetylneuraminate-beta-galactosamide-alpha-2,3-sialyltransferase, Golgi apparatus
3967	14597	ST3GAL31g	ST3 beta-galactoside alpha-2,3-sialyltransferase 3
3968	14624	ST3GAL61g	Type 2 lactosamine alpha-2,3-sialyltransferase
3969	14641	ST3GAL62g	Type 2 lactosamine alpha-2,3-sialyltransferase
3970	11104	ST6GALNAC21	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3971	11105	ST6GALNAC22	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3972	11107	ST6GALNAC23	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3973	11108	ST6GALNAC24	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3974	11109	ST6GALNAC25	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3975	11110	ST6GALNAC26	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3976	11111	ST6GALNAC27	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3977	11112	ST6GALNAC28	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 2
3978	11119	ST6GALNAC31	Alpha-N-acetylgalactosaminide alpha-2,6-sialyltransferase 3

Column	Reaction #	Abbreviation	Reaction Name
3979	11400	ST6GALNAC61	sialyltransferase 7 ((alpha-N-acetylneuraminyl 2,3-betagalactosyl-1,3)-N-acetyl galactosaminide alpha-2,6-sialyltransferase) F
3980	11125	ST6GALNAC62	sialyltransferase 7 ((alpha-N-acetylneuraminyl 2,3-betagalactosyl-1,3)-N-acetyl galactosaminide alpha-2,6-sialyltransferase) F
3981	11085	ST8SIA11	Beta-galactoside alpha-2,3-sialyltransferase
3982	11086	ST8SIA12	Beta-galactoside alpha-2,3-sialyltransferase
3983	11087	ST8SIA51g	Beta-galactoside alpha-2,3-sialyltransferase
3984	11113	ST8SIA52g	Beta-galactoside alpha-2,3-sialyltransferase
3985	11114	ST8SIA53g	Beta-galactoside alpha-2,3-sialyltransferase
3986	11115	ST8SIA54g	Beta-galactoside alpha-2,3-sialyltransferase
3987	11291	ST8SIA55g	Beta-galactoside alpha-2,3-sialyltransferase
3988	14625	ST8SIA56g	Alpha-2,8-sialyltransferase 8E
3989	19033	STCOAtx	fatty acid intracellular transport
3990	19103	STRDNCCPT1	carnitine O-palmitoyltransferase
3991	19122	STRDNCCPT2	carnitine transferase
3992	19084	STRDNCCRnt	transport into the mitochondria (carnitine)
3993	12466	STRDNCT	fatty acid transport via diffusion
3994	19779	STS1	Steryl-sulfatase
3995	12072	STS1r	Steryl-sulfatase
3996	19780	STS2	Steryl-sulfatase
3997	12073	STS2r	Steryl-sulfatase
3998	19782	STS3	Steryl-sulfatase
3999	19781	STS3r	Steryl-sulfatase
4000	19783	STS4	Steryl-sulfatase
4001	19784	STS4r	Steryl-sulfatase
4002	5321	SUCCt2m	succinate transport, mitochondrial
4003	12167	SUCCt4_2	succinate transport via sodium symport
4004	12173	SUCCt4_3	succinate transport via sodium symport
4005	15152	SUCCtp	succinate transporter, peroxisome
4006	1176	SUCD1m	succinate dehydrogenase
4007	510	SUCOAS1m	Succinate--CoA ligase (GDP-forming)
4008	2761	SUCOASm	Succinate--CoA ligase (ADP-forming)
4009	1547	SUCRe	sucrose hydrolyzing enzyme, extracellular
4010	18717	SULFOX	sulfite oxidase
4011	11034	T2M26DCOAHLM	trans-2-Methyl-5-isopropylhexa-2,5-dienoyl-CoA hydro-lyase (m)
4012	11045	T2M26DCOAHLX	trans-2-Methyl-5-isopropylhexa-2,5-dienoyl-CoA hydro-lyase (x)
