

Nuklidens masse

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1 Data

Data for nuklidernes masse er hentet på <http://amdc.in2p3.fr/masstable/Ame2003/mass.mas03>.

Visse af nuklidernes masse er estimerede værdier. Dette er markeret med en * i tabellen.

De øvrige data er fundet i Databogen (DATABOG fysik kemi, F&K Forlaget 2007).

2 Tabellen

Z angiver nuklidets protontal (atomnummer)

N angiver nuklidets neutrontal

A angiver nuklidets nukleontal (tidl. massetal)

3 Omregning mellem masse og energi

De tilhørende energier kan beregnes ved

$$E = m \cdot c^2 \quad (1)$$

3.1 Specielle værdier

1 u	$= 1.66053873 \cdot 10^{-27} \text{ kg}$	$\approx 1.661 \cdot 10^{-27} \text{ kg}$	
1 MeV	$= 1.602176462 \cdot 10^{-13} \text{ J}$	$\approx 1.602 \cdot 10^{-13} \text{ J}$	$= 0.1602 \text{ pJ}$
1 pJ	$= 6.24150648 \text{ MeV}$	$\approx 6.242 \text{ MeV}$	
$1 \text{ u} \cdot c^2$	$= 931.494043 \text{ MeV}$	$\approx 931.5 \text{ MeV}$	
$1 \text{ u} \cdot c^2$	$= 1.492419 \cdot 10^{-10} \text{ J}$	$\approx 1.492 \cdot 10^{-10} \text{ J}$	$= 149.2 \text{ pJ}$
m_e	$= 9.1093826 \cdot 10^{-31} \text{ kg}$	$= 5.4857990946 \cdot 10^{-4} \text{ u}$	$= 0.00054857990946 \text{ u}$
m_p	$= 1.67262192369 \cdot 10^{-27} \text{ kg}$	$= 1.007276466621 \text{ u}$	
m_n	$= 1.67492749804 \cdot 10^{-27} \text{ kg}$	$= 1.00866491595 \text{ u}$	

4 Beregning af kernemasse og massedefekt

I det følgende ses der bort fra elektronernes bindingsenergi.

4.1 Kernemasse

Kernens masse kan tilnærmelsesvist beregnes ved at trække elektronernes masse af nuklidets masse.

$$m_{\text{kern}} \approx m_{\text{nuklid}} - Z \cdot m_e \quad (2)$$

4.2 Massedefekt

Massedefekten kan tilnærmes med

$$m_{\text{defekt}} \approx Z \cdot m_H + N \cdot m_n - m_{\text{nuklid}} \quad (3)$$

hvor m_H er nuklidmassen for ${}^1_1\text{H}$. Kernens bindingsenergi kan beregnes ud fra massedefekten

$$E_b = m_{\text{defekt}} \cdot c^2 \quad (4)$$

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Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
0	1	1	n	1.00866491574	7	5	12	N	12.018613197	11	8	19	Na	19.013877499
1	0	1	H	1.00782503207	7	6	13	N	13.005738609	11	9	20	Na	20.007351328
1	1	2	H	2.01410177785	7	7	14	N	14.00307400478	11	10	21	Na	20.997655206
1	2	3	H	3.01604927767	7	8	15	N	15.00010889823	11	11	22	Na	21.994436425
1	3	4	H	4.027806424	7	9	16	N	16.006101658	11	12	23	Na	22.98976928087
1	4	5	H	5.035311488	7	10	17	N	17.008450261	11	13	24	Na	23.990962782
1	5	6	H	6.044942594	7	11	18	N	18.014078959	11	14	25	Na	24.989953968
1	6	7	H	7.052749*	7	12	19	N	19.017028697	11	15	26	Na	25.992633000
2	1	3	He	3.01602931914	7	13	20	N	20.023365807	11	16	27	Na	26.994076788
2	2	4	He	4.00260325415	7	14	21	N	21.027108240	11	17	28	Na	27.998938000
2	3	5	He	5.012223624	7	15	22	N	22.034394934	11	18	29	Na	29.002861000
2	4	6	He	6.018889124	7	16	23	N	23.041220*	11	19	30	Na	30.008976000
2	5	7	He	7.028020618	7	17	24	N	24.051040*	11	20	31	Na	31.013585452
2	6	8	He	8.033921897	7	18	25	N	25.060660*	11	21	32	Na	32.020466560
2	7	9	He	9.043950286	8	4	12	O	12.034404895	11	22	33	Na	33.026719756
2	8	10	He	10.052398837	8	5	13	O	13.024812213	11	23	34	Na	34.035170*
3	0	3	Li	3.030775*	8	6	14	O	14.008596250	11	24	35	Na	35.042493*
3	1	4	Li	4.027185558	8	7	15	O	15.003065617	11	25	36	Na	36.051480*
3	2	5	Li	5.012537800	8	8	16	O	15.99491461956	11	26	37	Na	37.059340*
3	3	6	Li	6.015122794	8	9	17	O	16.999131703	12	7	19	Mg	19.035470000
3	4	7	Li	7.016004548	8	10	18	O	17.999161001	12	8	20	Mg	20.018862545
3	5	8	Li	8.022487362	8	11	19	O	19.003580130	12	9	21	Mg	21.011712910
3	6	9	Li	9.026789505	8	12	20	O	20.004076742	12	10	22	Mg	21.999573843
3	7	10	Li	10.035481259	8	13	21	O	21.008655886	12	11	23	Mg	22.994123669
3	8	11	Li	11.043797715	8	14	22	O	22.009966947	12	12	24	Mg	23.985041699
3	9	12	Li	12.053780*	8	15	23	O	23.015687659	12	13	25	Mg	24.985836917
4	1	5	Be	5.040790*	8	16	24	O	24.020472917	12	14	26	Mg	25.982592929
4	2	6	Be	6.019726317	8	17	25	O	25.029460*	12	15	27	Mg	26.984340585
4	3	7	Be	7.016929828	8	18	26	O	26.038340*	12	16	28	Mg	27.983876825
4	4	8	Be	8.005305103	8	19	27	O	27.048260*	12	17	29	Mg	28.988600000
4	5	9	Be	9.012182201	8	20	28	O	28.057810*	12	18	30	Mg	29.990434000
4	6	10	Be	10.013533818	9	5	14	F	14.035060*	12	19	31	Mg	30.996546000
4	7	11	Be	11.021657749	9	6	15	F	15.018009103	12	20	32	Mg	31.998975000
4	8	12	Be	12.026920737	9	7	16	F	16.011465724	12	21	33	Mg	33.005254000
4	9	13	Be	13.035693007	9	8	17	F	17.002095237	12	22	34	Mg	34.009456424
4	10	14	Be	14.042892920	9	9	18	F	18.000937956	12	23	35	Mg	35.017340*
4	11	15	Be	15.053460*	9	10	19	F	18.998403224	12	24	36	Mg	36.023000*
4	12	16	Be	16.061920*	9	11	20	F	19.999981315	12	25	37	Mg	37.031400*
5	1	6	B	6.046810*	9	12	21	F	20.999948951	12	26	38	Mg	38.037570*
5	2	7	B	7.029917901	9	13	22	F	22.002998815	12	27	39	Mg	39.046772*
5	3	8	B	8.024607233	9	14	23	F	23.003574631	12	28	40	Mg	40.053930*
5	4	9	B	9.013328782	9	15	24	F	24.008115485	13	8	21	Al	21.028040*
5	5	10	B	10.012936992	9	16	25	F	25.012101747	13	9	22	Al	22.019520*
5	6	11	B	11.009305406	9	17	26	F	26.019615555	13	10	23	Al	23.007267432
5	7	12	B	12.014352104	9	18	27	F	27.026760086	13	11	24	Al	23.999938865
5	8	13	B	13.017780217	9	19	28	F	28.035670*	13	12	25	Al	24.990428095
5	9	14	B	14.025404009	9	20	29	F	29.043260*	13	13	26	Al	25.986891692
5	10	15	B	15.031103021	9	21	30	F	30.052500*	13	14	27	Al	26.981538627
5	11	16	B	16.039808829	9	22	31	F	31.060429*	13	15	28	Al	27.981910306
5	12	17	B	17.046989906	10	6	16	Ne	16.025761262	13	16	29	Al	28.980445046
5	13	18	B	18.056170*	10	7	17	Ne	17.017671504	13	17	30	Al	29.982960256
5	14	19	B	19.063730*	10	8	18	Ne	18.005708213	13	18	31	Al	30.983946619
6	2	8	C	8.037675025	10	9	19	Ne	19.001880248	13	19	32	Al	31.988124489
6	3	9	C	9.031036689	10	10	20	Ne	19.99244017542	13	20	33	Al	32.990843336
6	4	10	C	10.016853228	10	11	21	Ne	20.993846684	13	21	34	Al	33.996851837
6	5	11	C	11.011433613	10	12	22	Ne	21.991385113	13	22	35	Al	34.999860235
6	6	12	C	12.0000000	10	13	23	Ne	22.994466904	13	23	36	Al	36.006207204
6	7	13	C	13.00335483778	10	14	24	Ne	23.993610779	13	24	37	Al	37.010677820
6	8	14	C	14.00324198870	10	15	25	Ne	24.997736888	13	25	38	Al	38.017231021
6	9	15	C	15.010599256	10	16	26	Ne	26.000461206	13	26	39	Al	39.022970000
6	10	16	C	16.014701252	10	17	27	Ne	27.007589903	13	27	40	Al	40.031450*
6	11	17	C	17.022586116	10	18	28	Ne	28.012071575	13	28	41	Al	41.038330*
6	12	18	C	18.026759354	10	19	29	Ne	29.019385933	13	29	42	Al	42.046890*
6	13	19	C	19.034805018	10	20	30	Ne	30.024801045	14	8	22	Si	22.034530*
6	14	20	C	20.040319754	10	21	31	Ne	31.033110*	14	9	23	Si	23.025520*
6	15	21	C	21.049340*	10	22	32	Ne	32.040020*	14	10	24	Si	24.011545616
6	16	22	C	22.057200*	10	23	33	Ne	33.049380*	14	11	25	Si	25.004105574
7	3	10	N	10.041653674	10	24	34	Ne	34.057028*	14	12	26	Si	25.992329921
7	4	11	N	11.026090956	11	7	18	Na	18.025969000	14	13	27	Si	26.986704905

Z	N	A	Sy	Masse
14	14	28	Si	27.97692653246
14	15	29	Si	28.976494700
14	16	30	Si	29.973770171
14	17	31	Si	30.975363227
14	18	32	Si	31.974148082
14	19	33	Si	32.978000220
14	20	34	Si	33.978575524
14	21	35	Si	34.984583575
14	22	36	Si	35.986599477
14	23	37	Si	36.992936080
14	24	38	Si	37.995633601
14	25	39	Si	39.002070013
14	26	40	Si	40.005869121
14	27	41	Si	41.014560000
14	28	42	Si	42.019790*
14	29	43	Si	43.028660*
14	30	44	Si	44.035260*
15	9	24	P	24.034350*
15	10	25	P	25.020260*
15	11	26	P	26.011780*
15	12	27	P	26.999230236
15	13	28	P	27.992314761
15	14	29	P	28.981800606
15	15	30	P	29.978313789
15	16	31	P	30.973761629
15	17	32	P	31.973907274
15	18	33	P	32.971725543
15	19	34	P	33.973636257
15	20	35	P	34.973314117
15	21	36	P	35.978259680
15	22	37	P	36.979608946
15	23	38	P	37.984156827
15	24	39	P	38.986179475
15	25	40	P	39.991296951
15	26	41	P	40.994335435
15	27	42	P	42.001007913
15	28	43	P	43.006190000
15	29	44	P	44.012990*
15	30	45	P	45.019220*
15	31	46	P	46.027380*
16	10	26	S	26.027880*
16	11	27	S	27.018833*
16	12	28	S	28.004372763
16	13	29	S	28.996608049
16	14	30	S	29.984903249
16	15	31	S	30.979554728
16	16	32	S	31.972070999
16	17	33	S	32.971458759
16	18	34	S	33.967866902
16	19	35	S	34.969032161
16	20	36	S	35.967080760
16	21	37	S	36.971125567
16	22	38	S	37.971163317
16	23	39	S	38.975134306
16	24	40	S	39.975451728
16	25	41	S	40.979582149
16	26	42	S	41.981022419
16	27	43	S	42.987154790
16	28	44	S	43.990213390
16	29	45	S	44.996508112
16	30	46	S	46.000750*
16	31	47	S	47.008590*
16	32	48	S	48.014170*
16	33	49	S	49.023619*
17	11	28	Cl	28.028510*
17	12	29	Cl	29.014110*
17	13	30	Cl	30.004770*
17	14	31	Cl	30.992413086
17	15	32	Cl	31.985689901

Z	N	A	Sy	Masse
17	16	33	Cl	32.977451887
17	17	34	Cl	33.973762819
17	18	35	Cl	34.968852682
17	19	36	Cl	35.968306981
17	20	37	Cl	36.965902591
17	21	38	Cl	37.968010425
17	22	39	Cl	38.968008164
17	23	40	Cl	39.970415472
17	24	41	Cl	40.970684525
17	25	42	Cl	41.973254804
17	26	43	Cl	42.974054403
17	27	44	Cl	43.978281071
17	28	45	Cl	44.980286886
17	29	46	Cl	45.984210040
17	30	47	Cl	46.988710*
17	31	48	Cl	47.994950*
17	32	49	Cl	49.000320*
17	33	50	Cl	50.007840*
17	34	51	Cl	51.014490*
18	12	30	Ar	30.021560*
18	13	31	Ar	31.012123*
18	14	32	Ar	31.997637984
18	15	33	Ar	32.989925709
18	16	34	Ar	33.980271244
18	17	35	Ar	34.975257585
18	18	36	Ar	35.967545105
18	19	37	Ar	36.966776320
18	20	38	Ar	37.962732394
18	21	39	Ar	38.964313231
18	22	40	Ar	39.96238312251
18	23	41	Ar	40.964500611
18	24	42	Ar	41.963045736
18	25	43	Ar	42.965636056
18	26	44	Ar	43.964924033
18	27	45	Ar	44.968039956
18	28	46	Ar	45.968094129
18	29	47	Ar	46.972186792
18	30	48	Ar	47.974540*
18	31	49	Ar	48.980520*
18	32	50	Ar	49.984430*
18	33	51	Ar	50.991630*
18	34	52	Ar	51.996780*
18	35	53	Ar	53.004940*
19	13	32	K	32.021920*
19	14	33	K	33.007260*
19	15	34	K	33.998410*
19	16	35	K	34.988009692
19	17	36	K	35.981292235
19	18	37	K	36.973375889
19	19	38	K	37.969081184
19	20	39	K	38.963706679
19	21	40	K	39.963998475
19	22	41	K	40.961825762
19	23	42	K	41.962402810
19	24	43	K	42.960715540
19	25	44	K	43.961556804
19	26	45	K	44.960699493
19	27	46	K	45.961976864
19	28	47	K	46.961678473
19	29	48	K	47.965513535
19	30	49	K	48.967450928
19	31	50	K	49.972783355
19	32	51	K	50.976380*
19	33	52	K	51.982610*
19	34	53	K	52.987120*
19	35	54	K	53.994200*
19	36	55	K	54.999710*
20	14	34	Ca	34.014120*
20	15	35	Ca	35.004940*

