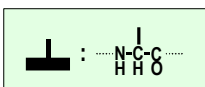


# Mutation Mass Shifts (1/2: Nominal Mass)

RNA Codon List		Stop: UAA UAG UGA	GGU GGC GGA GGG	GCU GCC GCA GCG	UCU UCC UCA UCG AGU AGC	CCU CCC CCA CCG	GUU GUC GUA GUG	ACU ACC ACA ACG	UGU UGC	AUU AUC AUA	UUA UUG CUU CUC CUA CUG	AAU AAC	GAU GAC	CAA CAG	AAA AAG	GAA GAG	AUG	CAU CAC	UUU UUC	CGU CGC CGA CGG AGA AGG	UAU UAC	UGG	
Full Name	3-letter Code	Empirical Formula (Residual)	Nom. Mass (Res.)																				
				Gly G	Ala A	Ser S	Pro P	Val V	Thr T	Cys C	Ile I	Leu L	Asn N	Asp D	Gln Q	Lys K	Glu E	Met M	His H	Phe F	Arg R	Tyr Y	Trp W
				57	71	87	97	99	101	103	113	113	114	115	128	128	129	131	137	147	156	163	186
Glycine	Gly	C2H3NO	57	0	14	30	40	42	44	46	56	56	57	58	71	71	72	74	80	90	99	106	129
Alanine	Ala	C3H5NO	71	-14	0	16	26	28	30	32	42	42	43	44	57	57	58	60	66	76	85	92	115
Serine	Ser	C3H5NO2	87	-30	-16	0	10	12	14	16	26	26	27	28	41	41	42	44	50	60	69	76	99
Proline	Pro	C5H7NO	97	-40	-26	-10	0	2	4	6	16	16	17	18	31	31	32	34	40	50	59	66	89
Valine	Val	C5H9NO	99	-42	-28	-12	-2	0	2	4	14	14	15	16	29	29	30	32	38	48	57	64	87
Threonine	Thr	C4H7NO2	101	-44	-30	-14	-4	-2	0	2	12	12	13	14	27	27	28	30	36	46	55	62	85
Cysteine	Cys	C3H5NOS	103	-46	-32	-16	-6	-4	-2	0	10	10	11	12	25	25	26	28	34	44	53	60	83
Isoleucine	Ile	C6H11NO	113	-56	-42	-26	-16	-14	-12	-10	0	0	1	2	15	15	16	18	24	34	43	50	73
Leucine	Leu	C6H11NO	113	-56	-42	-26	-16	-14	-12	-10	0	0	1	2	15	15	16	18	24	34	43	50	73
Asparagine	Asn	C4H6N2O2	114	-57	-43	-27	-17	-15	-13	-11	-1	-1	0	1	14	14	15	17	23	33	42	49	72
Aspartic acid	Asp	C4H5NO3	115	-58	-44	-28	-18	-16	-14	-12	-2	-2	-1	0	13	13	14	16	22	32	41	48	71
Glutamine	Gln	C5H8N2O2	128	-71	-57	-41	-31	-29	-27	-25	-15	-15	-14	-13	0	0	1	3	9	19	28	35	58
Lysine	Lys	C6H12N2O	128	-71	-57	-41	-31	-29	-27	-25	-15	-15	-14	-13	0	0	1	3	9	19	28	35	58
Glutamic acid	Glu	C5H7NO3	129	-72	-58	-42	-32	-30	-28	-26	-16	-16	-15	-14	-1	-1	0	2	8	18	27	34	57
Methionine	Met	C5H9NOS	131	-74	-60	-44	-34	-32	-30	-28	-18	-18	-17	-16	-3	-3	-2	0	6	16	25	32	55
Histidine	His	C6H7N3O	137	-80	-66	-50	-40	-38	-36	-34	-24	-24	-23	-22	-9	-9	-8	-6	0	10	19	26	49
Phenylalanine	Phe	C9H9NO	147	-90	-76	-60	-50	-48	-46	-44	-34	-34	-33	-32	-19	-19	-18	-16	-10	0	9	16	39
Arginine	Arg	C6H12N4O	156	-99	-85	-69	-59	-57	-55	-53	-43	-43	-42	-41	-28	-28	-27	-25	-19	-9	0	7	30
Tyrosine	Tyr	C9H9NO2	163	-106	-92	-76	-66	-64	-62	-60	-50	-50	-49	-48	-35	-35	-34	-32	-26	-16	-7	0	23
Tryptophan	Trp	C11H10N2O	186	-129	-115	-99	-89	-87	-85	-83	-73	-73	-72	-71	-58	-58	-57	-55	-49	-39	-30	-23	0



	Nominal Mass
H	1
C	12
N	14
O	16
S	32

|Δm|: 1,...,10
|Δm|: 11,...,20
|Δm|: 21,...,30
|Δm|: 31,...,40
|Δm|: 41,...,50
|Δm|: 51,...,70
|Δm|: 71,...,100
|Δm|: 101,....