4013	14224	T4HCINNMFM	4-hydroxycinnamate formation
4014	11049	T4HCINNOX	4-Coumarate:oxygen oxidoreductase
4015	19625	TAGAT-Dt	D-tagatose uptake via diffusion
4016	282	TALA	transaldolase
4017	11945	TAURt4(2)r	taurine transport (sodium symport) (2:1)
4018	11517	TAURtcx	taurine transport (sodium symport) (cytosol to peroxisome)
4019	19707	TAXOLte	xenobiotic transport
4020	12268	TCHOLAt	taurocholate transport via bicarbonate countertransport
4021	12619	TCHOLAt2	taurocholate transport via sodium cotransport
4022	12668	TCHOLAt3	ABC bile acid transporter
4023	19655	TCHOLAtc	bile acid intracellular transport
4024	19656	TCHOLAtx	bile acid intracellular transport
4025	20244	TCYNTt	Thiocyanate transport via diffusion (cytosol to extracellular)
4026	20245	TCYNTm	Thiocyanate transport via diffusion (mitochondrial)
4027	19657	TDCHOLAtc	bile acid intracellular transport

Column	Reaction #	Abbreviation	Reaction Name
4028	19658	TDCHOLAtx	bile acid intracellular transport
4029	9482	TDP	thiamine triphosphatase
4030	2492	TDPDRE	dTDP-4-dehydrorhamnose 3,5-epimerase
4031	2493	TDPDRR	dTDP-4-dehydrorhamnose reductase
4032	2490	TDPGDH	dTDPglucose 4,6-dehydratase
4033	14062	TDPm	thiamine triphosphatase, mitochondrial
4034	19039	TETHEX3COAtx	fatty acid intracellular transport
4035	12472	TETHEX3t	fatty acid transport via diffusion
4036	19046	TETPENT3COAtx	fatty acid intracellular transport
4037	19108	TETPENT3CPT1	carnitine O-palmitoyltransferase
4038	19127	TETPENT3CPT2	carnitine transferase
4039	19090	TETPENT3CRNt	transport into the mitochondria (carnitine)
4040	12471	TETPENT3t	fatty acid transport via diffusion
4041	19044	TETPENT6COAtx	fatty acid intracellular transport
4042	19109	TETPENT6CPT1	carnitine O-palmitoyltransferase
4043	19128	TETPENT6CPT2	carnitine transferase
4044	19089	TETPENT6CRNt	transport into the mitochondria (carnitine)
4045	12468	TETPENT6t	fatty acid transport via diffusion
4046	19042	TETTET6COAtx	fatty acid intracellular transport
4047	19104	TETTET6CPT1	carnitine O-palmitoyltransferase
4048	19123	TETTET6CPT2	carnitine transferase
4049	19085	TETTET6CRNt	transport into the mitochondria (carnitine)
4050	12469	TETTET6t	fatty acid transport via diffusion
4051	14584	THBPT4ACAMDASE	Tetrahydrobiopterin-4a-carbinolamine dehydratase
4052	14183	THCHOLSTOICtm	lipid, flip-flop intracellular transport
4053	5323	THD1m	NAD(P) transhydrogenase
4054	14837	THFt2	tetrahydrofolate transport via anion exchange
4055	14903	THFtl	5,6,7,8-Tetrahydrofolate transport, diffusion, lysosomal
4056	1418	THFtm	5,6,7,8-Tetrahydrofolate transport, diffusion, mitochondrial
4057	7883	THMDt4	thymidine transport in via sodium symport
4058	12145	THMDt5	thymidine transport (1:2 Na/Thymd cotransport)
4059	14011	THMMPt4	Thiamine monophosphate transport in via anion antiport
4060	14065	THMMPtm	Thiamine monophosphate transport, mitochondrial
4061	3625	THMP	thiamin phosphatase
4062	14069	THMPptm	Thiamine diphosphate transport in via anion antiport, mitochondria