Z	N	A	Sy	Masse
20	16	36	Ca	35.993087063
20	17	37	Ca	36.985870269
20	18	38	Ca	37.976318452
20	19	39	Ca	38.970719725
20	20	40	Ca	39.962590983
20	21	41	Ca	40.962278062
20	22	42	Ca	41.958618014
20	23	43	Ca	42.958766628
20	24	44	Ca	43.955481754
20	25	45	Ca	44.956186566
20	26	46	Ca	45.953692587
20	27	47	Ca	46.954546006
20	28	48	Ca	47.952534177
20	29	49	Ca	48.955674148
20	30	50	Ca	49.957518962
20	31	51	Ca	50.961499214
20	32	52	Ca	51.965100000
20	33	53	Ca	52.970050*
20	34	54	Ca	53.974350*
20	35	55	Ca	54.980550*
20	36	56	Ca	55.985570*
20	37	57	Ca	56.992356*
21	15	36	Sc	36.014920*
21	16	37	Sc	37.003050*
21	17	38	Sc	37.994700*
21	18	39	Sc	38.984790002
21	19	40	Sc	39.977967407
21	20	41	Sc	40.969251125
21	21	42	Sc	41.965516429
21	22	43	Sc	42.961150658
21	23	44	Sc	43.959402752
21	24	45	Sc	44.955911909
21	25	46	Sc	45.955171890
21	26	47	Sc	46.952407508
21	27	48	Sc	47.952231468
21	28	49	Sc	48.950023975
21	29	50	Sc	49.952187685
21	30	51	Sc	50.953603368
21	31	52	Sc	51.956675468
21	32	53	Sc	52.959610*
21	33	54	Sc	53.963264561
21	34	55	Sc	54.968243949
21	35	56	Sc	55.972870*
21	36	57	Sc	56.977790*
21	37	58	Sc	57.983710*
21	38	59	Sc	58.989220*
21	39	60	Sc	59.995710*
22	16	38	Ti	38.009770*
22	17	39	Ti	39.001610*
22	18	40	Ti	39.990498838
22	19	41	Ti	40.983145*
22	20	42	Ti	41.973030902
22	21	43	Ti	42.968522499
22	22	44	Ti	43.959690069
22	23	45	Ti	44.958125616
22	24	46	Ti	45.952631555
22	25	47	Ti	46.951763088
22	26	48	Ti	47.947946281
22	27	49	Ti	48.947869982
22	28	50	Ti	49.944791194
22	29	51	Ti	50.946614955
22	30	52	Ti	51.946897311
22	31	53	Ti	52.949727171
22	32	54	Ti	53.951052401
22	33	55	Ti	54.955265056
22	34	56	Ti	55.958199639
22	35	57	Ti	56.963989137
22	36	58	Ti	57.966970*
22	37	59	Ti	58.972930*

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
22	38	60	Ti	59.976760*	25	32	57	Mn	56.938285378	27	48	75	Co	74.968330*
22	39	61	Ti	60.983200*	25	33	58	Mn	57.939981549	28	20	48	Ni	48.019750*
22	40	62	Ti	61.987490*	25	34	59	Mn	58.940440237	28	21	49	Ni	49.009660*
22	41	63	Ti	62.994420*	25	35	60	Mn	59.942911246	28	22	50	Ni	49.995930*
23	17	40	V	40.011090*	25	36	61	Mn	60.944652638	28	23	51	Ni	50.987720*
23	18	41	V	40.999780*	25	37	62	Mn	61.948428220	28	24	52	Ni	51.975680*
23	19	42	V	41.991230*	25	38	63	Mn	62.950239990	28	25	53	Ni	52.968470*
23	20	43	V	42.980650*	25	39	64	Mn	63.954249090	28	26	54	Ni	53.957905495
23	21	44	V	43.974110000	25	40	65	Mn	64.956336065	28	27	55	Ni	54.951330251
23	22	45	V	44.965775808	25	41	66	Mn	65.961080*	28	28	56	Ni	55.942132022
23	23	46	V	45.960200481	25	42	67	Mn	66.964140*	28	29	57	Ni	56.939793526
23	24	47	V	46.954908940	25	43	68	Mn	67.969300*	28	30	58	Ni	57.935342907
23	25	48	V	47.952253707	25	44	69	Mn	68.972840*	28	31	59	Ni	58.934346705
23	26	49	V	48.948516101	26	19	45	Fe	45.014578*	28	32	60	Ni	59.930786372
23	27	50	V	49.947158485	26	20	46	Fe	46.000810*	28	33	61	Ni	60.931056033
23	28	51	V	50.943959507	26	21	47	Fe	46.992890*	28	34	62	Ni	61.928345115
23	29	52	V	51.944775479	26	22	48	Fe	47.980504*	28	35	63	Ni	62.929669374
23	30	53	V	52.944337979	26	23	49	Fe	48.973610*	28	36	64	Ni	63.927965959
23	31	54	V	53.946439854	26	24	50	Fe	49.962988982	28	37	65	Ni	64.930084304
23	32	55	V	54.947233701	26	25	51	Fe	50.956819538	28	38	66	Ni	65.929139334
23	33	56	V	55.950530966	26	26	52	Fe	51.948113875	28	39	67	Ni	66.931569414
23	34	57	V	56.952561432	26	27	53	Fe	52.945307942	28	40	68	Ni	67.931868789
23	35	58	V	57.956834136	26	28	54	Fe	53.939610501	28	41	69	Ni	68.935610269
23	36	59	V	58.960207407	26	29	55	Fe	54.938293357	28	42	70	Ni	69.936500000
23	37	60	V	59.965026862	26	30	56	Fe	55.934937475	28	43	71	Ni	70.940736283
23	38	61	V	60.968480*	26	31	57	Fe	56.935393969	28	44	72	Ni	71.942092682
23	39	62	V	61.973780*	26	32	58	Fe	57.933275558	28	45	73	Ni	72.946470*
23	40	63	V	62.977550*	26	33	59	Fe	58.934875464	28	46	74	Ni	73.948070*
23	41	64	V	63.983470*	26	34	60	Fe	59.934071683	28	47	75	Ni	74.952870*
23	42	65	V	64.987920*	26	35	61	Fe	60.936745281	28	48	76	Ni	75.955330*
24	18	42	Cr	42.006430*	26	36	62	Fe	61.936767442	28	49	77	Ni	76.960550*
24	19	43	Cr	42.997710*	26	37	63	Fe	62.940369091	28	50	78	Ni	77.963180*
24	20	44	Cr	43.985549*	26	38	64	Fe	63.941201265	29	23	52	Cu	51.997180*
24	21	45	Cr	44.979640000	26	39	65	Fe	64.945380270	29	24	53	Cu	52.985550*
24	22	46	Cr	45.968358635	26	40	66	Fe	65.946780638	29	25	54	Cu	53.976710*
24	23	47	Cr	46.962900046	26	41	67	Fe	66.950947244	29	26	55	Cu	54.966050*
24	24	48	Cr	47.954031716	26	42	68	Fe	67.953700000	29	27	56	Cu	55.958560*
24	25	49	Cr	48.951335721	26	43	69	Fe	68.958780*	29	28	57	Cu	56.949211078
24	26	50	Cr	49.946044205	26	44	70	Fe	69.961460*	29	29	58	Cu	57.944538499
24	27	51	Cr	50.944767431	26	45	71	Fe	70.966720*	29	30	59	Cu	58.939498028
24	28	52	Cr	51.940507472	26	46	72	Fe	71.969620*	29	31	60	Cu	59.937365030
24	29	53	Cr	52.940649386	27	20	47	Co	47.011490*	29	32	61	Cu	60.933457821
24	30	54	Cr	53.938880395	27	21	48	Co	48.001760*	29	33	62	Cu	61.932583745
24	31	55	Cr	54.940839672	27	22	49	Co	48.989720*	29	34	63	Cu	62.929597474
24	32	56	Cr	55.940653139	27	23	50	Co	49.981540*	29	35	64	Cu	63.929764183
24	33	57	Cr	56.943613013	27	24	51	Co	50.970720*	29	36	65	Cu	64.927789485
24	34	58	Cr	57.944353129	27	25	52	Co	51.963590*	29	37	66	Cu	65.928868813
24	35	59	Cr	58.948586367	27	26	53	Co	52.954218896	29	38	67	Cu	66.927730314
24	36	60	Cr	59.950076033	27	27	54	Co	53.948459635	29	39	68	Cu	67.929610889
24	37	61	Cr	60.954717204	27	28	55	Co	54.941999029	29	40	69	Cu	68.929429269
24	38	62	Cr	61.956613190	27	29	56	Co	55.939839278	29	41	70	Cu	69.932392343
24	39	63	Cr	62.961860*	27	30	57	Co	56.936291373	29	42	71	Cu	70.932676833
24	40	64	Cr	63.964410*	27	31	58	Co	57.935752814	29	43	72	Cu	71.935820307
24	41	65	Cr	64.970160*	27	32	59	Co	58.933195048	29	44	73	Cu	72.936675282
24	42	66	Cr	65.973380*	27	33	60	Co	59.933817059	29	45	74	Cu	73.939874862
24	43	67	Cr	66.979550*	27	34	61	Co	60.932475763	29	46	75	Cu	74.941900000
25	19	44	Mn	44.006870*	27	35	62	Co	61.934050563	29	47	76	Cu	75.945275026
25	20	45	Mn	44.994510*	27	36	63	Co	62.933611611	29	48	77	Cu	76.947850*
25	21	46	Mn	45.986720*	27	37	64	Co	63.935809908	29	49	78	Cu	77.951960*
25	22	47	Mn	46.976100*	27	38	65	Co	64.936478460	29	50	79	Cu	78.954560*
25	23	48	Mn	47.968520000	27	39	66	Co	65.939762004	29	51	80	Cu	79.960870*
25	24	49	Mn	48.959618005	27	40	67	Co	66.940889529	30	24	54	Zn	53.992950*
25	25	50	Mn	49.954238230	27	41	68	Co	67.944873058	30	25	55	Zn	54.983980*
25	26	51	Mn	50.948210787	27	42	69	Co	68.946320000	30	26	56	Zn	55.972380*
25	27	52	Mn	51.945565464	27	43	70	Co	69.951000000	30	27	57	Zn	56.964788*
25	28	53	Mn	52.941290117	27	44	71	Co	70.952900000	30	28	58	Zn	57.954591555
25	29	54	Mn	53.940358854	27	45	72	Co	71.957810*	30	29	59	Zn	58.949263764
25	30	55	Mn	54.938045141	27	46	73	Co	72.960240*	30	30	60	Zn	59.941827035
25	31	56	Mn	55.938904910	27	47	74	Co	73.965380*	30	31	61	Zn	60.939510635

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
30	32	62	Zn	61.934329764	32	42	74	Ge	73.921177767	34	51	85	Se	84.922245053
30	33	63	Zn	62.933211566	32	43	75	Ge	74.922858948	34	52	86	Se	85.924271579
30	34	64	Zn	63.929142222	32	44	76	Ge	75.921402557	34	53	87	Se	86.928521358
30	35	65	Zn	64.929240984	32	45	77	Ge	76.923548591	34	54	88	Se	87.931423998
30	36	66	Zn	65.926033419	32	46	78	Ge	77.922852739	34	55	89	Se	88.936450*
30	37	67	Zn	66.927127345	32	47	79	Ge	78.925400995	34	56	90	Se	89.939960*
30	38	68	Zn	67.924844154	32	48	80	Ge	79.925372392	34	57	91	Se	90.945960*
30	39	69	Zn	68.926550281	32	49	81	Ge	80.928820467	34	58	92	Se	91.949920*
30	40	70	Zn	69.925319274	32	50	82	Ge	81.929549725	34	59	93	Se	92.956290*
30	41	71	Zn	70.927721599	32	51	83	Ge	82.934620*	34	60	94	Se	93.960490*
30	42	72	Zn	71.926857951	32	52	84	Ge	83.937470*	35	32	67	Br	66.964790*
30	43	73	Zn	72.929779104	32	53	85	Ge	84.943030*	35	33	68	Br	67.958516*
30	44	74	Zn	73.929458609	32	54	86	Ge	85.946490*	35	34	69	Br	68.950106*
30	45	75	Zn	74.932936741	32	55	87	Ge	86.952510*	35	35	70	Br	69.944792*
30	46	76	Zn	75.933293570	32	56	88	Ge	87.956910*	35	36	71	Br	70.938740000
30	47	77	Zn	76.936958967	32	57	89	Ge	88.963830*	35	37	72	Br	71.936644572
30	48	78	Zn	77.938440216	33	27	60	As	59.993130*	35	38	73	Br	72.931691524
30	49	79	Zn	78.942652*	33	28	61	As	60.980620*	35	39	74	Br	73.929891034
30	50	80	Zn	79.944342348	33	29	62	As	61.973200*	35	40	75	Br	74.925776207
30	51	81	Zn	80.950480*	33	30	63	As	62.963690*	35	41	76	Br	75.924541469
30	52	82	Zn	81.954420*	33	31	64	As	63.957572*	35	42	77	Br	76.921379082
30	53	83	Zn	82.961030*	33	32	65	As	64.949564*	35	43	78	Br	77.921145706
31	25	56	Ga	55.994910*	33	33	66	As	65.944710000	35	44	79	Br	78.918337087
31	26	57	Ga	56.982930*	33	34	67	As	66.939186071	35	45	80	Br	79.918529296
31	27	58	Ga	57.974250*	33	35	68	As	67.936769069	35	46	81	Br	80.916290563
31	28	59	Ga	58.963370*	33	36	69	As	68.932273675	35	47	82	Br	81.916804119
31	29	60	Ga	59.957060*	33	37	70	As	69.930924826	35	48	83	Br	82.915180421
31	30	61	Ga	60.949446287	33	38	71	As	70.927112428	35	49	84	Br	83.916478974
31	31	62	Ga	61.944175238	33	39	72	As	71.926752283	35	50	85	Br	84.915608403
31	32	63	Ga	62.939294196	33	40	73	As	72.923824844	35	51	86	Br	85.918797577
31	33	64	Ga	63.936838747	33	41	74	As	73.923928692	35	52	87	Br	86.920711324
31	34	65	Ga	64.932734754	33	42	75	As	74.921596478	35	53	88	Br	87.924065926
31	35	66	Ga	65.931589010	33	43	76	As	75.922394021	35	54	89	Br	88.926385334
31	36	67	Ga	66.928201703	33	44	77	As	76.920647286	35	55	90	Br	89.930627737
31	37	68	Ga	67.927980084	33	45	78	As	77.921827281	35	56	91	Br	90.933968095
31	38	69	Ga	68.925573587	33	46	79	As	78.920947934	35	57	92	Br	91.939258714
31	39	70	Ga	69.926021972	33	47	80	As	79.922533816	35	58	93	Br	92.943050*
31	40	71	Ga	70.924701349	33	48	81	As	80.922132287	35	59	94	Br	93.948680*
31	41	72	Ga	71.926366268	33	49	82	As	81.924504067	35	60	95	Br	94.952870*
31	42	73	Ga	72.925174682	33	50	83	As	82.924980024	35	61	96	Br	95.958530*
31	43	74	Ga	73.926945762	33	51	84	As	83.929058*	35	62	97	Br	96.962800*
31	44	75	Ga	74.926500246	33	52	85	As	84.932020*	36	33	69	Kr	68.965180*
31	45	76	Ga	75.928827626	33	53	86	As	85.936500*	36	34	70	Kr	69.955259*
31	46	77	Ga	76.929154300	33	54	87	As	86.939900*	36	35	71	Kr	70.949625738
31	47	78	Ga	77.931608180	33	55	88	As	87.944940*	36	36	72	Kr	71.942092038
31	48	79	Ga	78.932893260	33	56	89	As	88.949390*	36	37	73	Kr	72.939289195
31	49	80	Ga	79.936515781	33	57	90	As	89.955500*	36	38	74	Kr	73.933084369
31	50	81	Ga	80.937752355	33	58	91	As	90.960430*	36	39	75	Kr	74.930945746
31	51	82	Ga	81.942990*	33	59	92	As	91.966800*	36	40	76	Kr	75.925910078
31	52	83	Ga	82.946980*	34	31	65	Se	64.964660*	36	41	77	Kr	76.924670000
31	53	84	Ga	83.952650*	34	32	66	Se	65.955210*	36	42	78	Kr	77.920364783
31	54	85	Ga	84.957000*	34	33	67	Se	66.950090*	36	43	79	Kr	78.920082431
31	55	86	Ga	85.963120*	34	34	68	Se	67.941798000	36	44	80	Kr	79.916378965
32	26	58	Ge	57.991010*	34	35	69	Se	68.939557817	36	45	81	Kr	80.916592015
32	27	59	Ge	58.981750*	34	36	70	Se	69.933390644	36	46	82	Kr	81.913483600
32	28	60	Ge	59.970190*	34	37	71	Se	70.932241822	36	47	83	Kr	82.914136099
32	29	61	Ge	60.963790*	34	38	72	Se	71.927112352	36	48	84	Kr	83.911506687
32	30	62	Ge	61.954650*	34	39	73	Se	72.926765345	36	49	85	Kr	84.912527331
32	31	63	Ge	62.949640*	34	40	74	Se	73.922476436	36	50	86	Kr	85.910610729
32	32	64	Ge	63.941653000	34	41	75	Se	74.922523368	36	51	87	Kr	86.913354862
32	33	65	Ge	64.939436406	34	42	76	Se	75.919213597	36	52	88	Kr	87.914446969
32	34	66	Ge	65.933843453	34	43	77	Se	76.919914038	36	53	89	Kr	88.917630581
32	35	67	Ge	66.932734070	34	44	78	Se	77.917309090	36	54	90	Kr	89.919516555
32	36	68	Ge	67.928094240	34	45	79	Se	78.918499098	36	55	91	Kr	90.923445215
32	37	69	Ge	68.927964533	34	46	80	Se	79.916521271	36	56	92	Kr	91.926156210
32	38	70	Ge	69.924247381	34	47	81	Se	80.917992474	36	57	93	Kr	92.931274357
32	39	71	Ge	70.924950954	34	48	82	Se	81.916699401	36	58	94	Kr	93.934360*
32	40	72	Ge	71.922075815	34	49	83	Se	82.919118473	36	59	95	Kr	94.939840*
32	41	73	Ge	72.923458945	34	50	84	Se	83.918462354	36	60	96	Kr	95.943070*