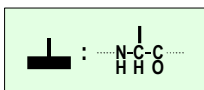
Residues DOWN the left indicate the EXPECTED residues.  
Residues ACROSS the top indicate the MUTANT residues.

Ref: <[http://en.wikipedia.org/wiki/Genetic\\_code](http://en.wikipedia.org/wiki/Genetic_code)>, <<http://prowl.rockefeller.edu/aainfo/mutation.html>>



# Mutation Mass Shifts (2/2: Monoisotopic Mass)

Full Name	3-letter Code	Empirical Formula (Residual)	Monoiso. Mass (Res.)	RNA Codon List																			
				GGU	GCU	UCU	CCU	GUU	ACU	UUU	UAU	CGU	UUA	AAU	GAU	CAA	AAA	GAA	AUG	CAU	UUU	CGU	UUA
				G	A	S	P	V	T	C	I	L	N	D	Q	K	E	M	H	F	R	Y	W
				57.02146	71.03711	87.03203	97.05276	99.06841	101.04768	103.00918	113.08406	113.08406	114.04293	115.02694	128.05858	128.09496	129.04259	131.04048	137.05891	147.06841	156.10111	163.06333	186.07931
Glycine	Gly	C2H3NO	57.02146	0.0000	14.0157	30.0106	40.0313	42.0470	44.0262	45.9877	56.0626	56.0626	57.0215	58.0055	71.0371	71.0735	72.0211	74.0190	80.0374	90.0470	99.0796	106.0419	129.0578
Alanine	Ala	C3H5NO	71.03711	-14.0157	0.0000	15.9949	26.0157	28.0313	30.0106	31.9721	42.0470	42.0470	43.0058	43.9898	57.0215	57.0578	58.0055	60.0034	66.0218	76.0313	85.0640	92.0262	115.0422
Serine	Ser	C3H5NO2	87.03203	-30.0106	-15.9949	0.0000	10.0207	12.0364	14.0157	15.9772	26.0520	26.0520	27.0109	27.9949	41.0265	41.0629	42.0106	44.0085	50.0269	60.0364	69.0691	76.0313	99.0473
Proline	Pro	C5H7NO	97.05276	-40.0313	-26.0157	-10.0207	0.0000	2.0157	3.9949	5.9564	16.0313	16.0313	16.9902	17.9742	31.0058	31.0422	31.9898	33.9877	40.0061	50.0157	59.0483	66.0106	89.0265
Valine	Val	C5H9NO	99.06841	-42.0470	-28.0313	-12.0364	-2.0157	0.0000	1.9793	3.9408	14.0157	14.0157	14.9745	15.9585	28.9902	29.0265	29.9742	31.9721	37.9905	48.0000	57.0327	63.9949	87.0109
Threonine	Thr	C4H7NO2	101.04768	-44.0262	-30.0106	-14.0157	-3.9949	-1.9793	0.0000	1.9615	12.0364	12.0364	12.9952	13.9793	27.0109	27.0473	27.9949	29.9928	36.0112	46.0207	55.0534	62.0157	85.0316
Cysteine	Cys	C3H5NOS	103.00918	-45.9877	-31.9721	-15.9772	-5.9564	-3.9408	-1.9615	0.0000	10.0749	10.0749	11.0337	12.0178	25.0494	25.0858	26.0334	28.0313	34.0497	44.0592	53.0919	60.0541	83.0701
Isoleucine	Ile	C6H11NO	113.08406	-56.0626	-42.0470	-26.0520	-16.0313	-14.0157	-12.0364	-10.0749	0.0000	0.0000	0.9589	1.9429	14.9745	15.0109	15.9585	17.9564	23.9748	33.9843	43.0170	49.9793	72.9952
Leucine	Leu	C6H11NO	113.08406	-56.0626	-42.0470	-26.0520	-16.0313	-14.0157	-12.0364	-10.0749	0.0000	0.0000	0.9589	1.9429	14.9745	15.0109	15.9585	17.9564	23.9748	33.9843	43.0170	49.9793	72.9952
