

ATOMIC MASSES AND ABUNDANCES

This table lists the mass (in atomic mass units, symbol u) and the natural abundance (in percent) of the stable nuclides and a few important radioactive nuclides. A complete table of all nuclides may be found in Section 11 ("Table of the Isotopes").

The atomic masses were taken from the 2003 evaluation of Audi, Wapstra, and Thibault (References 2, 3). The number in parentheses following the mass value is the uncertainty in the last digit(s) given. An asterisk * after an entry indicates the mass value was derived not purely from experimental data, but at least partly from systematic trends.

Natural abundance values were taken from the IUPAC Technical Report "Atomic Weight of the Elements: Review 2000" (Reference 4); these entries are also followed by uncertainties in the last digit(s) of the stated values. This uncertainty includes both the estimated measurement uncertainty and the reported range of variation in different terrestrial sources of the element (see Reference 4 for full

details and caveats regarding elements whose abundance is variable). The absence of an entry in the Abundance column indicates a radioactive nuclide not present in nature or an element whose isotopic composition varies so widely that a meaningful natural abundance cannot be defined.

References

1. Holden, N. E., "Table of the Isotopes", in Lide, D. R., Ed., *CRC Handbook of Chemistry and Physics, 86th Ed.*, CRC Press, Boca Raton FL, 2005.
2. Audi, G., Wapstra, A. H., and Thibault, *Nucl. Phys.*, A729, 336, 2003.
3. Audi, G., and Wapstra, A. H., Atomic Mass Data Center, World Wide Web site, <<http://www.nndc.bnl.gov/amdc/index.html>>
4. de Laeter, J. R., Böhlke, J. K., De Bièvre, P., Hidaka, H., Peiser, H. S., Rosman, K. J. R., and Taylor, P. D. P., *Pure Appl. Chem.* 75, 683, 2003.

Z	Isotope	Mass in u	Abundance in %
1	¹ H	1.00782503207(10)	99.9885(70)
	² H	2.0141017778(4)	0.0115(70)
	³ H	3.0160492777(25)	
2	³ He	3.0160293191(26)	0.000134(3)
	⁴ He	4.00260325415(6)	99.999866(3)