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
36	61	97	Kr	96.948560*	39	37	76	Y	75.958450*	41	43	84	Nb	83.933570*
36	62	98	Kr	97.951910*	39	38	77	Y	76.949645*	41	44	85	Nb	84.927912447
36	63	99	Kr	98.957600*	39	39	78	Y	77.943610*	41	45	86	Nb	85.925038326
36	64	100	Kr	99.961140*	39	40	79	Y	78.937351634	41	46	87	Nb	86.920361108
37	34	71	Rb	70.965320*	39	41	80	Y	79.934280000	41	47	88	Nb	87.918332163
37	35	72	Rb	71.959080*	39	42	81	Y	80.929127468	41	48	89	Nb	88.913418245
37	36	73	Rb	72.950561*	39	43	82	Y	81.926792451	41	49	90	Nb	89.911264845
37	37	74	Rb	73.944264751	39	44	83	Y	82.922354243	41	50	91	Nb	90.906996243
37	38	75	Rb	74.938570000	39	45	84	Y	83.920388264	41	51	92	Nb	91.907193888
37	39	76	Rb	75.935072226	39	46	85	Y	84.916433039	41	52	93	Nb	92.906378058
37	40	77	Rb	76.930408000	39	47	86	Y	85.914885576	41	53	94	Nb	93.907283888
37	41	78	Rb	77.928141000	39	48	87	Y	86.910875730	41	54	95	Nb	94.906835792
37	42	79	Rb	78.923989460	39	49	88	Y	87.909501146	41	55	96	Nb	95.908100647
37	43	80	Rb	79.922519250	39	50	89	Y	88.905848295	41	56	97	Nb	96.908098556
37	44	81	Rb	80.918995913	39	51	90	Y	89.907151886	41	57	98	Nb	97.910328412
37	45	82	Rb	81.918208598	39	52	91	Y	90.907304791	41	58	99	Nb	98.911618375
37	46	83	Rb	82.915109701	39	53	92	Y	91.908949143	41	59	100	Nb	99.914181619
37	47	84	Rb	83.914384821	39	54	93	Y	92.909582713	41	60	101	Nb	100.915252025
37	48	85	Rb	84.911789737	39	55	94	Y	93.911595245	41	61	102	Nb	101.918037614
37	49	86	Rb	85.911167419	39	56	95	Y	94.912820621	41	62	103	Nb	102.919143842
37	50	87	Rb	86.909180526	39	57	96	Y	95.915891343	41	63	104	Nb	103.922464701
37	51	88	Rb	87.911315588	39	58	97	Y	96.918133995	41	64	105	Nb	104.923936545
37	52	89	Rb	88.912278016	39	59	98	Y	97.922203020	41	65	106	Nb	105.927970*
37	53	90	Rb	89.914801694	39	60	99	Y	98.924636204	41	66	107	Nb	106.930310*
37	54	91	Rb	90.916536958	39	61	100	Y	99.927756586	41	67	108	Nb	107.934840*
37	55	92	Rb	91.919728900	39	62	101	Y	100.930313850	41	68	109	Nb	108.937630*
37	56	93	Rb	92.922041876	39	63	102	Y	101.933555695	41	69	110	Nb	109.942440*
37	57	94	Rb	93.926404946	39	64	103	Y	102.936730*	41	70	111	Nb	110.945650*
37	58	95	Rb	94.929302889	39	65	104	Y	103.941050*	41	71	112	Nb	111.950830*
37	59	96	Rb	95.934272637	39	66	105	Y	104.944870*	41	72	113	Nb	112.954700*
37	60	97	Rb	96.937351916	39	67	106	Y	105.949790*	42	41	83	Mo	82.948740*
37	61	98	Rb	97.941790668	39	68	107	Y	106.954140*	42	42	84	Mo	83.940090*
37	62	99	Rb	98.945379283	39	69	108	Y	107.959480*	42	43	85	Mo	84.936550*
37	63	100	Rb	99.949870*	40	38	78	Zr	77.955230*	42	44	86	Mo	85.930695904
37	64	101	Rb	100.953196445	40	39	79	Zr	78.949160*	42	45	87	Mo	86.927326502
37	65	102	Rb	101.958870*	40	40	80	Zr	79.940400000	42	46	88	Mo	87.921953241
38	35	73	Sr	72.965970*	40	41	81	Zr	80.937210026	42	47	89	Mo	88.919480009
38	36	74	Sr	73.956310*	40	42	82	Zr	81.931087*	42	48	90	Mo	89.913936896
38	37	75	Sr	74.949949568	40	43	83	Zr	82.928653801	42	49	91	Mo	90.911750194
38	38	76	Sr	75.941766782	40	44	84	Zr	83.923250*	42	50	92	Mo	91.906810991
38	39	77	Sr	76.937944782	40	45	85	Zr	84.921471182	42	51	93	Mo	92.906812610
38	40	78	Sr	77.932180000	40	46	86	Zr	85.916473591	42	52	94	Mo	93.905088269
38	41	79	Sr	78.929708000	40	47	87	Zr	86.914816252	42	53	95	Mo	94.905842129
38	42	80	Sr	79.924521013	40	48	88	Zr	87.910226904	42	54	96	Mo	95.904679477
38	43	81	Sr	80.923211846	40	49	89	Zr	88.908889500	42	55	97	Mo	96.906021465
38	44	82	Sr	81.918401639	40	50	90	Zr	89.904704416	42	56	98	Mo	97.905408169
38	45	83	Sr	82.917556701	40	51	91	Zr	90.905645767	42	57	99	Mo	98.907711870
38	46	84	Sr	83.913425275	40	52	92	Zr	91.905040847	42	58	100	Mo	99.907477336
38	47	85	Sr	84.912932803	40	53	93	Zr	92.906476006	42	59	101	Mo	100.910347001
38	48	86	Sr	85.909260204	40	54	94	Zr	93.906315192	42	60	102	Mo	101.910297360
38	49	87	Sr	86.908877124	40	55	95	Zr	94.908042600	42	61	103	Mo	102.913207142
38	50	88	Sr	87.905612124	40	56	96	Zr	95.908273386	42	62	104	Mo	103.913763625
38	51	89	Sr	88.907450675	40	57	97	Zr	96.910953109	42	63	105	Mo	104.916974610
38	52	90	Sr	89.907737888	40	58	98	Zr	97.912734892	42	64	106	Mo	105.918136802
38	53	91	Sr	90.910203095	40	59	99	Zr	98.916512106	42	65	107	Mo	106.921692604
38	54	92	Sr	91.911037858	40	60	100	Zr	99.917761889	42	66	108	Mo	107.923453*
38	55	93	Sr	92.914025634	40	61	101	Zr	100.921140415	42	67	109	Mo	108.927810*
38	56	94	Sr	93.915361312	40	62	102	Zr	101.922981285	42	68	110	Mo	109.929730*
38	57	95	Sr	94.919358766	40	63	103	Zr	102.926599606	42	69	111	Mo	110.934410*
38	58	96	Sr	95.921696802	40	64	104	Zr	103.928780*	42	70	112	Mo	111.936840*
38	59	97	Sr	96.926152923	40	65	105	Zr	104.933050*	42	71	113	Mo	112.941880*
38	60	98	Sr	97.928452934	40	66	106	Zr	105.935910*	42	72	114	Mo	113.944920*
38	61	99	Sr	98.933240926	40	67	107	Zr	106.940750*	42	73	115	Mo	114.950290*
38	62	100	Sr	99.935351911	40	68	108	Zr	107.943960*	43	42	85	Tc	84.948830*
38	63	101	Sr	100.940517888	40	69	109	Zr	108.949240*	43	43	86	Tc	85.942880*
38	64	102	Sr	101.943018987	40	70	110	Zr	109.952870*	43	44	87	Tc	86.936530*
38	65	103	Sr	102.948950*	41	40	81	Nb	80.949030*	43	45	88	Tc	87.932678*
38	66	104	Sr	103.952330*	41	41	82	Nb	81.943130*	43	46	89	Tc	88.927167*
38	67	105	Sr	104.958580*	41	42	83	Nb	82.936705382	43	47	90	Tc	89.923556564

Z	N	A	Sy	Masse
43	48	91	Tc	90.918427639
43	49	92	Tc	91.915260166
43	50	93	Tc	92.910248984
43	51	94	Tc	93.909657002
43	52	95	Tc	94.907657084
43	53	96	Tc	95.907871383
43	54	97	Tc	96.906365358
43	55	98	Tc	97.907215966
43	56	99	Tc	98.906254747
43	57	100	Tc	99.907657780
43	58	101	Tc	100.907314659
43	59	102	Tc	101.909215019
43	60	103	Tc	102.909181351
43	61	104	Tc	103.911447454
43	62	105	Tc	104.911660566
43	63	106	Tc	105.914357927
43	64	107	Tc	106.915079572
43	65	108	Tc	107.918461226
43	66	109	Tc	108.919982665
43	67	110	Tc	109.923820483
43	68	111	Tc	106.915079572
43	69	112	Tc	111.929146493
43	70	113	Tc	112.931590*
43	71	114	Tc	113.935880*
43	72	115	Tc	114.938690*
43	73	116	Tc	115.943370*
43	74	117	Tc	116.946480*
43	75	118	Tc	117.951480*
44	43	87	Ru	86.949180*
44	44	88	Ru	87.940260*
44	45	89	Ru	88.936110*
44	46	90	Ru	89.929890*
44	47	91	Ru	90.926292*
44	48	92	Ru	91.920120*
44	49	93	Ru	92.917052034
44	50	94	Ru	93.911359711
44	51	95	Ru	94.910412929
44	52	96	Ru	95.907597835
44	53	97	Ru	96.907554700
44	54	98	Ru	97.905287132
44	55	99	Ru	98.905939302
44	56	100	Ru	99.904219476
44	57	101	Ru	100.905582087
44	58	102	Ru	101.904349312
44	59	103	Ru	102.906323847
44	60	104	Ru	103.905432701
44	61	105	Ru	104.907752866
44	62	106	Ru	105.907329433
44	63	107	Ru	106.909905089
44	64	108	Ru	107.910173465
44	65	109	Ru	108.913203233
44	66	110	Ru	109.914136041
44	67	111	Ru	110.917696000
44	68	112	Ru	111.918965000
44	69	113	Ru	112.922487194
44	70	114	Ru	113.924281*
44	71	115	Ru	114.928686173
44	72	116	Ru	115.930810*
44	73	117	Ru	116.935580*
44	74	118	Ru	117.937820*
44	75	119	Ru	118.942840*
44	76	120	Ru	119.945310*
45	44	89	Rh	88.948837*
45	45	90	Rh	89.942870*
45	46	91	Rh	90.936550*
45	47	92	Rh	91.931980*
45	48	93	Rh	92.925740*
45	49	94	Rh	93.921698*
45	50	95	Rh	94.915898740

Z	N	A	Sy	Masse
45	51	96	Rh	95.914460631
45	52	97	Rh	96.911336797
45	53	98	Rh	97.910708158
45	54	99	Rh	98.908132104
45	55	100	Rh	99.908121550
45	56	101	Rh	100.906163625
45	57	102	Rh	101.906843196
45	58	103	Rh	102.905504292
45	59	104	Rh	103.906655518
45	60	105	Rh	104.905693821
45	61	106	Rh	105.907287135
45	62	107	Rh	106.906748423
45	63	108	Rh	107.908728018
45	64	109	Rh	108.908737289
45	65	110	Rh	109.911136411
45	66	111	Rh	110.911585913
45	67	112	Rh	111.914394159
45	68	113	Rh	112.915530627
45	69	114	Rh	113.918806000
45	70	115	Rh	114.920334000
45	71	116	Rh	115.924062000
45	72	117	Rh	116.925980*
45	73	118	Rh	117.930070*
45	74	119	Rh	118.932110*
45	75	120	Rh	119.936410*
45	76	121	Rh	120.938720*
45	77	122	Rh	121.943210*
46	45	91	Pd	90.949110*
46	46	92	Pd	91.940420*
46	47	93	Pd	92.935910*
46	48	94	Pd	93.928770*
46	49	95	Pd	94.924690*
46	50	96	Pd	95.918164359
46	51	97	Pd	96.916479073
46	52	98	Pd	97.912720902
46	53	99	Pd	98.911767833
46	54	100	Pd	99.908505886
46	55	101	Pd	100.908289242
46	56	102	Pd	101.905608544
46	57	103	Pd	102.906087307
46	58	104	Pd	103.904035834
46	59	105	Pd	104.905084920
46	60	106	Pd	105.903485715
46	61	107	Pd	106.905133481
46	62	108	Pd	107.903891701
46	63	109	Pd	108.905950451
46	64	110	Pd	109.905153254
46	65	111	Pd	110.907670734
46	66	112	Pd	111.907314058
46	67	113	Pd	112.910152908
46	68	114	Pd	113.910362638
46	69	115	Pd	114.913683824
46	70	116	Pd	115.914158662
46	71	117	Pd	116.917841338
46	72	118	Pd	117.918984300
46	73	119	Pd	118.923110*
46	74	120	Pd	119.924691878
46	75	121	Pd	120.928870*
46	76	122	Pd	121.930550*
46	77	123	Pd	122.934930*
46	78	124	Pd	123.936880*
47	46	93	Ag	92.949780*
47	47	94	Ag	93.942780*
47	48	95	Ag	94.935480*
47	49	96	Ag	95.930680*
47	50	97	Ag	96.923972412
47	51	98	Ag	97.921566201
47	52	99	Ag	98.917597178
47	53	100	Ag	99.916104255