4063	9481	THMTP	thiamine-triphosphatase
4064	14070	THMTPt	Thiamine triphosphate transport in via anion antiport
4065	14009	THMt2m	Thiamine transport in via proton symport, mitochondrial
4066	14016	THMt3	Thiamine transport in via proton antiport
4067	12939	THP2Ctp	2,3,4,5-Tetrahydropyridine-2-carboxylate transport, peroxisomal
4068	11839	THRALANaEx	L-alanine/L-threonine Na-dependent exchange (Thr-L in)
4069	11861	THRASNNaEx	L-threonine/L-asparagine Na-dependent exchange (Thr-L in)
4070	11845	THRCYSNaEx	L-cysteine/L-threonine Na-dependent exchange (Thr-L in)
4071	324	THRD_L	L-threonine deaminase
4072	11859	THRGLNNaEx	L-threonine/L-glutamine Na-dependent exchange (Thr-L in)
4073	11800	THRGLNexR	L-threonine/glycine reversible exchange
4074	11799	THRGLYexR	L-threonine/glycine reversible exchange
4075	365	THRS	threonine synthase
4076	11843	THRSERNaEx	L-serine/L-threonine Na-dependent exchange (Thr-L in)
4077	2476	THRt4	L-threonine via sodium symport
4078	4021	THYMDt1	thymd transport
4079	12577	THYMDtl	thymidine facilitated transport from lysosome
4080	4011	THYMDtm	thymd transport

Column	Reaction #	Abbreviation	Reaction Name
4081	12551	THYMt	thymine reversible transport via facilitated diffusion
4082	12272	THYOXt	T4 transport via bicarbonate countertransport
4083	12489	THYOXt2	T4 transport via facilitated diffusion
4084	12123	THYPX	thyroid peroxidase
4085	283	TKT1	transketolase
4086	4641	TKT2	transketolase
4087	10964	TMABADH	4-trimethylaminobutyraldehyde dehydrogenase
4088	432	TMDK1	thymidine kinase (ATP:thymidine)
4089	4532	TMDK1m	thymidine kinase (ATP:thymidine)
4090	3871	TMDPK	thiamine diphosphokinase
4091	435	TMDPP	thymidine phosphorylase
4092	3352	TMDPPK	thiamine-diphosphate kinase
4093	431	TMDS	thymidylate synthase
4094	10959	TMLYSOX	trimethyllysine dioxygenase
4095	14817	TMLYSter	trimethyl-L-lysine transport (ER to cytosol)
4096	19040	TMNDNCCOAtx	fatty acid intracellular transport
4097	19105	TMNDNCCPT1	carnitine O-palmitoyltransferase
4098	19124	TMNDNCCPT2	carnitine transferase
4099	19086	TMNDNCCRNt	transport into the mitochondria (carnitine)
4100	12465	TMNDNCt	fatty acid transport via diffusion
4101	19708	TOLBUTAMIDEte	xenobiotic transport
4102	276	TPI	triose-phosphate isomerase
4103	2817	TRDR	thioredoxin reductase (NADPH)
4104	10104	TRDR2	Thioredoxin (ubiquinone 10) reductase (NADPH)
4105	10105	TRDR3	Thioredoxin (ubiquinone 10) reductase (NADH)
4106	1436	TRDRm	thioredoxin reductase (NADPH)
4107	695	TREH	alpha,alpha-trehalase
4108	2462	TREHe	alpha,alpha-trehalase
4109	19422	TRIODTHYSUFt	Triiodothyronine sulfate transport (diffusion)
4110	12107	TRIODTHYSULT	Triiodothyronine Sulfotransferase
4111	12273	TRIODTHYt	T3 transport via bicarbonate countertransport
4112	12490	TRIODTHYt2	T3 transport via facilitated diffusion
4113	11870	TRIOK	trio kinase
4114	14583	TRPHYDRO2	L-Tryptophan,tetrahydrobiopterin:oxygen oxidoreductase (5-hydroxylating)
4115	1389	TRPO2	L-Tryptophan:oxygen 2,3-oxidoreductase (deacylizing)