3	⁶ Li	6.015122795(16)	7.59(4)
	⁷ Li	7.01600455(8)	92.41(4)
4	⁹ Be	9.0121822(4)	100
5	¹⁰ B	10.0129370(4)	19.9(7)
	¹¹ B	11.0093054(4)	80.1(7)
6	¹¹ C	11.0114336(10)	
	¹² C	12.0000000(0)	98.93(8)
	¹³ C	13.0033548378(10)	1.07(8)
	¹⁴ C	14.003241989(4)	
7	¹⁴ N	14.0030740048(6)	99.636(7)
	¹⁵ N	15.0001088982(7)	0.364(7)
8	¹⁶ O	15.99491461956(16)	99.757(16)
	¹⁷ O	16.99913170(12)	0.038(1)
	¹⁸ O	17.9991610(7)	0.205(14)
9	¹⁸ F	18.0009380(6)	
	¹⁹ F	18.99840322(7)	100
10	²⁰ Ne	19.9924401754(19)	90.48(3)
	²¹ Ne	20.99384668(4)	0.27(1)
	²² Ne	21.991385114(19)	9.25(3)
11	²² Na	21.9944364(4)	
	²³ Na	22.9897692809(29)	100
	²⁴ Na	23.99096278(8)	
12	²⁴ Mg	23.985041700(14)	78.99(4)
	²⁵ Mg	24.98583692(3)	10.00(1)
	²⁶ Mg	25.982592929(30)	11.01(3)
13	²⁷ Al	26.98153863(12)	100
14	²⁸ Si	27.9769265325(19)	92.223(19)
	²⁹ Si	28.976494700(22)	4.685(8)
	³⁰ Si	29.97377017(3)	3.092(11)
15	³¹ P	30.97376163(20)	100
	³² P	31.97390727(20)	
16	³² S	31.97207100(15)	94.99(26)
	³³ S	32.97145876(15)	0.75(2)
	³⁴ S	33.96786690(12)	4.25(24)
	³⁵ S	34.96903216(11)	
	³⁶ S	35.96708076(20)	0.01(1)

Z	Isotope	Mass in u	Abundance in %
17	³⁵ Cl	34.96885268(4)	75.76(10)
	³⁷ Cl	36.96590259(5)	24.24(10)
18	³⁶ Ar	35.967545106(29)	0.3365(30)
	³⁸ Ar	37.9627324(4)	0.0632(5)
	⁴⁰ Ar	39.9623831225(29)	99.6003(30)
19	³⁹ K	38.96370668(20)	93.2581(44)
	⁴⁰ K	39.96399848(21)	0.0117(1)
	⁴¹ K	40.96182576(21)	6.7302(44)
	⁴² K	41.96240281(24)	
	⁴³ K	42.960716(10)	
20	⁴⁰ Ca	39.96259098(22)	96.941(156)
	⁴² Ca	41.95861801(27)	0.647(23)
	⁴³ Ca	42.9587666(3)	0.135(10)
	⁴⁴ Ca	43.9554818(4)	2.086(110)
	⁴⁵ Ca	44.9561866(4)	
	⁴⁶ Ca	45.9536926(24)	0.004(3)
	⁴⁷ Ca	46.9545460(24)	
	⁴⁸ Ca	47.952534(4)	0.187(21)
21	⁴⁵ Sc	44.9559119(9)	100
22	⁴⁶ Ti	45.9526316(9)	8.25(3)
	⁴⁷ Ti	46.9517631(9)	7.44(2)
	⁴⁸ Ti	47.9479463(9)	73.72(3)
	⁴⁹ Ti	48.9478700(9)	5.41(2)
	⁵⁰ Ti	49.9447912(9)	5.18(2)
23	⁵⁰ V	49.9471585(11)	0.250(4)
	⁵¹ V	50.9439595(11)	99.750(4)
24	⁵⁰ Cr	49.9460442(11)	4.345(13)
	⁵¹ Cr	50.9447674(11)	
	⁵² Cr	51.9405075(8)	83.789(18)
	⁵³ Cr	52.9406494(8)	9.501(17)
	⁵⁴ Cr	53.9388804(8)	2.365(7)