Z	N	A	Sy	Masse
47	54	101	Ag	100.912802233
47	55	102	Ag	101.911685000
47	56	103	Ag	102.908972720
47	57	104	Ag	103.908629157
47	58	105	Ag	104.906528661
47	59	106	Ag	105.906668921
47	60	107	Ag	106.905096820
47	61	108	Ag	107.905955556
47	62	109	Ag	108.904752292
47	63	110	Ag	109.906107231
47	64	111	Ag	110.905291157
47	65	112	Ag	111.907004814
47	66	113	Ag	112.906566579
47	67	114	Ag	113.908803704
47	68	115	Ag	114.908762698
47	69	116	Ag	115.911359933
47	70	117	Ag	116.911684562
47	71	118	Ag	117.914582768
47	72	119	Ag	118.915665059
47	73	120	Ag	119.918787384
47	74	121	Ag	120.919848046
47	75	122	Ag	121.923530*
47	76	123	Ag	122.924900*
47	77	124	Ag	123.928640*
47	78	125	Ag	124.930430*
47	79	126	Ag	125.934500*
47	80	127	Ag	126.936770*
47	81	128	Ag	127.941170*
47	82	129	Ag	128.943690*
47	83	130	Ag	129.950448*
48	47	95	Cd	94.949870*
48	48	96	Cd	95.939770*
48	49	97	Cd	96.934940*
48	50	98	Cd	97.927395546
48	51	99	Cd	98.925010*
48	52	100	Cd	99.920289525
48	53	101	Cd	100.918681538
48	54	102	Cd	101.914462258
48	55	103	Cd	102.913419246
48	56	104	Cd	103.909849475
48	57	105	Cd	104.909467905
48	58	106	Cd	105.906459410
48	59	107	Cd	106.906617928
48	60	108	Cd	107.904183683
48	61	109	Cd	108.904982293
48	62	110	Cd	109.903002070
48	63	111	Cd	110.904178107
48	64	112	Cd	111.902757809
48	65	113	Cd	112.904401662
48	66	114	Cd	113.903358540
48	67	115	Cd	114.905430969
48	68	116	Cd	115.904755809
48	69	117	Cd	116.907218618
48	70	118	Cd	117.906914530
48	71	119	Cd	118.909921597
48	72	120	Cd	119.909850129
48	73	121	Cd	120.912977363
48	74	122	Cd	121.913332432
48	75	123	Cd	122.917002999
48	76	124	Cd	123.917647616
48	77	125	Cd	124.921246370
48	78	126	Cd	125.922353321
48	79	127	Cd	126.926443864
48	80	128	Cd	127.927762285
48	81	129	Cd	128.932150*
48	82	130	Cd	129.933901937
48	83	131	Cd	130.940670*
48	84	132	Cd	131.945550*
49	48	97	In	96.949540*

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
49	49	98	In	97.942140*	50	80	130	Sn	129.913967295	52	77	129	Te	128.906598238
49	50	99	In	98.934220*	50	81	131	Sn	130.916999769	52	78	130	Te	129.906224399
49	51	100	In	99.931110851	50	82	132	Sn	131.917815713	52	79	131	Te	130.908523864
49	52	101	In	100.926340*	50	83	133	Sn	132.923829249	52	80	132	Te	131.908553160
49	53	102	In	101.924090238	50	84	134	Sn	133.928291765	52	81	133	Te	132.910955306
49	54	103	In	102.919914188	50	85	135	Sn	134.934730*	52	82	134	Te	133.911368737
49	55	104	In	103.918296171	50	86	136	Sn	135.939340*	52	83	135	Te	134.916448592
49	56	105	In	104.914673540	50	87	137	Sn	136.945990*	52	84	136	Te	135.920101246
49	57	106	In	105.913465411	51	52	103	Sb	102.939690*	52	85	137	Te	136.925322954
49	58	107	In	106.910295100	51	53	104	Sb	103.936472*	52	86	138	Te	137.929220*
49	59	108	In	107.909698180	51	54	105	Sb	104.931486348	52	87	139	Te	138.934730*
49	60	109	In	108.907150507	51	55	106	Sb	105.928791*	52	88	140	Te	139.938850*
49	61	110	In	109.907165274	51	56	107	Sb	106.924150*	52	89	141	Te	140.944650*
49	62	111	In	110.905103278	51	57	108	Sb	107.922160*	52	90	142	Te	141.949080*
49	63	112	In	111.905532331	51	58	109	Sb	108.918132426	53	55	108	I	107.943475*
49	64	113	In	112.904057761	51	59	110	Sb	109.916753*	53	56	109	I	108.938149417
49	65	114	In	113.904913876	51	60	111	Sb	110.913163000	53	57	110	I	109.935242*
49	66	115	In	114.903878484	51	61	112	Sb	111.912398009	53	58	111	I	110.930276*
49	67	116	In	115.905259703	51	62	113	Sb	112.909371672	53	59	112	I	111.927970*
49	68	117	In	116.904513564	51	63	114	Sb	113.909269000	53	60	113	I	112.923640583
49	69	118	In	117.906354367	51	64	115	Sb	114.906598000	53	61	114	I	113.921850*
49	70	119	In	118.905845350	51	65	116	Sb	115.906793629	53	62	115	I	114.918048000
49	71	120	In	119.907959608	51	66	117	Sb	116.904835941	53	63	116	I	115.916808633
49	72	121	In	120.907845822	51	67	118	Sb	117.905528731	53	64	117	I	116.913650000
49	73	122	In	121.910276010	51	68	119	Sb	118.903942009	53	65	118	I	117.913074000
49	74	123	In	122.910438276	51	69	120	Sb	119.905072427	53	66	119	I	118.910074000
49	75	124	In	123.913175231	51	70	121	Sb	120.903815686	53	67	120	I	119.910048173
49	76	125	In	124.913600588	51	71	122	Sb	121.905173651	53	68	121	I	120.907366811
49	77	126	In	125.916463857	51	72	123	Sb	122.904213970	53	69	122	I	121.907589284
49	78	127	In	126.917353091	51	73	124	Sb	123.905935743	53	70	123	I	122.905588965
49	79	128	In	127.920172328	51	74	125	Sb	124.905253818	53	71	124	I	123.906209852
49	80	129	In	128.921696980	51	75	126	Sb	125.907247480	53	72	125	I	124.904630164
49	81	130	In	129.924970049	51	76	127	Sb	126.906923609	53	73	126	I	125.905624153
49	82	131	In	130.926851767	51	77	128	Sb	127.909169001	53	74	127	I	126.904472681
49	83	132	In	131.932990260	51	78	129	Sb	128.909148442	53	75	128	I	127.905809443
49	84	133	In	132.937810*	51	79	130	Sb	129.911656324	53	76	129	I	128.904987722
49	85	134	In	133.944150*	51	80	131	Sb	130.911982275	53	77	130	I	129.906674247
49	86	135	In	134.949330*	51	81	132	Sb	131.914466896	53	78	131	I	130.906124609
50	49	99	Sn	98.949330*	51	82	133	Sb	132.915251630	53	79	132	I	131.907997381
50	50	100	Sn	99.939044343	51	83	134	Sb	133.920379744	53	80	133	I	132.907796939
50	51	101	Sn	100.936060*	51	84	135	Sb	134.925165771	53	81	134	I	133.909744465
50	52	102	Sn	101.930295324	51	85	136	Sb	135.930350*	53	82	135	I	134.910048121
50	53	103	Sn	102.928100*	51	86	137	Sb	136.935310*	53	83	136	I	135.914653993
50	54	104	Sn	103.923143223	51	87	138	Sb	137.940790*	53	84	137	I	136.917870840
50	55	105	Sn	104.921349437	51	88	139	Sb	138.945980*	53	85	138	I	137.922349591
50	56	106	Sn	105.916880620	52	53	105	Te	104.943640*	53	86	139	I	138.926099478
50	57	107	Sn	106.915644329	52	54	106	Te	105.937504237	53	87	140	I	139.931000*
50	58	108	Sn	107.911925378	52	55	107	Te	106.935006*	53	88	141	I	140.935030*
50	59	109	Sn	108.911283214	52	56	108	Te	107.929444597	53	89	142	I	141.940180*
50	60	110	Sn	109.907842791	52	57	109	Te	108.927415515	53	90	143	I	142.944560*
50	61	111	Sn	110.907734460	52	58	110	Te	109.922407316	53	91	144	I	143.949990*
50	62	112	Sn	111.904818207	52	59	111	Te	110.921110692	54	56	110	Xe	109.944278068
50	63	113	Sn	112.905170577	52	60	112	Te	111.917013672	54	57	111	Xe	110.941602*
50	64	114	Sn	113.902778869	52	61	113	Te	112.915891000	54	58	112	Xe	111.935623112
50	65	115	Sn	114.903342397	52	62	114	Te	113.912089000	54	59	113	Xe	112.933341174
50	66	116	Sn	115.901740530	52	63	115	Te	114.911902000	54	60	114	Xe	113.927980306
50	67	117	Sn	116.902951656	52	64	116	Te	115.908460000	54	61	115	Xe	114.926293920
50	68	118	Sn	117.901603167	52	65	117	Te	116.908644719	54	62	116	Xe	115.921581087
50	69	119	Sn	118.903307630	52	66	118	Te	117.905827581	54	63	117	Xe	116.920358735
50	70	120	Sn	119.902194676	52	67	119	Te	118.906403645	54	64	118	Xe	117.916178655
50	71	121	Sn	120.904235480	52	68	120	Te	119.904020222	54	65	119	Xe	118.915410688
50	72	122	Sn	121.903439046	52	69	121	Te	120.904936424	54	66	120	Xe	119.911784244
50	73	123	Sn	122.905720838	52	70	122	Te	121.903043898	54	67	121	Xe	120.911461829
50	74	124	Sn	123.905273946	52	71	123	Te	122.904270029	54	68	122	Xe	121.908367632
50	75	125	Sn	124.907784125	52	72	124	Te	123.902817896	54	69	123	Xe	122.908481910
50	76	126	Sn	125.907653280	52	73	125	Te	124.904430731	54	70	124	Xe	123.905893003
50	77	127	Sn	126.910360024	52	74	126	Te	125.903311696	54	71	125	Xe	124.906395464
50	78	128	Sn	127.910536624	52	75	127	Te	126.905226336	54	72	126	Xe	125.904273634
50	79	129	Sn	128.913479000	52	76	128	Te	127.904463056	54	73	127	Xe	126.905183723

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
54	74	128	Xe	127.903531275	56	67	123	Ba	122.918781036	57	98	155	La	154.958350*
54	75	129	Xe	128.904779435	56	68	124	Ba	123.915093603	58	61	119	Ce	118.952760*
54	76	130	Xe	129.903508007	56	69	125	Ba	124.914472912	58	62	120	Ce	119.946640*
54	77	131	Xe	130.905082362	56	70	126	Ba	125.911250177	58	63	121	Ce	120.943420*
54	78	132	Xe	131.904153457	56	71	127	Ba	126.911093797	58	64	122	Ce	121.937910*
54	79	133	Xe	132.905910722	56	72	128	Ba	127.908317698	58	65	123	Ce	122.935400*
54	80	134	Xe	133.905394464	56	73	129	Ba	128.908679439	58	66	124	Ce	123.930410*
54	81	135	Xe	134.907227495	56	74	130	Ba	129.906320811	58	67	125	Ce	124.928440*
54	82	136	Xe	135.907218794	56	75	131	Ba	130.906941118	58	68	126	Ce	125.923971000
54	83	137	Xe	136.911562125	56	76	132	Ba	131.905061288	58	69	127	Ce	126.922731000
54	84	138	Xe	137.913954475	56	77	133	Ba	132.906007490	58	70	128	Ce	127.918911000
54	85	139	Xe	138.918792936	56	78	134	Ba	133.904508383	58	71	129	Ce	128.918102000
54	86	140	Xe	139.921640943	56	79	135	Ba	134.905688591	58	72	130	Ce	129.914736000
54	87	141	Xe	140.926648049	56	80	136	Ba	135.904575945	58	73	131	Ce	130.914422000
54	88	142	Xe	141.929709590	56	81	137	Ba	136.905827384	58	74	132	Ce	131.911460487
54	89	143	Xe	142.935110*	56	82	138	Ba	137.905247237	58	75	133	Ce	132.911515020
54	90	144	Xe	143.938510*	56	83	139	Ba	138.908841341	58	76	134	Ce	133.908924821
54	91	145	Xe	144.944070*	56	84	140	Ba	139.910604505	58	77	135	Ce	134.909151396
54	92	146	Xe	145.947750*	56	85	141	Ba	140.914411009	58	78	136	Ce	135.907172422
54	93	147	Xe	146.953560*	56	86	142	Ba	141.916453410	58	79	137	Ce	136.907805577
55	57	112	Cs	111.950301*	56	87	143	Ba	142.920626719	58	80	138	Ce	137.905991321
55	58	113	Cs	112.944493274	56	88	144	Ba	143.922952853	58	81	139	Ce	138.906652651
55	59	114	Cs	113.941450*	56	89	145	Ba	144.927627032	58	82	140	Ce	139.905438706
55	60	115	Cs	114.935910*	56	90	146	Ba	145.930219572	58	83	141	Ce	140.908276270
55	61	116	Cs	115.933367*	56	91	147	Ba	146.934945*	58	84	142	Ce	141.909244205
55	62	117	Cs	116.928670701	56	92	148	Ba	147.937720047	58	85	143	Ce	142.912385910
55	63	118	Cs	117.926559494	56	93	149	Ba	148.942580*	58	86	144	Ce	143.913647336
55	64	119	Cs	118.922377304	56	94	150	Ba	149.945680*	58	87	145	Ce	144.917233135
55	65	120	Cs	119.920677253	56	95	151	Ba	150.950810*	58	88	146	Ce	145.918759009
55	66	121	Cs	120.917229209	56	96	152	Ba	151.954270*	58	89	147	Ce	146.922673954
55	67	122	Cs	121.916113434	56	97	153	Ba	152.959610*	58	90	148	Ce	147.924432410
55	68	123	Cs	122.912996036	57	60	117	La	116.950068*	58	91	149	Ce	148.928399883
55	69	124	Cs	123.912257798	57	61	118	La	117.946730*	58	92	150	Ce	149.930408931
55	70	125	Cs	124.909728270	57	62	119	La	118.940990*	58	93	151	Ce	150.933976196
55	71	126	Cs	125.909451977	57	63	120	La	119.938070*	58	94	152	Ce	151.936540*
55	72	127	Cs	126.907417525	57	64	121	La	120.933010*	58	95	153	Ce	152.940580*
55	73	128	Cs	127.907748866	57	65	122	La	121.930710*	58	96	154	Ce	153.943420*
55	74	129	Cs	128.906064426	57	66	123	La	122.926240*	58	97	155	Ce	154.948040*
55	75	130	Cs	129.906708552	57	67	124	La	123.924574275	58	98	156	Ce	155.951260*
55	76	131	Cs	130.905463926	57	68	125	La	124.920816034	58	99	157	Ce	156.956340*
55	77	132	Cs	131.906434260	57	69	126	La	125.919512667	59	62	121	Pr	120.955364*
55	78	133	Cs	132.905451932	57	70	127	La	126.916375448	59	63	122	Pr	121.951810*
55	79	134	Cs	133.906718475	57	71	128	La	127.915585177	59	64	123	Pr	122.945960*
55	80	135	Cs	134.905977008	57	72	129	La	128.912692815	59	65	124	Pr	123.942960*
55	81	136	Cs	135.907311576	57	73	130	La	129.912368724	59	66	125	Pr	124.937830*
55	82	137	Cs	136.907089473	57	74	131	La	130.910070000	59	67	126	Pr	125.935310*
55	83	138	Cs	137.911016704	57	75	132	La	131.910101145	59	68	127	Pr	126.930830*
55	84	139	Cs	138.913363999	57	76	133	La	132.908218000	59	69	128	Pr	127.928791000
55	85	140	Cs	139.917282354	57	77	134	La	133.908514011	59	70	129	Pr	128.925095000
55	86	141	Cs	140.920045752	57	78	135	La	134.906976844	59	71	130	Pr	129.923590000
55	87	142	Cs	141.924298927	57	79	136	La	135.907635536	59	72	131	Pr	130.920259000
55	88	143	Cs	142.927351750	57	80	137	La	136.906493598	59	73	132	Pr	131.919255000
55	89	144	Cs	143.932076914	57	81	138	La	137.907111930	59	74	133	Pr	132.916330532
55	90	145	Cs	144.935526170	57	82	139	La	138.906353267	59	75	134	Pr	133.915711737
55	91	146	Cs	145.940289423	57	83	140	La	139.909477645	59	76	135	Pr	134.913111745
55	92	147	Cs	146.944155008	57	84	141	La	140.910962152	59	77	136	Pr	135.912691611
55	93	148	Cs	147.949218153	57	85	142	La	141.914079130	59	78	137	Pr	136.910705455
55	94	149	Cs	148.952930*	57	86	143	La	142.916062720	59	79	138	Pr	137.910754636
55	95	150	Cs	149.958170*	57	87	144	La	143.919599647	59	80	139	Pr	138.908938399
55	96	151	Cs	150.962190*	57	88	145	La	144.921645401	59	81	140	Pr	139.909075874
56	58	114	Ba	113.950675405	57	89	146	La	145.925793460	59	82	141	Pr	140.907652769
56	59	115	Ba	114.947370*	57	90	147	La	146.928235284	59	83	142	Pr	141.910044806
56	60	116	Ba	115.941380*	57	91	148	La	147.932228868	59	84	143	Pr	142.910816926
56	61	117	Ba	116.938499*	57	92	149	La	148.934734*	59	85	144	Pr	143.913305245
56	62	118	Ba	117.933040*	57	93	150	La	149.938770*	59	86	145	Pr	144.914511700
56	63	119	Ba	118.930659661	57	94	151	La	150.941720*	59	87	146	Pr	145.917644336
56	64	120	Ba	119.926044974	57	95	152	La	151.946250*	59	88	147	Pr	146.918995992
56	65	121	Ba	120.924054499	57	96	153	La	152.949620*	59	89	148	Pr	147.922135026
56	66	122	Ba	121.919904000	57	97	154	La	153.954500*	59	90	149	Pr	148.923717651