4116	12567	TRPt	L-tryptophan transport
4117	11951	TRPt4	L-tryptophan transport in via sodium symport
4118	9585	TRYPTAOX	Tryptamine:oxygen oxidoreductase(deaminating)(flavin-containing)
4119	11319	TS3	Tachysterol 3 formation
4120	19768	TSTSTERONEGLCte	glucuronidated compound transport
4121	19759	TSTSTERONEGLCtr	glucuronidated compound transport
4122	20335	TSTSTERONESULT	testosterone sulfotransferase
4123	20337	TSTSTERONESte	sulfonated testosterone transport
4124	14984	TSTSTERONEtr	testosterone intracellular transport
4125	12163	TSULt4_3	thiosulfate transport via sodium symport
4126	1924	TTDCAt	Tetradecanoate (n-C14:0) transport in via uniport
4127	20625	TTDCPT1	carnitine O-palmitoyltransferase
4128	20626	TTDCPT2	carnitine transferase
4129	20624	TTDCRNt	transport into the mitochondria (carnitine)
4130	20860	TXA2te	thromboxane A2 transport
4131	20332	TXA2tr	thromboxane A2 intracellular transport
4132	10004	TXASr	Thromboxane-A synthase
4133	19423	TYMSFt	Tyramine O-sulfate transport (diffusion)
4134	12104	TYMSULT	Tyramine Sulfotransferase

Column	Reaction #	Abbreviation	Reaction Name
4135	14587	TYR3MO2	tyrosine 3-monoxygenase
4136	9390	TYRASE	Tyrosinase
4137	11604	TYRCBOX	L-Tyrosine carboxy-lyase
4138	10557	TYRDOPO	Tyrosine:dopa oxidase
4139	10559	TYRDOPO3	Tyrosine:dopa oxidase (dopaquinone producing 2)
4140	11608	TYROXDAc	Tyramine:oxygen oxidoreductase(deaminating)(flavin-containing) (cytosol)
4141	331	TYRTA	tyrosine transaminase
4142	1402	TYRTAm	tyrosine transaminase, mitochondrial
4143	12566	TYRt	L-tyrosine transport
4144	11950	TYRt4	L-tyrosine transport in via sodium symport
4145	10594	UAG2EMAi	UDP-N-acetyl-D-glucosamine 2-epimerase (Hydrolysis)
4146	9866	UAG4E	UDP-N-acetylglucosamine 4-epimerase
4147	10650	UAGALDP	UDP-N-acetylgalactosamine diphosphorylase
4148	476	UAGDP	UDP-N-acetylglucosamine diphosphorylase
4149	20329	UDPACGALtl	udpacgal intracellular transport
4150	7309	UDPDLPT_L	UDPglucose:dolichyl-phosphate beta-D-glucosyltransferase (liver)
4151	7310	UDPDLPT_U	UDPglucose:dolichyl-phosphate beta-D-glucosyltransferase (uterus)
4152	13426	UDPG1P	UDPglucuronate uridine-monophosphohydrolase
4153	200	UDPG4E	UDPglucose 4-epimerase
4154	12142	UDPGALtg	UDP-Gal Golgi transport via CMP antiport
4155	3196	UDPGD	UDPglucose 6-dehydrogenase
4156	12158	UDPGLCAtcr	UDPGlcA endoplasmic reticulum transport via UMP antiport
4157	15034	UDPGLCAtg	UDPGlcA Golgi transport via UMP antiport
4158	15035	UDPGLCter	UDP-Glc endoplasmic reticulum transport via CMP antiport
4159	12143	UDPGLCtg	UDP-Glc Golgi transport via CMP antiport
4160	13743	UDPGLCDcg	UDP-D-glucuronate decarboxylase, Golgi apparatus
4161	10141	UDPGNP	UDPglucuronate uridine-diphosphohydrolase
4162	10072	UDPGP	UDPglucose pyrophosphohydrolase
4163	15036	UDPXYLter	UDP-Xyl endoplasmic reticular transport via CMP antiport
4164	13272	UDPXYLtg	UDP-Xyl Golgi transport via CMP antiport
4165	20330	UDPtl	udp intracellular transport
4166	9892	UGALGTg	UDPgalactose:D-glucose 4-beta-D-galactosyltransferase, Golgi apparatus