25	⁵⁴ Mn	53.9403589(14)	
	⁵⁵ Mn	54.9380451(7)	100
26	⁵² Fe	51.948114(7)	
	⁵⁴ Fe	53.9396105(7)	5.845(35)
	⁵⁵ Fe	54.9382934(7)	
	⁵⁶ Fe	55.9349375(7)	91.754(36)
	⁵⁷ Fe	56.9353940(7)	2.119(10)
	⁵⁸ Fe	57.9332756(8)	0.282(4)
	⁵⁹ Fe	58.9348755(8)	
27	⁵⁷ Co	56.9362914(8)	

Z	Isotope	Mass in u	Abundance in %	Z	Isotope	Mass in u	Abundance in %
	⁵⁸ Co	57.9357528(13)			⁹⁶ Zr	95.9082734(30)	2.80(9)
	⁵⁹ Co	58.9331950(7)	100	41	⁹³ Nb	92.9063781(26)	100
	⁶⁰ Co	59.9338171(7)		42	⁹² Mo	91.906811(4)	14.77(31)
28	⁵⁸ Ni	57.9353429(7)	68.0769(89)		⁹⁴ Mo	93.9050883(21)	9.23(10)
	⁵⁹ Ni	58.9343467(7)			⁹⁵ Mo	94.9058421(21)	15.90(9)
	⁶⁰ Ni	59.9307864(7)	26.2231(77)		⁹⁶ Mo	95.9046795(21)	16.68(1)
	⁶¹ Ni	60.9310560(7)	1.1399(6)		⁹⁷ Mo	96.9060215(21)	9.56(5)
	⁶² Ni	61.9283451(6)	3.6345(17)		⁹⁸ Mo	97.9054082(21)	24.19(26)
	⁶³ Ni	62.9296694(6)			⁹⁹ Mo	98.9077119(21)	
	⁶⁴ Ni	63.9279660(7)	0.9256(9)		¹⁰⁰ Mo	99.907477(6)	9.67(20)
29	⁶³ Cu	62.9295975(6)	69.15(3)	43	⁹⁷ Tc	96.906365(5)	
	⁶⁴ Cu	63.9297642(6)			⁹⁸ Tc	97.907216(4)	
	⁶⁵ Cu	64.9277895(7)	30.85(3)		⁹⁹ Tc	98.9062547(21)	
30	⁶⁴ Zn	63.9291422(7)	48.268(321)	44	⁹⁶ Ru	95.907598(8)	5.54(14)
	⁶⁵ Zn	64.9292410(7)			⁹⁸ Ru	97.905287(7)	1.87(3)
	⁶⁶ Zn	65.9260334(10)	27.975(77)		⁹⁹ Ru	98.9059393(22)	12.76(14)
	⁶⁷ Zn	66.9271273(10)	4.102(21)		¹⁰⁰ Ru	99.9042195(22)	12.60(7)
	⁶⁸ Zn	67.9248442(10)	19.024(123)		¹⁰¹ Ru	100.9055821(22)	17.06(2)
	⁷⁰ Zn	69.9253193(21)	0.631(9)		¹⁰² Ru	101.9043493(22)	31.55(14)
31	⁶⁷ Ga	66.9282017(14)			¹⁰⁴ Ru	103.905433(3)	18.62(27)
	⁶⁸ Ga	67.9279801(16)			¹⁰⁶ Ru	105.907329(8)	
	⁶⁹ Ga	68.9255736(13)	60.108(9)	45	¹⁰³ Rh	102.905504(3)	100
	⁷¹ Ga	70.9247013(11)	39.892(9)	46	¹⁰² Pd	101.905609(3)	1.02(1)
32	⁶⁸ Ge	67.928094(7)			¹⁰⁴ Pd	103.904036(4)	11.14(8)
	⁷⁰ Ge	69.9242474(11)	20.38(18)		¹⁰⁵ Pd	104.905085(4)	22.33(8)
	⁷² Ge	71.9220758(18)	27.31(26)		¹⁰⁶ Pd	105.903486(4)	27.33(3)
	⁷³ Ge	72.9234589(18)	7.76(8)		¹⁰⁸ Pd	107.903892(4)	26.46(9)
	⁷⁴ Ge	73.9211778(18)	36.72(15)		¹¹⁰ Pd	109.905153(12)	11.72(9)
	⁷⁶ Ge	75.9214026(18)	7.83(7)	47	¹⁰⁷ Ag	106.905097(5)	51.839(8)