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
59	91	150	Pr	149.926672997	61	86	147	Pm	146.915138545	63	81	144	Eu	143.918816823
59	92	151	Pr	150.928318618	61	87	148	Pm	147.917474618	63	82	145	Eu	144.916265237
59	93	152	Pr	151.931499225	61	88	149	Pm	148.918334155	63	83	146	Eu	145.917205817
59	94	153	Pr	152.933838905	61	89	150	Pm	149.920983561	63	84	147	Eu	146.916746111
59	95	154	Pr	153.937518153	61	90	151	Pm	150.921206973	63	85	148	Eu	147.918085895
59	96	155	Pr	154.940120*	61	91	152	Pm	151.923496795	63	86	149	Eu	148.917931238
59	97	156	Pr	155.944270*	61	92	153	Pm	152.924116889	63	87	150	Eu	149.919701819
59	98	157	Pr	156.947430*	61	93	154	Pm	153.926463943	63	88	151	Eu	150.919850161
59	99	158	Pr	157.951980*	61	94	155	Pm	154.928101267	63	89	152	Eu	151.921744534
59	100	159	Pr	158.955500*	61	95	156	Pm	155.931056736	63	90	153	Eu	152.921230339
60	64	124	Nd	123.952230*	61	96	157	Pm	156.933039369	63	91	154	Eu	153.922979237
60	65	125	Nd	124.948880*	61	97	158	Pm	157.936561407	63	92	155	Eu	154.922893260
60	66	126	Nd	125.943220*	61	98	159	Pm	158.938970*	63	93	156	Eu	155.924752249
60	67	127	Nd	126.940500*	61	99	160	Pm	159.942990*	63	94	157	Eu	156.925423647
60	68	128	Nd	127.935390*	61	100	161	Pm	160.945860*	63	95	158	Eu	157.927845302
60	69	129	Nd	128.933188*	61	101	162	Pm	161.950290*	63	96	159	Eu	158.929088861
60	70	130	Nd	129.928506000	61	102	163	Pm	162.953680*	63	97	160	Eu	159.931971*
60	71	131	Nd	130.927247000	62	66	128	Sm	127.958080*	63	98	161	Eu	160.933680*
60	72	132	Nd	131.923321237	62	67	129	Sm	128.954640*	63	99	162	Eu	161.937040*
60	73	133	Nd	132.922348000	62	68	130	Sm	129.948920*	63	100	163	Eu	162.939210*
60	74	134	Nd	133.918790181	62	69	131	Sm	130.946110*	63	101	164	Eu	163.942990*
60	75	135	Nd	134.918181160	62	70	132	Sm	131.940690*	63	102	165	Eu	164.945720*
60	76	136	Nd	135.914976035	62	71	133	Sm	132.938670*	63	103	166	Eu	165.949970*
60	77	137	Nd	136.914567137	62	72	134	Sm	133.933970*	63	104	167	Eu	166.953210*
60	78	138	Nd	137.911949961	62	73	135	Sm	134.932520000	64	70	134	Gd	133.955370*
60	79	139	Nd	138.911978288	62	74	136	Sm	135.928275527	64	71	135	Gd	134.952570*
60	80	140	Nd	139.909552000	62	75	137	Sm	136.926971746	64	72	136	Gd	135.947340*
60	81	141	Nd	140.909609854	62	76	138	Sm	137.923243961	64	73	137	Gd	136.945020*
60	82	142	Nd	141.907723297	62	77	139	Sm	138.922296605	64	74	138	Gd	137.940120*
60	83	143	Nd	142.909814290	62	78	140	Sm	139.918994687	64	75	139	Gd	138.938240*
60	84	144	Nd	143.910087274	62	79	141	Sm	140.918476488	64	76	140	Gd	139.933674000
60	85	145	Nd	144.912573636	62	80	142	Sm	141.915197641	64	77	141	Gd	140.932126000
60	86	146	Nd	145.913116939	62	81	143	Sm	142.914628338	64	78	142	Gd	141.928116000
60	87	147	Nd	146.916100441	62	82	144	Sm	143.911999478	64	79	143	Gd	142.926749510
60	88	148	Nd	147.916893288	62	83	145	Sm	144.913410353	64	80	144	Gd	143.922963000
60	89	149	Nd	148.920148842	62	84	146	Sm	145.913040900	64	81	145	Gd	144.921709252
60	90	150	Nd	149.920890888	62	85	147	Sm	146.914897923	64	82	146	Gd	145.918310608
60	91	151	Nd	150.923828929	62	86	148	Sm	147.914822674	64	83	147	Gd	146.919094420
60	92	152	Nd	151.924682219	62	87	149	Sm	148.917184735	64	84	148	Gd	147.918114524
60	93	153	Nd	152.927698232	62	88	150	Sm	149.917275539	64	85	149	Gd	148.919340915
60	94	154	Nd	153.929477307	62	89	151	Sm	150.919932409	64	86	150	Gd	149.918658876
60	95	155	Nd	154.932932*	62	90	152	Sm	151.919732425	64	87	151	Gd	150.920348482
60	96	156	Nd	155.935018114	62	91	153	Sm	152.922097356	64	88	152	Gd	151.919790996
60	97	157	Nd	156.939030*	62	92	154	Sm	153.922209273	64	89	153	Gd	152.921749543
60	98	158	Nd	157.941600*	62	93	155	Sm	154.924640161	64	90	154	Gd	153.920865598
60	99	159	Nd	158.946090*	62	94	156	Sm	155.925527887	64	91	155	Gd	154.922622022
60	100	160	Nd	159.949090*	62	95	157	Sm	156.928358717	64	92	156	Gd	155.922122743
60	101	161	Nd	160.953880*	62	96	158	Sm	157.929991317	64	93	157	Gd	156.923960135
61	65	126	Pm	125.957520*	62	97	159	Sm	158.933211271	64	94	158	Gd	157.924103912
61	66	127	Pm	126.951630*	62	98	160	Sm	159.935140*	64	95	159	Gd	158.926388658
61	67	128	Pm	127.948420*	62	99	161	Sm	160.938830*	64	96	160	Gd	159.927054146
61	68	129	Pm	128.943160*	62	100	162	Sm	161.941220*	64	97	161	Gd	160.929669211
61	69	130	Pm	129.940450*	62	101	163	Sm	162.945360*	64	98	162	Gd	161.930984751
61	70	131	Pm	130.935870*	62	102	164	Sm	163.948280*	64	99	163	Gd	162.933990*
61	71	132	Pm	131.933750*	62	103	165	Sm	164.952980*	64	100	164	Gd	163.935860*
61	72	133	Pm	132.929782000	63	67	130	Eu	129.963569*	64	101	165	Gd	164.939380*
61	73	134	Pm	133.928353000	63	68	131	Eu	130.957753*	64	102	166	Gd	165.941600*
61	74	135	Pm	134.924876000	63	69	132	Eu	131.954370*	64	103	167	Gd	166.945570*
61	75	136	Pm	135.923565829	63	70	133	Eu	132.949240*	64	104	168	Gd	167.948360*
61	76	137	Pm	136.920479493	63	71	134	Eu	133.946510*	64	105	169	Gd	168.952870*
61	77	138	Pm	137.919548281	63	72	135	Eu	134.941820*	65	71	136	Tb	135.961380*
61	78	139	Pm	138.916804082	63	73	136	Eu	135.939600*	65	72	137	Tb	136.955980*
61	79	140	Pm	139.916041789	63	74	137	Eu	136.935570*	65	73	138	Tb	137.953160*
61	80	141	Pm	140.913555054	63	75	138	Eu	137.933709000	65	74	139	Tb	138.948290*
61	81	142	Pm	141.912874471	63	76	139	Eu	138.929792280	65	75	140	Tb	139.945805049
61	82	143	Pm	142.910932616	63	77	140	Eu	139.928087607	65	76	141	Tb	140.941448000
61	83	144	Pm	143.912590843	63	78	141	Eu	140.924930720	65	77	142	Tb	141.938744*
61	84	145	Pm	144.912749023	63	79	142	Eu	141.923434945	65	78	143	Tb	142.935121000
61	85	146	Pm	145.914696305	63	80	143	Eu	142.920297509	65	79	144	Tb	143.933045000

Z	N	A	Sy	Masse
65	80	145	Tb	144.929274000
65	81	146	Tb	145.927246584
65	82	147	Tb	146.924044585
65	83	148	Tb	147.924271701
65	84	149	Tb	148.923245909
65	85	150	Tb	149.923659686
65	86	151	Tb	150.923102543
65	87	152	Tb	151.924074438
65	88	153	Tb	152.923434588
65	89	154	Tb	153.924678019
65	90	155	Tb	154.923505236
65	91	156	Tb	155.924747213
65	92	157	Tb	156.924024604
65	93	158	Tb	157.925413137
65	94	159	Tb	158.925346757
65	95	160	Tb	159.927167606
65	96	161	Tb	160.927569919
65	97	162	Tb	161.929488234
65	98	163	Tb	162.930647536
65	99	164	Tb	163.933350838
65	100	165	Tb	164.934880*
65	101	166	Tb	165.937991959
65	102	167	Tb	166.940050*
65	103	168	Tb	167.943640*
65	104	169	Tb	168.946220*
65	105	170	Tb	169.950250*
65	106	171	Tb	170.953300*
66	72	138	Dy	137.962490*
66	73	139	Dy	138.959540*
66	74	140	Dy	139.954010*
66	75	141	Dy	140.951350*
66	76	142	Dy	141.946366*
66	77	143	Dy	142.943830*
66	78	144	Dy	143.939254000
66	79	145	Dy	144.937425000
66	80	146	Dy	145.932845369
66	81	147	Dy	146.931091500
66	82	148	Dy	147.927149831
66	83	149	Dy	148.927304787
66	84	150	Dy	149.925585184
66	85	151	Dy	150.926184601
66	86	152	Dy	151.924718300
66	87	153	Dy	152.925764670
66	88	154	Dy	153.924424457
66	89	155	Dy	154.925753775
66	90	156	Dy	155.924283110
66	91	157	Dy	156.925466095
66	92	158	Dy	157.924409487
66	93	159	Dy	158.925739214
66	94	160	Dy	159.925197517
66	95	161	Dy	160.926933364
66	96	162	Dy	161.926798447
66	97	163	Dy	162.928731159
66	98	164	Dy	163.929174751
66	99	165	Dy	164.931703333
66	100	166	Dy	165.932806741
66	101	167	Dy	166.935655462
66	102	168	Dy	167.937128769
66	103	169	Dy	168.940307614
66	104	170	Dy	169.942390*
66	105	171	Dy	170.946200*
66	106	172	Dy	171.948760*
66	107	173	Dy	172.953000*
67	73	140	Ho	139.968539*
67	74	141	Ho	140.963098*
67	75	142	Ho	141.959770*
67	76	143	Ho	142.954610*
67	77	144	Ho	143.951480*
67	78	145	Ho	144.947200*

Z	N	A	Sy	Masse
67	79	146	Ho	145.944640*
67	80	147	Ho	146.940056000
67	81	148	Ho	147.937718000
67	82	149	Ho	148.933774771
67	83	150	Ho	149.933496182
67	84	151	Ho	150.931688142
67	85	152	Ho	151.931713714
67	86	153	Ho	152.930198789
67	87	154	Ho	153.930601579
67	88	155	Ho	154.929103491
67	89	156	Ho	155.929839000
67	90	157	Ho	156.928256188
67	91	158	Ho	157.928941007
67	92	159	Ho	158.927711959
67	93	160	Ho	159.928729478
67	94	161	Ho	160.927854776
67	95	162	Ho	161.929095504
67	96	163	Ho	162.928733903
67	97	164	Ho	163.930233507
67	98	165	Ho	164.930322070
67	99	166	Ho	165.932284162
67	100	167	Ho	166.933132633
67	101	168	Ho	167.935515708
67	102	169	Ho	168.936872273
67	103	170	Ho	169.939618929
67	104	171	Ho	170.941465150
67	105	172	Ho	171.944820*
67	106	173	Ho	172.947290*
67	107	174	Ho	173.951150*
67	108	175	Ho	174.954050*
68	75	143	Er	142.966340*
68	76	144	Er	143.960380*
68	77	145	Er	144.957390*
68	78	146	Er	145.952000*
68	79	147	Er	146.949490*
68	80	148	Er	147.944550*
68	81	149	Er	148.942306000
68	82	150	Er	149.937913839
68	83	151	Er	150.937448903
68	84	152	Er	151.935050389
68	85	153	Er	152.935063492
68	86	154	Er	153.932783081
68	87	155	Er	154.933208949
68	88	156	Er	155.931064698
68	89	157	Er	156.931916000
68	90	158	Er	157.929893474
68	91	159	Er	158.930684066
68	92	160	Er	159.929083292
68	93	161	Er	160.929995309
68	94	162	Er	161.928778264
68	95	163	Er	162.930032749
68	96	164	Er	163.929200229
68	97	165	Er	164.930726003
68	98	166	Er	165.930293061
68	99	167	Er	166.932048159
68	100	168	Er	167.932370224
68	101	169	Er	168.934590364
68	102	170	Er	169.935464312
68	103	171	Er	170.938029808
68	104	172	Er	171.939356113
68	105	173	Er	172.942400*
68	106	174	Er	173.944230*
68	107	175	Er	174.947770*
68	108	176	Er	175.950080*
68	109	177	Er	176.954050*
69	76	145	Tm	144.970073*
69	77	146	Tm	145.966425*
69	78	147	Tm	146.960961*
69	79	148	Tm	147.957840*