4167	12161	UGALNACter	UDP-GalNAc endoplasmic reticulum transport via CMP antiport
4168	12154	UGALNACtg	UDP-GalNAc Golgi transport via CMP antiport
4169	11260	UGCG	Ceramide glucosyltransferase
4170	12157	UGLCNACtg	UDP-GlcNAc Golgi transport via CMP antiport
4171	1171	UGLT	UDPglucose--hexose-1-phosphate uridylyltransferase
4172	19785	UGT1A10r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4173	11781	UGT1A1r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4174	11784	UGT1A2r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4175	11782	UGT1A3r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4176	11785	UGT1A4r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4177	11786	UGT1A5r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4178	15118	UGT1A5r2	UDP-glucuronosyltransferase 1-10 precursor, microsomal (13-cis)
4179	11788	UGT1A6r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4180	11789	UGT1A7r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4181	11790	UGT1A8r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4182	14981	UGT1A9r	UDP-glucuronosyltransferase 1-10 precursor, microsomal
4183	2813	UMPK	UMP kinase

Column	Reaction #	Abbreviation	Reaction Name
4184	10235	UMPK2	UMP kinase (CTP)
4185	10234	UMPK2n	UMP kinase (CTP),nuclear
4186	10238	UMPK3	UMP kinase (UTP)
4187	10237	UMPK3n	UMP kinase (UTP),nuclear
4188	10239	UMPK4	UMP kinase (GTP)
4189	10240	UMPK4n	UMP kinase (GTP),nuclear
4190	10242	UMPK5	UMP kinase (dATP)
4191	10241	UMPK5n	UMP kinase (dATP),nuclear
4192	10245	UMPK6	UMP kinase (dCTP)
4193	10244	UMPK6n	UMP kinase (dCTP),nuclear
4194	10246	UMPK7	UMP kinase (dGTP)
4195	10247	UMPK7n	UMP kinase (dGTP),nuclear
4196	20307	UMPKm	UMP kinase (mitochondrial, ATP)
4197	1446	UMPKn	UMP kinase, nuclear
4198	2921	UNK2	2-keto-4-methylthiobutyrate transamination
4199	3645	UNK3	2-keto-4-methylthiobutyrate transamination
4200	5	UPP3S	uroporphyrinogen-III synthase
4201	6	UPPDC1	uroporphyrinogen decarboxylase (uroporphyrinogen III)
4202	9786	UPPN	b-ureidopropionase
4203	19376	URATEt	urate export from cytosol
4204	19375	URATEtx	urate export from peroxisome
4205	12549	URAt	uracil transport via facilitated diffusion
4206	2874	URCN	urocanase
4207	2092	UREAt	Urea transport via facilitate diffusion
4208	11966	UREAt5	urea, water cotransport
4209	14363	UREAtm	Urea transport via diffusion
4210	20322	URIDK2m	uridylyate kinase (dUMP), mitochondrial
4211	436	URIK1	uridine kinase (ATP:Uridine)
4212	12553	URIt	uridine facilitated transport in cytosol
4213	7884	URIt4	uridine transport in via sodium symport
4214	12089	URIt5	uridine transport in via sodium symport (1:2)
4215	10282	UROLACer	uronolactonase, endoplasmic reticulum
4216	14150	UTPtn	UTP diffusion in nucleus
4217	12570	Uritl	uridine facilitated transport from lysosome
4218	12149	Uritm	uridine facilitated transport in mitochondria
4219	19531	Uritn	uridine transport in nucleus
4220	19094	VACCCPT1	carnitine O-palmitoyltransferase
4221	19113	VACCCPT2	carnitine transferase