33	⁷⁵ As	74.9215965(20)	100		¹⁰⁹ Ag	108.904752(3)	48.161(8)
34	⁷⁴ Se	73.9224764(18)	0.89(4)	48	¹⁰⁶ Cd	105.906459(6)	1.25(6)
	⁷⁵ Se	74.9225234(18)			¹⁰⁸ Cd	107.904184(6)	0.89(3)
	⁷⁶ Se	75.9192136(18)	9.37(29)		¹¹⁰ Cd	109.9030021(29)	12.49(18)
	⁷⁷ Se	76.9199140(18)	7.63(16)		¹¹¹ Cd	110.9041781(29)	12.80(12)
	⁷⁸ Se	77.9173091(18)	23.77(28)		¹¹² Cd	111.9027578(29)	24.13(21)
	⁷⁹ Se	78.9184991(18)			¹¹³ Cd	112.9044017(29)	12.22(12)
	⁸⁰ Se	79.9165213(21)	49.61(41)		¹¹⁴ Cd	113.9033585(29)	28.73(42)
	⁸² Se	81.9166994(22)	8.73(22)		¹¹⁶ Cd	115.904756(3)	7.49(18)
35	⁷⁹ Br	78.9183371(22)	50.69(7)	49	¹¹¹ In	110.905103(5)	
	⁸¹ Br	80.9162906(21)	49.31(7)		¹¹³ In	112.904058(3)	4.29(5)
36	⁷⁸ Kr	77.9203648(12)	0.355(3)		¹¹⁵ In	114.903878(5)	95.71(5)
	⁸⁰ Kr	79.9163790(16)	2.286(10)	50	¹¹² Sn	111.904818(5)	0.97(1)
	⁸² Kr	81.9134836(19)	11.593(31)		¹¹³ Sn	112.905171(4)	
	⁸³ Kr	82.914136(3)	11.500(19)		¹¹⁴ Sn	113.902779(3)	0.66(1)
	⁸⁴ Kr	83.911507(3)	56.987(15)		¹¹⁵ Sn	114.903342(3)	0.34(1)
	⁸⁶ Kr	85.91061073(11)	17.279(41)		¹¹⁶ Sn	115.901741(3)	14.54(9)
37	⁸⁵ Rb	84.911789738(12)	72.17(2)		¹¹⁷ Sn	116.902952(3)	7.68(7)
	⁸⁶ Rb	85.91116742(21)			¹¹⁸ Sn	117.901603(3)	24.22(9)
	⁸⁷ Rb	86.909180527(13)	27.83(2)		¹¹⁹ Sn	118.903308(3)	8.59(4)
38	⁸⁴ Sr	83.913425(3)	0.56(1)		¹²⁰ Sn	119.9021947(27)	32.58(9)
	⁸⁵ Sr	84.912933(3)			¹²² Sn	121.9034390(29)	4.63(3)
	⁸⁶ Sr	85.9092602(12)	9.86(1)		¹²⁴ Sn	123.9052739(15)	5.79(5)
	⁸⁷ Sr	86.9088771(12)	7.00(1)	51	¹²¹ Sb	120.9038157(24)	57.21(5)
	⁸⁸ Sr	87.9056121(12)	82.58(1)		¹²³ Sb	122.9042140(22)	42.79(5)
	⁸⁹ Sr	88.9074507(12)		52	¹²⁰ Te	119.904020(10)	0.09(1)
	⁹⁰ Sr	89.907738(3)			¹²² Te	121.9030439(16)	2.55(12)
39	⁸⁹ Y	88.9058483(27)	100		¹²³ Te	122.9042700(16)	0.89(3)
40	⁹⁰ Zr	89.9047044(25)	51.45(40)		¹²⁴ Te	123.9028179(16)	4.74(14)
	⁹¹ Zr	90.9056458(25)	11.22(5)		¹²⁵ Te	124.9044307(16)	7.07(15)
	⁹² Zr	91.9050408(25)	17.15(8)		¹²⁶ Te	125.9033117(16)	18.84(25)
	⁹⁴ Zr	93.9063152(26)	17.38(28)		¹²⁸ Te	127.9044631(19)	31.74(8)

Z	Isotope	Mass in u	Abundance in %	Z	Isotope	Mass in u	Abundance in %	