Z	N	A	Sy	Masse
69	80	149	Tm	148.952720*
69	81	150	Tm	149.949960*
69	82	151	Tm	150.945483490
69	83	152	Tm	151.944422000
69	84	153	Tm	152.942012112
69	85	154	Tm	153.941567808
69	86	155	Tm	154.939199459
69	87	156	Tm	155.938979933
69	88	157	Tm	156.936973000
69	89	158	Tm	157.936979525
69	90	159	Tm	158.934975000
69	91	160	Tm	159.935262801
69	92	161	Tm	160.933549000
69	93	162	Tm	161.933994682
69	94	163	Tm	162.932651124
69	95	164	Tm	163.933560000
69	96	165	Tm	164.932435492
69	97	166	Tm	165.933554131
69	98	167	Tm	166.932851622
69	99	168	Tm	167.934172776
69	100	169	Tm	168.9324213250
69	101	170	Tm	169.935801397
69	102	171	Tm	170.936429440
69	103	172	Tm	171.938400044
69	104	173	Tm	172.939603607
69	105	174	Tm	173.942168605
69	106	175	Tm	174.943836853
69	107	176	Tm	175.946994685
69	108	177	Tm	176.949040*
69	109	178	Tm	177.952640*
69	110	179	Tm	178.955340*
70	78	148	Yb	147.967420*
70	79	149	Yb	148.964040*
70	80	150	Yb	149.958420*
70	81	151	Yb	150.955400769
70	82	152	Yb	151.950288919
70	83	153	Yb	152.949480*
70	84	154	Yb	153.946393928
70	85	155	Yb	154.945782332
70	86	156	Yb	155.942818215
70	87	157	Yb	156.942627848
70	88	158	Yb	157.939865617
70	89	159	Yb	158.940050099
70	90	160	Yb	159.937552344
70	91	161	Yb	160.937901678
70	92	162	Yb	161.935768210
70	93	163	Yb	162.936334305
70	94	164	Yb	163.934489416
70	95	165	Yb	164.935279000
70	96	166	Yb	165.933882042
70	97	167	Yb	166.934949605
70	98	168	Yb	167.933896895
70	99	169	Yb	168.935189802
70	100	170	Yb	169.934761837
70	101	171	Yb	170.936325799
70	102	172	Yb	171.936381469
70	103	173	Yb	172.938210787
70	104	174	Yb	173.938862089
70	105	175	Yb	174.941276450
70	106	176	Yb	175.942571683
70	107	177	Yb	176.945260822
70	108	178	Yb	177.946646680
70	109	179	Yb	178.950170*
70	110	180	Yb	179.952330*
70	111	181	Yb	180.956150*
71	79	150	Lu	149.973228*
71	80	151	Lu	150.967577*
71	81	152	Lu	151.964120*
71	82	153	Lu	152.958767331

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
71	83	154	Lu	153.957522*	73	84	157	Ta	156.968192445	75	85	160	Re	159.982115*
71	84	155	Lu	154.954316216	73	85	158	Ta	157.966699*	75	86	161	Re	160.977589119
71	85	156	Lu	155.953032523	73	86	159	Ta	158.963018173	75	87	162	Re	161.976002*
71	86	157	Lu	156.950098300	73	87	160	Ta	159.961486056	75	88	163	Re	162.972080535
71	87	158	Lu	157.949313283	73	88	161	Ta	160.958417*	75	89	164	Re	163.970323*
71	88	159	Lu	158.946628776	73	89	162	Ta	161.957291859	75	90	165	Re	164.967088557
71	89	160	Lu	159.946033000	73	90	163	Ta	162.954330271	75	91	166	Re	165.965808*
71	90	161	Lu	160.943572000	73	91	164	Ta	163.953534000	75	92	167	Re	166.962601*
71	91	162	Lu	161.943277288	73	92	165	Ta	164.950772514	75	93	168	Re	167.961572608
71	92	163	Lu	162.941179000	73	93	166	Ta	165.950512000	75	94	169	Re	168.958791096
71	93	164	Lu	163.941339000	73	94	167	Ta	166.948093000	75	95	170	Re	169.958220071
71	94	165	Lu	164.939406724	73	95	168	Ta	167.948047000	75	96	171	Re	170.955716000
71	95	166	Lu	165.939859000	73	96	169	Ta	168.946011000	75	97	172	Re	171.955422961
71	96	167	Lu	166.938270000	73	97	170	Ta	169.946175000	75	98	173	Re	172.953243000
71	97	168	Lu	167.938739111	73	98	171	Ta	170.944476000	75	99	174	Re	173.953115000
71	98	169	Lu	168.937651439	73	99	172	Ta	171.944895000	75	100	175	Re	174.951381000
71	99	170	Lu	169.938474968	73	100	173	Ta	172.943750000	75	101	176	Re	175.951623000
71	100	171	Lu	170.937913136	73	101	174	Ta	173.944454000	75	102	177	Re	176.950328000
71	101	172	Lu	171.939085669	73	102	175	Ta	174.943737000	75	103	178	Re	177.950989000
71	102	173	Lu	172.938930602	73	103	176	Ta	175.944857000	75	104	179	Re	178.949987641
71	103	174	Lu	173.940337480	73	104	177	Ta	176.944472403	75	105	180	Re	179.950789084
71	104	175	Lu	174.940771819	73	105	178	Ta	177.945778221	75	106	181	Re	180.950067916
71	105	176	Lu	175.942686310	73	106	179	Ta	178.945929535	75	107	182	Re	181.951210080
71	106	177	Lu	176.943758055	73	107	180	Ta	179.947464831	75	108	183	Re	182.950819841
71	107	178	Lu	177.945954559	73	108	181	Ta	180.947995763	75	109	184	Re	183.952520756
71	108	179	Lu	178.947327443	73	109	182	Ta	181.950151849	75	110	185	Re	184.952954982
71	109	180	Lu	179.949881160	73	110	183	Ta	182.951372616	75	111	186	Re	185.954986084
71	110	181	Lu	180.951970*	73	111	184	Ta	183.954007966	75	112	187	Re	186.955753109
71	111	182	Lu	181.955040*	73	112	185	Ta	184.955559375	75	113	188	Re	187.958114438
71	112	183	Lu	182.957570*	73	113	186	Ta	185.958552023	75	114	189	Re	188.959229007
71	113	184	Lu	183.960910*	73	114	187	Ta	186.960530*	75	115	190	Re	189.961817977
72	81	153	Hf	152.970690*	73	115	188	Ta	187.963700*	75	116	191	Re	190.963125242
72	82	154	Hf	153.964860*	73	116	189	Ta	188.965830*	75	117	192	Re	191.965960*
72	83	155	Hf	154.963390*	73	117	190	Ta	189.969230*	75	118	193	Re	192.967470*
72	84	156	Hf	155.959364025	74	84	158	W	157.974562*	75	119	194	Re	193.970420*
72	85	157	Hf	156.958396*	74	85	159	W	158.972918*	76	86	162	Os	161.984431*
72	86	158	Hf	157.954799366	74	86	160	W	159.968478805	76	87	163	Os	162.982690*
72	87	159	Hf	158.953994870	74	87	161	W	160.967357*	76	88	164	Os	163.978035649
72	88	160	Hf	159.950684379	74	88	162	W	161.963497417	76	89	165	Os	164.976762*
72	89	161	Hf	160.950274844	74	89	163	W	162.962523542	76	90	166	Os	165.972690753
72	90	162	Hf	161.947210498	74	90	164	W	163.958954382	76	91	167	Os	166.971547969
72	91	163	Hf	162.947089000	74	91	165	W	164.958279949	76	92	168	Os	167.967803678
72	92	164	Hf	163.944367284	74	92	166	W	165.955027253	76	93	169	Os	168.967019270
72	93	165	Hf	164.944567000	74	93	167	W	166.954816014	76	94	170	Os	169.963577028
72	94	166	Hf	165.942180000	74	94	168	W	167.951808394	76	95	171	Os	170.963184819
72	95	167	Hf	166.942600000	74	95	169	W	168.951778790	76	96	172	Os	171.960023303
72	96	168	Hf	167.940568000	74	96	170	W	169.949228482	76	97	173	Os	172.959808409
72	97	169	Hf	168.941259000	74	97	171	W	170.949451000	76	98	174	Os	173.957062202
72	98	170	Hf	169.939609000	74	98	172	W	171.947292000	76	99	175	Os	174.956945835
72	99	171	Hf	170.940492000	74	99	173	W	172.947689000	76	100	176	Os	175.954806000
72	100	172	Hf	171.939448301	74	100	174	W	173.946079000	76	101	177	Os	176.954965324
72	101	173	Hf	172.940513000	74	101	175	W	174.946717000	76	102	178	Os	177.953251241
72	102	174	Hf	173.940046178	74	102	176	W	175.945634000	76	103	179	Os	178.953816017
72	103	175	Hf	174.941509181	74	103	177	W	176.946643000	76	104	180	Os	179.952378803
72	104	176	Hf	175.941408631	74	104	178	W	177.945876236	76	105	181	Os	180.953244000
72	105	177	Hf	176.943220651	74	105	179	W	178.947070447	76	106	182	Os	181.952110186
72	106	178	Hf	177.943698766	74	106	180	W	179.946704459	76	107	183	Os	182.953126102
72	107	179	Hf	178.945816145	74	107	181	W	180.948197248	76	108	184	Os	183.952489071
72	108	180	Hf	179.946549953	74	108	182	W	181.948204156	76	109	185	Os	184.954042265
72	109	181	Hf	180.949101246	74	109	183	W	182.950222951	76	110	186	Os	185.953838158
72	110	182	Hf	181.950554096	74	110	184	W	183.950931188	76	111	187	Os	186.955750458
72	111	183	Hf	182.953530439	74	111	185	W	184.953419264	76	112	188	Os	187.955838228
72	112	184	Hf	183.955446515	74	112	186	W	185.954364127	76	113	189	Os	188.958147470
72	113	185	Hf	184.958820*	74	113	187	W	186.957160466	76	114	190	Os	189.958447048
72	114	186	Hf	185.960890*	74	114	188	W	187.958489105	76	115	191	Os	190.960929718
72	115	187	Hf	186.964590*	74	115	189	W	188.961912868	76	116	192	Os	191.961480690
72	116	188	Hf	187.966850*	74	116	190	W	189.963181378	76	117	193	Os	192.964151563
73	82	155	Ta	154.974592*	74	117	191	W	190.966600*	76	118	194	Os	193.95182083
73	83	156	Ta	155.972303*	74	118	192	W	191.968170*	76	119	195	Os	194.968126661