4222	19075	VACCCRNt	transport into the mitochondria (carnitine)
4223	12449	VACCT	fatty acid transport via diffusion
4224	320	VALTA	valine transaminase
4225	3805	VALTAm	valine transaminase, mitochondrial
4226	11954	VALt4	L-valine transport in via sodium symport
4227	12593	VALt5m	Valine reversible mitochondrial transport
4228	11926	VALtec	L-valine transport via diffusion (extracellular to cytosol)
4229	11317	VD3	Vitamin D3 formation
4230	11326	VITD2Hm	Vitamin D-25-hydroxylase (D2)
4231	11332	VITD2t	Vitamin D2 release
4232	11335	VITD2tm	Vitamin D2 transport from mitochondria
4233	11323	VITD3Hm	Vitamin D-25-hydroxylase (D3)
4234	11321	VITD3t	Vitamin D3 release
4235	20308	VITD3t2	Vitamin D3 uptake
4236	11336	VITD3tm	Vitamin D3 transport from mitochondria
4237	20309	VITD3tm3	Vitamin D3 transport in mitochondria
4238	13910	VLCS2p	Very-long-chain-fatty-acid-CoA ligase
4239	13911	VLCS2r	Very-long-chain-fatty-acid-CoA ligase

Column	Reaction #	Abbreviation	Reaction Name
4240	13901	VLCSp	Very-long-chain-fatty-acid-CoA ligase
4241	13903	VLCSr	Very-long-chain-fatty-acid-CoA ligase
4242	19720	WHDDCAte	xenobiotic transport
4243	19721	WHHDCate	xenobiotic transport
4244	20132	WHTSTSTERONEte	omega hydroxy testosterone transport
4245	19722	WHTTDCAte	xenobiotic transport
4246	9843	XANDp	xanthine dehydrogenase, peroxisomal
4247	14089	XANtx	xanthine diffusion in peroxisome
4248	12077	XAO2x	xanthine oxidase
4249	12080	XAOx	xanthine oxidase,peroxisomal
4250	19642	XOL27OHtm	27 hydroxy cholesterol transport
4251	14181	XOL7AH2tm	lipid, flip-flop intracellular transport
4252	14182	XOL7AH2tr	lipid, flip-flop intracellular transport
4253	14180	XOL7AONEtr	lipid, flip-flop intracellular transport
4254	12681	XOLDIOLONEt	lipid, flip-flop intracellular transport
4255	14177	XOLDIOLONEtm	lipid, flip-flop intracellular transport
4256	14714	XOLEST2te	cholesterol ester transporter
4257	14713	XOLESTte	cholesterol ester transporter
4258	19643	XOLTRI24tc	24 trihydroxy cholesterol transport
4259	19644	XOLTRI24te	24 trihydroxy cholesterol transport
4260	19645	XOLTRI25tc	25 trihydroxy cholesterol transport
4261	19646	XOLTRI25te	25 trihydroxy cholesterol transport
4262	19647	XOLTRI27tc	27 trihydroxy cholesterol transport
4263	19648	XOLTRI27te	27 trihydroxy cholesterol transport
4264	14179	XOLTRIOLtm	lipid, flip-flop intracellular transport
4265	14178	XOLTRIOLtr	lipid, flip-flop intracellular transport
4266	14927	XSERTg	Xyl-L-Ser (protein) transport from endoplasmic reticulum to Golgi apparatus
4267	254	XYLK	xylulokinase
4268	10156	XYLTD_Dr	xylitol dehydrogenase (D-xyulose-forming)
4269	11551	XYLTer	UDP-xylose:protein xylosyltransferase, endoplasmic reticulum
4270	2052	XYLTt	Xylitol transport via passive diffusion
4271	10155	XYLUR	xylulose reductase
4272	1556	XYLt	D-xylose reversible transport
4273	14922	XYLtly	Xylose efflux from lysosome
4274	11412	YVITEt	gamma-Tocopherol (Vit. E) transport
4275	14773	biomass_mm_1_no_glygl	Mouse Biomass 1 (no glycogen)