53	¹³⁰ Te	129.9062244(21)	34.08(62)	65	¹⁵⁸ Gd	157.9241039(27)	24.84(7)	
	¹²³ I	122.905589(4)			¹⁶⁰ Gd	159.9270541(27)	21.86(19)	
	¹²⁵ I	124.9046302(16)			¹⁵⁹ Tb	158.9253468(27)	100	
	¹²⁷ I	126.904473(4)	100		¹⁵⁶ Dy	155.924283(7)	0.056(3)	
	¹²⁹ I	128.904988(3)			¹⁵⁸ Dy	157.924409(4)	0.095(3)	
54	¹³¹ I	130.9061246(12)			¹⁶⁰ Dy	159.9251975(27)	2.329(18)	
	¹²⁴ Xe	123.9058930(20)	0.0952(3)		¹⁶¹ Dy	160.9269334(27)	18.889(42)	
	¹²⁶ Xe	125.904274(7)	0.0890(2)		¹⁶² Dy	161.9267984(27)	25.475(36)	
	¹²⁸ Xe	127.9035313(15)	1.9102(8)		¹⁶³ Dy	162.9287312(27)	24.896(42)	
	¹²⁹ Xe	128.9047794(8)	26.4006(82)		¹⁶⁴ Dy	163.9291748(27)	28.260(54)	
	¹³⁰ Xe	129.9035080(8)	4.0710(13)		67	¹⁶⁵ Ho	164.9303221(27)	100
	¹³¹ Xe	130.9050824(10)	21.2324(30)			¹⁶² Er	161.928778(4)	0.139(5)
	¹³² Xe	131.9041535(10)	26.9086(33)			¹⁶⁴ Er	163.929200(3)	1.601(3)
¹³⁴ Xe	133.9053945(9)	10.4357(21)	¹⁶⁶ Er			165.9302931(27)	33.503(36)	
¹³⁶ Xe	135.907219(8)	8.8573(44)	¹⁶⁷ Er			166.9320482(27)	22.869(9)	
55	¹²⁹ Cs	128.906064(5)		¹⁶⁸ Er		167.9323702(27)	26.978(18)	
	¹³³ Cs	132.905451933(24)	100	¹⁷⁰ Er		169.9354643(30)	14.910(36)	
	¹³⁴ Cs	133.906718475(28)		69		¹⁶⁹ Tm	168.9342133(27)	100
	¹³⁶ Cs	135.9073116(20)				¹⁶⁸ Yb	167.933897(5)	0.13(1)
	56	¹³⁷ Cs	136.9070895(5)			¹⁶⁹ Yb	168.935190(5)	
¹³⁰ Ba		129.9063208(30)	0.106(1)	¹⁷⁰ Yb	169.9347618(26)	3.04(15)		
¹³² Ba		131.9050613(11)	0.101(1)	¹⁷¹ Yb	170.9363258(26)	14.28(57)		
¹³³ Ba		132.9060075(11)		¹⁷² Yb	171.9363815(26)	21.83(67)		
¹³⁴ Ba		133.9045084(4)	2.417(18)	¹⁷³ Yb	172.9382108(26)	16.13(27)		
¹³⁵ Ba		134.9056886(4)	6.592(12)	¹⁷⁴ Yb	173.9388621(26)	31.83(92)		
¹³⁶ Ba		135.9045759(4)	7.854(24)	¹⁷⁶ Yb	175.9425717(28)	12.76(41)		
¹³⁷ Ba		136.9058274(5)	11.232(24)	71	¹⁷⁵ Lu	174.9407718(23)	97.41(2)	
¹³⁸ Ba		137.9052472(5)	71.698(42)		¹⁷⁶ Lu	175.9426863(23)	2.59(2)	
57		¹⁴⁰ Ba	139.910605(9)		72	¹⁷⁴ Hf	173.940046(3)	0.16(1)
	¹³⁸ La	137.907112(4)	0.090(1)	¹⁷⁶ Hf		175.9414086(24)	5.26(7)	
	¹³⁹ La	138.9063533(26)	99.910(1)	¹⁷⁷ Hf	176.9432207(23)	18.60(9)		