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
76	120	196	Os	.195	78	120	198	Pt	197.967892790	80	118	198	Hg	197.966769032
				55.538	78	121	199	Pt	198.970593094	80	119	199	Hg	198.968279932
77	87	164	Ir	163.992201*	78	122	200	Pt	199.971440677	80	120	200	Hg	199.968326004
77	88	165	Ir	164.987520*	78	123	201	Pt	200.974512868	80	121	201	Hg	200.970302268
77	89	166	Ir	165.985824*	78	124	202	Pt	201.975740*	80	122	202	Hg	201.970643011
77	90	167	Ir	166.981665156	79	90	169	Au	168.998080*	80	123	203	Hg	202.972872484
77	91	168	Ir	167.979881*	79	91	170	Au	169.996122*	80	124	204	Hg	203.973493933
77	92	169	Ir	168.976294942	79	92	171	Au	170.991878881	80	125	205	Hg	204.976073386
77	93	170	Ir	169.974965*	79	93	172	Au	171.990035*	80	126	206	Hg	205.977514066
77	94	171	Ir	170.971626042	79	94	173	Au	172.986237380	80	127	207	Hg	206.982588545
77	95	172	Ir	171.970456*	79	95	174	Au	173.984761*	80	128	208	Hg	207.985940*
77	96	173	Ir	172.967501739	79	96	175	Au	174.981274107	80	129	209	Hg	208.991040*
77	97	174	Ir	173.966861045	79	97	176	Au	175.980099*	80	130	210	Hg	209.994510*
77	98	175	Ir	174.964112895	79	98	177	Au	176.976864908	81	95	176	Tl	176.000590*
77	99	176	Ir	175.963648688	79	99	178	Au	177.976031920	81	96	177	Tl	176.996427286
77	100	177	Ir	176.961301500	79	100	179	Au	178.973212812	81	97	178	Tl	177.994897*
77	101	178	Ir	177.961082000	79	101	180	Au	179.972521124	81	98	179	Tl	178.991089082
77	102	179	Ir	178.959122266	79	102	181	Au	180.970079048	81	99	180	Tl	179.989906*
77	103	180	Ir	179.959229446	79	103	182	Au	181.969617874	81	100	181	Tl	180.986257447
77	104	181	Ir	180.957625297	79	104	183	Au	182.967593034	81	101	182	Tl	181.985667104
77	105	182	Ir	181.958076296	79	105	184	Au	183.967451524	81	102	183	Tl	182.982192802
77	106	183	Ir	182.956846458	79	106	185	Au	184.965789411	81	103	184	Tl	183.981873122
77	107	184	Ir	183.957476000	79	107	186	Au	185.965952703	81	104	185	Tl	184.978791305
77	108	185	Ir	184.956698000	79	108	187	Au	186.964567541	81	105	186	Tl	185.978325000
77	109	186	Ir	185.957946104	79	109	188	Au	187.965323661	81	106	187	Tl	186.975905897
77	110	187	Ir	186.957363361	79	110	189	Au	188.963948286	81	107	188	Tl	187.976009782
77	111	188	Ir	187.958853121	79	111	190	Au	189.964700339	81	108	189	Tl	188.973588428
77	112	189	Ir	188.958718935	79	112	191	Au	190.963704225	81	109	190	Tl	189.973877149
77	113	190	Ir	189.960545968	79	113	192	Au	191.964812953	81	110	191	Tl	190.971786154
77	114	191	Ir	190.960594046	79	114	193	Au	192.964149715	81	111	192	Tl	191.972225000
77	115	192	Ir	191.962605012	79	115	194	Au	193.965365250	81	112	193	Tl	192.970672000
77	116	193	Ir	192.962926430	79	116	195	Au	194.965034640	81	113	194	Tl	193.971200000
77	117	194	Ir	193.965078378	79	117	196	Au	195.966569813	81	114	195	Tl	194.969774335
77	118	195	Ir	194.965979573	79	118	197	Au	196.966568662	81	115	196	Tl	195.970481151
77	119	196	Ir	195.968396542	79	119	198	Au	197.968242303	81	116	197	Tl	196.969574511
77	120	197	Ir	196.969653285	79	120	199	Au	198.968765193	81	117	198	Tl	197.970483495
77	121	198	Ir	197.972280*	79	121	200	Au	199.970725647	81	118	199	Tl	198.969877000
77	122	199	Ir	198.973804583	79	122	201	Au	200.971657240	81	119	200	Tl	199.970962672
78	88	166	Pt	165.994855*	79	123	202	Au	201.973805838	81	120	201	Tl	200.970818891
78	89	167	Pt	166.992979*	79	124	203	Au	202.975154542	81	121	202	Tl	201.972105808
78	90	168	Pt	167.988150742	79	125	204	Au	203.977724*	81	122	203	Tl	202.972344220
78	91	169	Pt	168.986715*	79	126	205	Au	204.979870*	81	123	204	Tl	203.973863522
78	92	170	Pt	169.982495289	80	91	171	Hg	171.003760*	81	124	205	Tl	204.974427541
78	93	171	Pt	170.981244542	80	92	172	Hg	171.998832686	81	125	206	Tl	205.976110320
78	94	172	Pt	171.977347128	80	93	173	Hg	172.997242*	81	126	207	Tl	206.977419429
78	95	173	Pt	172.976444754	80	94	174	Hg	173.992863695	81	127	208	Tl	207.982018700
78	96	174	Pt	173.972818767	80	95	175	Hg	174.991423270	81	128	209	Tl	208.985358952
78	97	175	Pt	174.972420552	80	96	176	Hg	175.987354580	81	129	210	Tl	209.990073689
78	98	176	Pt	175.968944622	80	97	177	Hg	176.986279158	81	130	211	Tl	210.993477*
78	99	177	Pt	176.968469481	80	98	178	Hg	177.982483143	81	131	212	Tl	211.998228*
78	100	178	Pt	177.965648724	80	99	179	Hg	178.981833861	82	96	178	Pb	178.003830191
78	101	179	Pt	178.965363404	80	100	180	Hg	179.978266394	82	97	179	Pb	179.002150*
78	102	180	Pt	179.963031477	80	101	181	Hg	180.977819311	82	98	180	Pb	179.997918173
78	103	181	Pt	180.963097285	80	102	182	Hg	181.974689964	82	99	181	Pb	180.996623958
78	104	182	Pt	181.961170656	80	103	183	Hg	182.974449841	82	100	182	Pb	181.992671842
78	105	183	Pt	182.961596703	80	104	184	Hg	183.971713051	82	101	183	Pb	182.991874629
78	106	184	Pt	183.959922251	80	105	185	Hg	184.971899086	82	102	184	Pb	183.988142339
78	107	185	Pt	184.960619000	80	106	186	Hg	185.969361790	82	103	185	Pb	184.987609944
78	108	186	Pt	185.959350813	80	107	187	Hg	186.969814236	82	104	186	Pb	185.984238945
78	109	187	Pt	186.960587000	80	108	188	Hg	187.967577049	82	105	187	Pb	186.983918370
78	110	188	Pt	187.959395391	80	109	189	Hg	188.968190034	82	106	188	Pb	187.980874338
78	111	189	Pt	188.960833686	80	110	190	Hg	189.966322449	82	107	189	Pb	188.980807000
78	112	190	Pt	189.959931655	80	111	191	Hg	190.967157105	82	108	190	Pb	189.978081517
78	113	191	Pt	190.961676661	80	112	192	Hg	191.965634327	82	109	191	Pb	190.978265000
78	114	192	Pt	191.961038005	80	113	193	Hg	192.966665421	82	110	192	Pb	191.975785171
78	115	193	Pt	192.962987401	80	114	194	Hg	193.965439409	82	111	193	Pb	192.976173234
78	116	194	Pt	193.962680253	80	115	195	Hg	194.966720113	82	112	194	Pb	193.974012070
78	117	195	Pt	194.964791134	80	116	196	Hg	195.965832649	82	113	195	Pb	194.974542050
78	118	196	Pt	195.964951521	80	117	197	Hg	196.967212908	82	114	196	Pb	195.972774109
78	119	197	Pt	196.967340182										

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
82	115	197	Pb	196.973431124	84	119	203	Po	202.981420103	86	129	215	Rn	214.998745483
82	116	198	Pb	197.972033959	84	120	204	Po	203.980318121	86	130	216	Rn	216.000274370
82	117	199	Pb	198.972916650	84	121	205	Po	204.981203322	86	131	217	Rn	217.003927675
82	118	200	Pb	199.971826675	84	122	206	Po	205.980481099	86	132	218	Rn	218.005601256
82	119	201	Pb	200.972884511	84	123	207	Po	206.981593173	86	133	219	Rn	219.009480204
82	120	202	Pb	201.972159133	84	124	208	Po	207.981245702	86	134	220	Rn	220.011393981
82	121	203	Pb	202.973390521	84	125	209	Po	208.982430435	86	135	221	Rn	221.015536782
82	122	204	Pb	203.973043589	84	126	210	Po	209.982873673	86	136	222	Rn	222.017577738
82	123	205	Pb	204.974481755	84	127	211	Po	210.986653154	86	137	223	Rn	223.021790*
82	124	206	Pb	205.974465278	84	128	212	Po	211.988867969	86	138	224	Rn	224.024090*
82	125	207	Pb	206.975896887	84	129	213	Po	212.992857280	86	139	225	Rn	225.028440*
82	126	208	Pb	207.976652071	84	130	214	Po	213.995201350	86	140	226	Rn	226.030890*
82	127	209	Pb	208.981090120	84	131	215	Po	214.999419988	86	141	227	Rn	227.035407*
82	128	210	Pb	209.984188527	84	132	216	Po	216.001915035	86	142	228	Rn	228.037986*
82	129	211	Pb	210.988736964	84	133	217	Po	217.006334796	87	112	199	Fr	199.007258147
82	130	212	Pb	211.991897543	84	134	218	Po	218.008973037	87	113	200	Fr	200.006572490
82	131	213	Pb	212.996581499	84	135	219	Po	219.013744*	87	114	201	Fr	201.003860867
82	132	214	Pb	213.999805408	84	136	220	Po	220.016602*	87	115	202	Fr	202.003372847
82	133	215	Pb	215.004807*	85	108	193	At	192.999843112	87	116	203	Fr	203.000924647
83	101	184	Bi	184.001124*	85	109	194	At	193.998725085	87	117	204	Fr	204.000653204
83	102	185	Bi	184.997625*	85	110	195	At	194.996268098	87	118	205	Fr	204.998593960
83	103	186	Bi	185.996597625	85	111	196	At	195.995788077	87	119	206	Fr	205.998666066
83	104	187	Bi	186.993157835	85	112	197	At	196.993189215	87	120	207	Fr	206.996949414
83	105	188	Bi	187.992265154	85	113	198	At	197.992837202	87	121	208	Fr	207.997138783
83	106	189	Bi	188.989199012	85	114	199	At	198.990532254	87	122	209	Fr	208.995953555
83	107	190	Bi	189.988295129	85	115	200	At	199.990351264	87	123	210	Fr	209.996407738
83	108	191	Bi	190.985786119	85	116	201	At	200.988416999	87	124	211	Fr	210.995536544
83	109	192	Bi	191.985457954	85	117	202	At	201.988630236	87	125	212	Fr	211.996202244
83	110	193	Bi	192.982959771	85	118	203	At	202.986941984	87	126	213	Fr	212.996189081
83	111	194	Bi	193.982833960	85	119	204	At	203.987251326	87	127	214	Fr	213.998971145
83	112	195	Bi	194.980650737	85	120	205	At	204.986074483	87	128	215	Fr	215.000341497
83	113	196	Bi	195.980666509	85	121	206	At	205.986667036	87	129	216	Fr	216.003197990
83	114	197	Bi	196.978864454	85	122	207	At	206.985783502	87	130	217	Fr	217.004631951
83	115	198	Bi	197.979206000	85	123	208	At	207.986589977	87	131	218	Fr	218.007578322
83	116	199	Bi	198.977671961	85	124	209	At	208.986173143	87	132	219	Fr	219.009252149
83	117	200	Bi	199.978131829	85	125	210	At	209.987147710	87	133	220	Fr	220.012327405
83	118	201	Bi	200.977009036	85	126	211	At	210.987496271	87	134	221	Fr	221.014254762
83	119	202	Bi	201.977742324	85	127	212	At	211.990744771	87	135	222	Fr	222.017551730
83	120	203	Bi	202.976876001	85	128	213	At	212.992936646	87	136	223	Fr	223.019735857
83	121	204	Bi	203.977812736	85	129	214	At	213.996371733	87	137	224	Fr	224.023249951
83	122	205	Bi	204.977389366	85	130	215	At	214.998652570	87	138	225	Fr	225.025565414
83	123	206	Bi	205.978499130	85	131	216	At	216.002423257	87	139	226	Fr	226.029386231
83	124	207	Bi	206.978470679	85	132	217	At	217.004718822	87	140	227	Fr	227.031835938
83	125	208	Bi	207.979742196	85	133	218	At	218.008694336	87	141	228	Fr	228.035729*
83	126	209	Bi	208.980398734	85	134	219	At	219.011161691	87	142	229	Fr	229.038450228
83	127	210	Bi	209.984120371	85	135	220	At	220.015407682	87	143	230	Fr	230.042510*
83	128	211	Bi	210.987269460	85	136	221	At	221.018050*	87	144	231	Fr	231.045440*
83	129	212	Bi	211.991285724	85	137	222	At	222.022330*	87	145	232	Fr	232.049772*
83	130	213	Bi	212.994384666	85	138	223	At	223.025190*	88	114	202	Ra	202.009890686
83	131	214	Bi	213.998711539	86	109	195	Rn	195.005437696	88	115	203	Ra	203.009271619
83	132	215	Bi	215.001769776	86	110	196	Rn	196.002115223	88	116	204	Ra	204.006499668
83	133	216	Bi	216.006305943	86	111	197	Rn	197.001584351	88	117	205	Ra	205.006268570
83	134	217	Bi	217.009470*	86	112	198	Rn	197.998678663	88	118	206	Ra	206.003827270
83	135	218	Bi	218.014316*	86	113	199	Rn	198.998370297	88	119	207	Ra	207.003798105
84	104	188	Po	187.999422048	86	114	200	Rn	199.995699300	88	120	208	Ra	208.001839940
84	105	189	Po	188.998480562	86	115	201	Rn	200.995628335	88	121	209	Ra	209.001991373
84	106	190	Po	189.995101185	86	116	202	Rn	201.993263492	88	122	210	Ra	210.000494978
84	107	191	Po	190.994574485	86	117	203	Rn	202.993386687	88	123	211	Ra	211.000897987
84	108	192	Po	191.991335149	86	118	204	Rn	203.991428740	88	124	212	Ra	211.999794499
84	109	193	Po	192.991025275	86	119	205	Rn	204.991718799	88	125	213	Ra	213.000383959
84	110	194	Po	193.988185606	86	120	206	Rn	205.990214104	88	126	214	Ra	214.000107894
84	111	195	Po	194.988110728	86	121	207	Rn	206.990734225	88	127	215	Ra	215.002719834
84	112	196	Po	195.985534580	86	122	208	Rn	207.989642470	88	128	216	Ra	216.003533035
84	113	197	Po	196.985659630	86	123	209	Rn	208.990414742	88	129	217	Ra	217.006320327
84	114	198	Po	197.983388616	86	124	210	Rn	209.989696216	88	130	218	Ra	218.007140230
84	115	199	Po	198.983666063	86	125	211	Rn	210.990600523	88	131	219	Ra	219.010085078
84	116	200	Po	199.981798604	86	126	212	Rn	211.990703529	88	132	220	Ra	220.011028384
84	117	201	Po	200.982259764	86	127	213	Rn	212.993882668	88	133	221	Ra	221.013917338
84	118	202	Po	201.980757541	86	128	214	Rn	213.995362554	88	134	222	Ra	222.015374530

Z	N	A	Sy	Masse
88	135	223	Ra	223.018502171
88	136	224	Ra	224.020211821
88	137	225	Ra	225.023611564
88	138	226	Ra	226.025409823
88	139	227	Ra	227.029177842
88	140	228	Ra	228.031070292
88	141	229	Ra	229.034957577
88	142	230	Ra	230.037056394
88	143	231	Ra	231.041220*
88	144	232	Ra	232.043638*
88	145	233	Ra	233.048060*
88	146	234	Ra	234.050704*
89	117	206	Ac	206.014504980
89	118	207	Ac	207.011949748
89	119	208	Ac	208.011551551
89	120	209	Ac	209.009494863
89	121	210	Ac	210.009435986
89	122	211	Ac	211.007734835
89	123	212	Ac	212.007813822
89	124	213	Ac	213.006607643
89	125	214	Ac	214.006901798
89	126	215	Ac	215.006453625
89	127	216	Ac	216.008720075
89	128	217	Ac	217.009346914
89	129	218	Ac	218.011641453
89	130	219	Ac	219.012420389
89	131	220	Ac	220.014762979
89	132	221	Ac	221.015591248
89	133	222	Ac	222.017843851
89	134	223	Ac	223.019137468
89	135	224	Ac	224.021722866
89	136	225	Ac	225.023229585
89	137	226	Ac	226.026098089
89	138	227	Ac	227.027752127
89	139	228	Ac	228.031021112
89	140	229	Ac	229.033015243
89	141	230	Ac	230.036294178
89	142	231	Ac	231.038558786
89	143	232	Ac	232.042027438
89	144	233	Ac	233.044550*
89	145	234	Ac	234.048420*
89	146	235	Ac	235.051232*
89	147	236	Ac	236.055296*
90	119	209	Th	209.017715682
90	120	210	Th	210.015075342
90	121	211	Th	211.014928413
90	122	212	Th	212.012980288
90	123	213	Th	213.013010140
90	124	214	Th	214.011499770
90	125	215	Th	215.011730330
90	126	216	Th	216.011062115
90	127	217	Th	217.013114328
90	128	218	Th	218.013284499
90	129	219	Th	219.015536895
90	130	220	Th	220.015747762
90	131	221	Th	221.018183674
90	132	222	Th	222.018468121
90	133	223	Th	223.020811448
90	134	224	Th	224.021466895
90	135	225	Th	225.023951021
90	136	226	Th	226.024903069
90	137	227	Th	227.027704070
90	138	228	Th	228.028741127
90	139	229	Th	229.031762430
90	140	230	Th	230.033133843
90	141	231	Th	231.036304343
90	142	232	Th	232.038055325
90	143	233	Th	233.041581843
90	144	234	Th	234.043601230