Asparagine	Asn	C4H6N2O2	114.04293	-57.0215	-43.0058	-27.0109	-16.9902	-14.9745	-12.9952	-11.0337	-0.9589	-0.9589	0.0000	0.9840	14.0157	14.0520	14.9997	16.9976	23.0160	33.0255	42.0582	49.0204	72.0364
Aspartic acid	Asp	C4H5NO3	115.02694	-58.0055	-43.9898	-27.9949	-17.9742	-15.9585	-13.9793	-12.0178	-1.9429	-1.9429	-0.9840	0.0000	13.0316	13.0680	14.0157	16.0135	22.0320	32.0415	41.0742	48.0364	71.0524
Glutamine	Gln	C5H8N2O2	128.05858	-71.0371	-57.0215	-41.0265	-31.0058	-28.9902	-27.0109	-25.0494	-14.9745	-14.9745	-14.0157	-13.0316	0.0000	0.0364	0.9840	2.9819	9.0003	19.0098	28.0425	35.0048	58.0207
Lysine	Lys	C6H12N2O	128.09496	-71.0735	-57.0578	-41.0629	-31.0422	-29.0265	-27.0473	-25.0858	-15.0109	-15.0109	-14.0520	-13.0680	-0.0364	0.0000	0.9476	2.9455	8.9639	18.9735	28.0061	34.9684	57.9843
Glutamic acid	Glu	C5H7NO3	129.04259	-72.0211	-58.0055	-42.0106	-31.9898	-29.9742	-27.9949	-26.0334	-15.9585	-15.9585	-14.9997	-14.0157	-0.9840	-0.9476	0.0000	1.9979	8.0163	18.0258	27.0585	34.0207	57.0367
Methionine	Met	C5H9NOS	131.04048	-74.0190	-60.0034	-44.0085	-33.9877	-31.9721	-29.9928	-28.0313	-17.9564	-17.9564	-16.9976	-16.0135	-2.9819	-2.9455	-1.9979	0.0000	6.0184	16.0279	25.0606	32.0228	55.0388
Histidine	His	C6H7N3O	137.05891	-80.0374	-66.0218	-50.0269	-40.0061	-37.9905	-36.0112	-34.0497	-23.9748	-23.9748	-23.0160	-22.0320	-9.0003	-8.9639	-8.0163	-6.0184	0.0000	10.0095	19.0422	26.0044	49.0204
Phenylalanine	Phe	C9H9NO	147.06841	-90.0470	-76.0313	-60.0364	-50.0157	-48.0000	-46.0207	-44.0592	-33.9843	-33.9843	-33.0255	-32.0415	-19.0098	-18.9735	-18.0258	-16.0279	-10.0095	0.0000	9.0327	15.9949	39.0109
Arginine	Arg	C6H12N4O	156.10111	-99.0796	-85.0640	-69.0691	-59.0483	-57.0327	-55.0534	-53.0919	-43.0170	-43.0170	-42.0582	-41.0742	-28.0425	-28.0061	-27.0585	-25.0606	-19.0422	-9.0327	0.0000	6.9622	29.9782
Tyrosine	Tyr	C9H9NO2	163.06333	-106.0419	-92.0262	-76.0313	-66.0106	-63.9949	-62.0157	-60.0541	-49.9793	-49.9793	-49.0204	-48.0364	-35.0048	-34.9684	-34.0207	-32.0228	-26.0044	-15.9949	-6.9622	0.0000	23.0160
Tryptophan	Trp	C11H10N2O	186.07931	-129.0578	-115.0422	-99.0473	-89.0265	-87.0109	-85.0316	-83.0701	-72.9952	-72.9952	-72.0364	-71.0524	-58.0207	-57.9843	-57.0367	-55.0388	-49.0204	-39.0109	-29.9782	-23.0160	0.0000



	Monoisotopic Mass
H	1.00782504
C	12.00000000
N	14.00307400
O	15.99491460
S	31.97207100

0 <  Δm  < 10	10 <  Δm  < 20	20 <  Δm  < 30	30 <  Δm  < 40	40 <  Δm  < 50	50 <  Δm  < 70	70 <  Δm  < 100	100 <  Δm
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Residues DOWN the left indicate the EXPECTED residues.  
Residues ACROSS the top indicate the MUTANT residues.