58	¹³⁶ Ce	135.907172(14)	0.185(2)	¹⁷⁸ Hf	177.9436988(23)	27.28(7)		
	¹³⁸ Ce	137.905991(11)	0.251(2)	¹⁷⁹ Hf	178.9458161(23)	13.62(2)		
	¹⁴⁰ Ce	139.9054387(26)	88.450(51)	¹⁸⁰ Hf	179.9465500(23)	35.08(16)		
	¹⁴¹ Ce	140.9082763(26)		73	¹⁸⁰ Ta	179.9474648(24)	0.012(2)	
	¹⁴² Ce	141.909244(3)	11.114(51)		¹⁸¹ Ta	180.9479958(19)	99.988(2)	
	¹⁴⁴ Ce	143.913647(4)		74	¹⁸⁰ W	179.946704(4)	0.12(1)	
59	¹⁴¹ Pr	140.9076528(26)	100		¹⁸² W	181.9482042(9)	26.50(16)	
	¹⁴² Nd	141.9077233(25)	27.2(5)		¹⁸³ W	182.9502230(9)	14.31(4)	
60	¹⁴³ Nd	142.9098143(25)	12.2(2)		¹⁸⁴ W	183.9509312(9)	30.64(2)	
	¹⁴⁴ Nd	143.9100873(25)	23.8(3)		¹⁸⁶ W	185.9543641(19)	28.43(19)	
	¹⁴⁵ Nd	144.9125736(25)	8.3(1)		75	¹⁸⁵ Re	184.9529550(13)	37.40(2)
	¹⁴⁶ Nd	145.9131169(25)	17.2(3)			¹⁸⁷ Re	186.9557531(15)	62.60(2)
	¹⁴⁸ Nd	147.916893(3)	5.7(1)		76	¹⁸⁴ Os	183.9524891(14)	0.02(1)
	¹⁵⁰ Nd	149.920891(3)	5.6(2)			¹⁸⁶ Os	185.9538382(15)	1.59(3)
	61	¹⁴⁵ Pm	144.912749(3)				¹⁸⁷ Os	186.9557505(15)
		¹⁴⁷ Pm	146.9151385(26)			¹⁸⁸ Os	187.9558382(15)	13.24(8)
62	¹⁴⁴ Sm	143.911999(3)	3.07(7)	¹⁸⁹ Os		188.9581475(16)	16.15(5)	
	¹⁴⁷ Sm	146.9148979(26)	14.99(18)	¹⁹⁰ Os		189.9584470(16)	26.26(2)	
	¹⁴⁸ Sm	147.9148227(26)	11.24(10)	¹⁹² Os		191.9614807(27)	40.78(19)	
	¹⁴⁹ Sm	148.9171847(26)	13.82(7)	77		¹⁹¹ Ir	190.9605940(18)	37.3(2)
	¹⁵⁰ Sm	149.9172755(26)	7.38(1)			¹⁹³ Ir	192.9629264(18)	62.7(2)
	¹⁵² Sm	151.9197324(27)	26.75(16)	78		¹⁹⁰ Pt	189.959932(6)	0.014(1)
	¹⁵⁴ Sm	153.9222093(27)	22.75(29)		¹⁹² Pt	191.9610380(27)	0.782(7)	
	63	¹⁵¹ Eu	150.9198502(26)	47.81(6)	¹⁹⁴ Pt	193.9626803(9)	32.967(99)	
¹⁵³ Eu		152.9212303(26)	52.19(6)	¹⁹⁵ Pt	194.9647911(9)	33.832(10)		
64	¹⁵² Gd	151.9197910(27)	0.20(1)	¹⁹⁶ Pt	195.9649515(9)	25.242(41)		
	¹⁵⁴ Gd	153.9208656(27)	2.18(3)	¹⁹⁸ Pt	197.967893(3)	7.163(55)		
	¹⁵⁵ Gd	154.9226220(27)	14.80(12)	79	¹⁹⁷ Au	196.9665687(6)	100	
	¹⁵⁶ Gd	155.9221227(27)	20.47(9)		¹⁹⁸ Au	197.9682423(6)		
	¹⁵⁷ Gd	156.9239601(27)	15.65(2)	80	¹⁹⁶ Hg	195.965833(3)	0.15(1)	

Z	Isotope	Mass in u	Abundance in %	Z	Isotope	Mass in u	Abundance in %
	¹⁹⁷ Hg	196.967213(3)			²³⁶ U	236.0455680(20)	