Z	N	A	Sy	Masse
90	145	235	Th	235.047510074
90	146	236	Th	236.049870*
90	147	237	Th	237.053894*
90	148	238	Th	238.056496*
91	121	212	Pa	212.023204138
91	122	213	Pa	213.021109340
91	123	214	Pa	214.020918417
91	124	215	Pa	215.019185865
91	125	216	Pa	216.019109564
91	126	217	Pa	217.018323986
91	127	218	Pa	218.020041889
91	128	219	Pa	219.019883143
91	129	220	Pa	220.021875303
91	130	221	Pa	221.021877983
91	131	222	Pa	222.023742*
91	132	223	Pa	223.023962273
91	133	224	Pa	224.025625738
91	134	225	Pa	225.026130678
91	135	226	Pa	226.027947753
91	136	227	Pa	227.028805072
91	137	228	Pa	228.031051376
91	138	229	Pa	229.032096793
91	139	230	Pa	230.034540754
91	140	231	Pa	231.035883990
91	141	232	Pa	232.038591592
91	142	233	Pa	233.040247277
91	143	234	Pa	234.043308058
91	144	235	Pa	235.045443615
91	145	236	Pa	236.048681284
91	146	237	Pa	237.051145659
91	147	238	Pa	238.054502710
91	148	239	Pa	239.057260*
91	149	240	Pa	240.060980*
92	125	217	U	217.024368791
92	126	218	U	218.023535671
92	127	219	U	219.024919160
92	128	220	U	220.024723*
92	129	221	U	221.026399*
92	130	222	U	222.026086*
92	131	223	U	223.027738600
92	132	224	U	224.027604778
92	133	225	U	225.029390717
92	134	226	U	226.029338702
92	135	227	U	227.031156367
92	136	228	U	228.031374006
92	137	229	U	229.033505939
92	138	230	U	230.033939784
92	139	231	U	231.036293704
92	140	232	U	232.037156152
92	141	233	U	233.039635207
92	142	234	U	234.040952088
92	143	235	U	235.043929918
92	144	236	U	236.045568006
92	145	237	U	237.048730184
92	146	238	U	238.050788247
92	147	239	U	239.054293299
92	148	240	U	240.056591988
92	149	241	U	241.060330*
92	150	242	U	242.062931*
93	132	225	Np	225.033913933
93	133	226	Np	226.035145*
93	134	227	Np	227.034956789
93	135	228	Np	228.036180*
93	136	229	Np	229.036263808
93	137	230	Np	230.037827597
93	138	231	Np	231.038245085
93	139	232	Np	232.040108*
93	140	233	Np	233.040740546
93	141	234	Np	234.042895038

Z	N	A	Sy	Masse
93	142	235	Np	235.044063267
93	143	236	Np	236.046569600
93	144	237	Np	237.048173444
93	145	238	Np	238.050946405
93	146	239	Np	239.052939025
93	147	240	Np	240.056162182
93	148	241	Np	241.058252431
93	149	242	Np	242.061641180
93	150	243	Np	243.064279*
93	151	244	Np	244.067850*
94	134	228	Pu	228.038742328
94	135	229	Pu	229.040150212
94	136	230	Pu	230.039649886
94	137	231	Pu	231.041101107
94	138	232	Pu	232.041187097
94	139	233	Pu	233.042997375
94	140	234	Pu	234.043317076
94	141	235	Pu	235.045286050
94	142	236	Pu	236.046057964
94	143	237	Pu	237.048409658
94	144	238	Pu	238.049559894
94	145	239	Pu	239.052163381
94	146	240	Pu	240.053813545
94	147	241	Pu	241.056851456
94	148	242	Pu	242.058742611
94	149	243	Pu	243.062003092
94	150	244	Pu	244.064203907
94	151	245	Pu	245.067747154
94	152	246	Pu	246.070204627
94	153	247	Pu	247.074070*
95	136	231	Am	231.045560*
95	137	232	Am	232.046590*
95	138	233	Am	233.046348*
95	139	234	Am	234.047809*
95	140	235	Am	235.047946*
95	141	236	Am	236.049579*
95	142	237	Am	237.049996*
95	143	238	Am	238.051984324
95	144	239	Am	239.053024479
95	145	240	Am	240.055300179
95	146	241	Am	241.056829144
95	147	242	Am	242.059549159
95	148	243	Am	243.061381080
95	149	244	Am	244.064284847
95	150	245	Am	245.066452114
95	151	246	Am	246.069774619
95	152	247	Am	247.072093*
95	153	248	Am	248.075752*
95	154	249	Am	249.078480*
96	137	233	Cm	233.050771232
96	138	234	Cm	234.050159841
96	139	235	Cm	235.051434*
96	140	236	Cm	236.051413*
96	141	237	Cm	237.052901*
96	142	238	Cm	238.053028697
96	143	239	Cm	239.054957*
96	144	240	Cm	240.055529539
96	145	241	Cm	241.057653001
96	146	242	Cm	242.058835824
96	147	243	Cm	243.061389114
96	148	244	Cm	244.062752578
96	149	245	Cm	245.065491249
96	150	246	Cm	246.067223662
96	151	247	Cm	247.070353540
96	152	248	Cm	248.072348508
96	153	249	Cm	249.075953413
96	154	250	Cm	250.078356959
96	155	251	Cm	251.082284605
96	156	252	Cm	252.084870*

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
97	138	235	Bk	235.056580*	100	152	252	Fm	252.082466855	104	158	262	Rf	262.109925*
97	139	236	Bk	236.057330*	100	153	253	Fm	253.085185236	104	159	263	Rf	263.112547*
97	140	237	Bk	237.057003*	100	154	254	Fm	254.086854220	104	160	264	Rf	264.113985*
97	141	238	Bk	238.058281*	100	155	255	Fm	255.089962202	104	161	265	Rf	265.116704*
97	142	239	Bk	239.058279*	100	156	256	Fm	256.091773117	104	162	266	Rf	266.117956*
97	143	240	Bk	240.059759*	100	157	257	Fm	257.095104724	104	163	267	Rf	267.121529*
97	144	241	Bk	241.060230*	100	158	258	Fm	258.097076*	104	164	268	Rf	268.123644*
97	145	242	Bk	242.061981*	100	159	259	Fm	259.100595*	105	150	255	Db	255.107398*
97	146	243	Bk	243.063007572	100	160	260	Fm	260.102678*	105	151	256	Db	256.108127*
97	147	244	Bk	244.065180774	101	144	245	Md	245.080829*	105	152	257	Db	257.107722*
97	148	245	Bk	245.066361616	101	145	246	Md	246.081886*	105	153	258	Db	258.109231*
97	149	246	Bk	246.068672947	101	146	247	Md	247.081635*	105	154	259	Db	259.109610*
97	150	247	Bk	247.070307080	101	147	248	Md	248.082823*	105	155	260	Db	260.111300*
97	151	248	Bk	248.073086*	101	148	249	Md	249.083013*	105	156	261	Db	261.112056*
97	152	249	Bk	249.074986657	101	149	250	Md	250.084420*	105	157	262	Db	262.114084*
97	153	250	Bk	250.078316520	101	150	251	Md	251.084839*	105	158	263	Db	263.114988*
97	154	251	Bk	251.080760172	101	151	252	Md	252.086560*	105	159	264	Db	264.117404*
97	155	252	Bk	252.084310*	101	152	253	Md	253.087280*	105	160	265	Db	265.118601*
97	156	253	Bk	253.086880*	101	153	254	Md	254.089656*	105	161	266	Db	266.121029*
97	157	254	Bk	254.090600*	101	154	255	Md	255.091082705	105	162	267	Db	267.122377*
98	139	237	Cf	237.062070*	101	155	256	Md	256.094059025	105	163	268	Db	268.125445*
98	140	238	Cf	238.061410*	101	156	257	Md	257.095541368	105	164	269	Db	269.127460*
98	141	239	Cf	239.062422*	101	157	258	Md	258.098431319	105	165	270	Db	270.130712*
98	142	240	Cf	240.062302*	101	158	259	Md	259.100509*	106	152	258	Sg	258.113168*
98	143	241	Cf	241.063726*	101	159	260	Md	260.103652*	106	153	259	Sg	259.114500*
98	144	242	Cf	242.063701552	101	160	261	Md	261.105721*	106	154	260	Sg	260.114422071
98	145	243	Cf	243.065427*	101	161	262	Md	262.108865*	106	155	261	Sg	261.116117*
98	146	244	Cf	244.066000689	102	146	248	No	248.086596*	106	156	262	Sg	262.116398*
98	147	245	Cf	245.068048612	102	147	249	No	249.087833*	106	157	263	Sg	263.118322*
98	148	246	Cf	246.068805309	102	148	250	No	250.087510*	106	158	264	Sg	264.118931*
98	149	247	Cf	247.071000589	102	149	251	No	251.089012*	106	159	265	Sg	265.121114693
98	150	248	Cf	248.072184861	102	150	252	No	252.088976521	106	160	266	Sg	266.122065*
98	151	249	Cf	249.074853537	102	151	253	No	253.090678*	106	161	267	Sg	267.124425*
98	152	250	Cf	250.076406066	102	152	254	No	254.090955253	106	162	268	Sg	268.125606*
98	153	251	Cf	251.079586788	102	153	255	No	255.093241131	106	163	269	Sg	269.128755*
98	154	252	Cf	252.081625846	102	154	256	No	256.094282666	106	164	270	Sg	270.130329*
98	155	253	Cf	253.085133145	102	155	257	No	257.096877190	106	165	271	Sg	271.133472*
98	156	254	Cf	254.087322909	102	156	258	No	258.098207*	106	166	272	Sg	272.135158*
98	157	255	Cf	255.091046*	102	157	259	No	259.101031*	106	167	273	Sg	273.138220*
98	158	256	Cf	256.093440*	102	158	260	No	260.102643*	107	153	260	Bh	260.121970*
99	141	240	Es	240.068920*	102	159	261	No	261.105749*	107	154	261	Bh	261.121664*
99	142	241	Es	241.068538*	102	160	262	No	262.107301*	107	155	262	Bh	262.122892*
99	143	242	Es	242.069745*	102	161	263	No	263.110552*	107	156	263	Bh	263.123035*
99	144	243	Es	243.069548*	102	162	264	No	264.112345*	107	157	264	Bh	264.124604*
99	145	244	Es	244.070883*	103	148	251	Lr	251.094360*	107	158	265	Bh	265.125147*
99	146	245	Es	245.071324*	103	149	252	Lr	252.095371*	107	159	266	Bh	266.126942*
99	147	246	Es	246.072896*	103	150	253	Lr	253.095210*	107	160	267	Bh	267.127650*
99	148	247	Es	247.073656*	103	151	254	Lr	254.096454*	107	161	268	Bh	268.129755*
99	149	248	Es	248.075471*	103	152	255	Lr	255.096681*	107	162	269	Bh	269.130694*
99	150	249	Es	249.076411*	103	153	256	Lr	256.098629*	107	163	270	Bh	270.133616*
99	151	250	Es	250.078612*	103	154	257	Lr	257.099555*	107	164	271	Bh	271.135179*
99	152	251	Es	251.079992142	103	155	258	Lr	258.101814*	107	165	272	Bh	272.138032*
99	153	252	Es	252.082978512	103	156	259	Lr	259.102901*	107	166	273	Bh	273.139618*
99	154	253	Es	253.084824697	103	157	260	Lr	260.105504*	107	167	274	Bh	274.142440*
99	155	254	Es	254.088022021	103	158	261	Lr	261.106883*	107	168	275	Bh	275.144250*
99	156	255	Es	255.090273122	103	159	262	Lr	262.109634*	108	155	263	Hs	263.128558*
99	157	256	Es	256.093598*	103	160	263	Lr	263.111293*	108	156	264	Hs	264.128394885
99	158	257	Es	257.095979*	103	161	264	Lr	264.114038*	108	157	265	Hs	265.130085*
99	159	258	Es	258.099520*	103	162	265	Lr	265.115839*	108	158	266	Hs	266.130097*
100	142	242	Fm	242.073430*	103	163	266	Lr	266.119305*	108	159	267	Hs	267.131789*
100	143	243	Fm	243.074353*	104	149	253	Rf	253.100689*	108	160	268	Hs	268.132162*
100	144	244	Fm	244.074084*	104	150	254	Rf	254.100184*	108	161	269	Hs	269.134056*
100	145	245	Fm	245.075385*	104	151	255	Rf	255.101340*	108	162	270	Hs	270.134650*
100	146	246	Fm	246.075299023	104	152	256	Rf	256.101166194	108	163	271	Hs	271.137657*
100	147	247	Fm	247.076847*	104	153	257	Rf	257.102990*	108	164	272	Hs	272.139052*
100	148	248	Fm	248.077194714	104	154	258	Rf	258.103489*	108	165	273	Hs	273.141986*
100	149	249	Fm	249.079034*	104	155	259	Rf	259.105637*	108	166	274	Hs	274.143131*
100	150	250	Fm	250.079521264	104	156	260	Rf	260.106440*	108	167	275	Hs	275.145952*
100	151	251	Fm	251.081575017	104	157	261	Rf	261.108766556	108	168	276	Hs	276.147208*

Z	N	A	Sy	Masse	Z	N	A	Sy	Masse
108	169	277	Hs	277.149841*	116	175	291	Lv	291.200011*
109	156	265	Mt	265.136151*	116	176	292	Lv	292.199786*
109	157	266	Mt	266.137299*	117	174	291	Ts	291.206564*
109	158	267	Mt	267.137307*	117	175	292	Ts	292.207549*
109	159	268	Mt	268.138728*	118	175	293	Og	293.214670*
109	160	269	Mt	269.139055*					
109	161	270	Mt	270.140657*					
109	162	271	Mt	271.141139*					
109	163	272	Mt	272.143738*					
109	164	273	Mt	273.144913*					
109	165	274	Mt	274.147492*					
109	166	275	Mt	275.148647*					
109	167	276	Mt	276.151156*					
109	168	277	Mt	277.152420*					
109	169	278	Mt	278.154812*					
109	170	279	Mt	279.156193*					
110	157	267	Ds	267.144341*					
110	158	268	Ds	268.143795*					
110	159	269	Ds	269.145124*					
110	160	270	Ds	270.144720*					
110	161	271	Ds	271.146062*					
110	162	272	Ds	272.146317*					
110	163	273	Ds	273.148863*					
110	164	274	Ds	274.149492*					
110	165	275	Ds	275.152176*					
110	166	276	Ds	276.153034*					
110	167	277	Ds	277.155647*					
110	168	278	Ds	278.156469*					
110	169	279	Ds	279.158861*					
110	170	280	Ds	280.159795*					
110	171	281	Ds	281.162061*					
111	161	272	Rg	272.153615*					
111	162	273	Rg	273.153682*					
111	163	274	Rg	274.155713*					
111	164	275	Rg	275.156142*					
111	165	276	Rg	276.158493*					
111	166	277	Rg	277.159519*					
111	167	278	Rg	278.161604*					
111	168	279	Rg	279.162468*					
111	169	280	Rg	280.164473*					
111	170	281	Rg	281.165372*					
111	171	282	Rg	282.167486*					
111	172	283	Rg	283.168415*					
112	165	277	Rg	277.163943*					
112	166	278	Rg	278.164312*					
112	167	279	Rg	279.166546*					
112	168	280	Rg	280.167039*					
112	169	281	Rg	281.169286*					
112	170	282	Rg	282.169765*					
112	171	283	Rg	283.171792*					
112	172	284	Rg	284.172384*					
112	173	285	Rg	285.174105*					
113	170	283	Nh	283.176451*					
113	171	284	Nh	284.178080*					
113	172	285	Nh	285.178732*					
113	173	286	Nh	286.180481*					
113	174	287	Nh	287.181045*					
114	171	285	Fl	285.183698*					
114	172	286	Fl	286.183855*					
114	173	287	Fl	287.185599*					
114	174	288	Fl	288.185689*					
114	175	289	Fl	289.187279*					
115	172	287	Mc	287.191186*					
115	173	288	Mc	288.192492*					
115	174	289	Mc	289.192715*					
115	175	290	Mc	290.194141*					
115	176	291	Mc	291.194384*					
116	173	289	Lv	289.198862*					
116	174	290	Lv	290.198590*					