	¹⁹⁸ Hg	197.9667690(4)	9.97(20)		²³⁸ U	238.0507882(20)	99.2742(10)
	¹⁹⁹ Hg	198.9682799(4)	16.87(22)	93	²³⁷ Np	237.0481734(20)	
	²⁰⁰ Hg	199.9683260(4)	23.10(19)		²³⁹ Np	239.0529390(22)	
	²⁰¹ Hg	200.9703023(6)	13.18(9)	94	²³⁸ Pu	238.0495599(20)	
	²⁰² Hg	201.9706430(6)	29.86(26)		²³⁹ Pu	239.0521634(20)	
	²⁰³ Hg	202.9728725(18)			²⁴⁰ Pu	240.0538135(20)	
	²⁰⁴ Hg	203.9734939(4)	6.87(15)		²⁴¹ Pu	241.0568515(20)	
81	²⁰¹ Tl	200.970819(16)			²⁴² Pu	242.0587426(20)	
	²⁰³ Tl	202.9723442(14)	29.52(1)		²⁴⁴ Pu	244.064204(5)	
	²⁰⁵ Tl	204.9744275(14)	70.48(1)	95	²⁴¹ Am	241.0568291(20)	
82	²⁰⁴ Pb	203.9730436(13)	1.4(1)		²⁴³ Am	243.0613811(25)	
	²⁰⁶ Pb	205.9744653(13)	24.1(1)	96	²⁴³ Cm	243.0613891(22)	
	²⁰⁷ Pb	206.9758969(13)	22.1(1)		²⁴⁴ Cm	244.0627526(20)	
	²⁰⁸ Pb	207.9766521(13)	52.4(1)		²⁴⁵ Cm	245.0654912(22)	
	²¹⁰ Pb	209.9841885(16)			²⁴⁶ Cm	246.0672237(22)	
83	²⁰⁷ Bi	206.9784707(26)			²⁴⁷ Cm	247.070354(5)	
	²⁰⁹ Bi	208.9803987(16)	100		²⁴⁸ Cm	248.072349(5)	
84	²⁰⁹ Po	208.9824304(20)		97	²⁴⁷ Bk	247.070307(6)	
	²¹⁰ Po	209.9828737(13)			²⁴⁹ Bk	249.0749867(28)	
85	²¹⁰ At	209.987148(8)		98	²⁴⁹ Cf	249.0748535(24)	
	²¹¹ At	210.9874963(30)			²⁵⁰ Cf	250.0764061(22)	
86	²¹¹ Rn	210.990601(7)			²⁵¹ Cf	251.079587(5)	
	²²⁰ Rn	220.0113940(24)			²⁵² Cf	252.081626(5)	
	²²² Rn	222.0175777(25)		99	²⁵² Es	252.082980(50)	
87	²²³ Fr	223.0197359(26)		100	²⁵⁷ Fm	257.095105(7)	
88	²²³ Ra	223.0185022(27)		101	²⁵⁶ Md	256.094060(60)	
	²²⁴ Ra	224.0202118(24)			²⁵⁸ Md	258.098431(5)	
	²²⁶ Ra	226.0254098(25)		102	²⁵⁹ No	259.10103(11)*	
	²²⁸ Ra	228.0310703(26)		103	²⁶² Lr	262.10963(22)*	
89	²²⁷ Ac	227.0277521(26)		104	²⁶¹ Rf	261.108770(30)*	
90	²²⁸ Th	228.0287411(24)		105	²⁶² Db	262.11408(20)*	
	²³⁰ Th	230.0331338(19)		106	²⁶³ Sg	263.11832(13)*	
	²³² Th	232.0380553(21)	100	107	²⁶⁴ Bh	264.12460(30)*	
91	²³¹ Pa	231.0358840(24)	100	108	²⁶⁵ Hs	265.13009(15)*	
92	²³³ U	233.0396352(29)		109	²⁶⁸ Mt	268.13873(34)*	
	²³⁴ U	234.0409521(20)	0.0054(5)	110	²⁸¹ Ds	281.16206(78)*	
	²³⁵ U	235.0439299(20)	0.7204(6)	111	²⁷² Rg	273.15362(36)*	