

Tabela de massas atômicas, com todos os isótopos.

Link para a referência:

http://physics.nist.gov/cgi-bin/Compositions/stand_alone.pl?ele=&all=all&ascii=ascii&isotype=all

Column Descriptions

Isotope: Atomic number, Symbol, and Mass number

Relative Atomic Mass (of the isotope): $A_r(X)$, where X is an isotope
[formerly called atomic weight (see [Standard Atomic Weight](#))]

These values are scaled to $A_r(^{12}\text{C}) = 12$, where ^{12}C is a neutral atom in its nuclear and electronic ground state. Thus, the relative atomic mass of entity X is given by: $A_r(X) = m(X) / [m(^{12}\text{C}) / 12]$. If # is present, the value and error were derived not from purely experimental data, but at least partly from systematic trends. *The 2003 Atomic Mass Evaluation* does not extend beyond an atomic mass of 293.

Representative Isotopic Composition: Mole fraction of the various isotopes

In the opinion of the Subcommittee for Isotopic Abundance Measurements (SIAM), these values represent the isotopic composition of the chemicals and/or materials most commonly encountered in the laboratory. They may not, therefore, correspond to the most abundant natural material. The uncertainties listed in parenthesis cover the range of probable variations of the materials as well as experimental errors. These values are consistent with the values published in *Atomic Weights of the Elements, 2001*.

Standard Atomic Weight (common usage): $A_r(X)$, where X is an element
[more appropriately called relative atomic mass of the element]

The relative atomic mass of an element is derived by averaging the relative atomic masses of the isotopes of that element. These values are scaled to $A_r(^{12}\text{C}) = 12$, where ^{12}C is a neutral atom in its nuclear and electronic ground state. These values are dependent on the origin and treatment of the material. The uncertainties are listed in parenthesis. Brackets [] indicate the mass number of the most stable isotope.

Notes: Notes for Representative Isotopic Composition and Standard Atomic Weight

- a** Air reference material used for the best measurement.
- b** Tank hydrogen has reported ^2H mole fractions as low as 0.000032.
- c** Materials depleted in ^6Li and ^{235}U are commercial sources of laboratory shelf reagents. In the case of Li, such samples are known to have ^6Li mole fractions in the range of 0.02007 - 0.07672, with natural materials at the higher end of this range. In the case of U, the ^{235}U mole fractions are reported to range from 0.0021 to 0.007207, far removed from the natural value.
- d** The Commission on Atomic Weights and Isotopic Abundances recommends that the value of 272 be employed for $^{14}\text{N}/^{15}\text{N}$ of N_2 in air for the calculation of ^{15}N mole fractions from measured $\delta^{15}\text{N}$ values.
- e** The original data for Sn were adjusted to account for possible errors due to ^{115}In contamination, and an error in the ^{114}Sn abundance.
- f** The abundance of this radiogenic isotope may vary substantially.
- g** Geological specimens are known in which the element has an isotopic composition outside the limits for normal material. The difference between the atomic weight of the element in such specimens and that given in the table may exceed the stated uncertainty.
- h** An electron multiplier was used for the Te measurements and the measured abundances were adjusted using a "square root of the masses" correction factor.
- i** Commercially available Li materials have atomic weights that range between 6.939 and 6.996; if a more accurate value is required, it must be determined for the specific material.
Note: The range given in *Atomic Weights of the Elements 1995* was 6.94 to 6.99.
- m** Modified isotopic compositions may be found in commercially available material because it has been subject to an undisclosed or inadvertent isotopic fractionation. Substantial deviations in the atomic weight and isotopic composition of the element from that given in the table can occur.
- r** Range in isotopic composition of normal terrestrial material prevents a more precise value being given; the tabulated value should be applicable to any normal material.
- w** Fresh water reference material used for the best measurement.

Atomic Weights and Isotopic Compositions for All Elements

[Column Descriptions](#)

Isotope		Relative Atomic Mass	Isotopic Composition	Standard Atomic Weight	Notes					
1	H	1	1.0078250321 (4)	99.9885 (70)	g, m, r, c, w					
	D	2	2.0141017780 (4)			0.0115 (70)				
	T	3	3.0160492675 (11)							
	H	4	4.02783 (12)							
		5	5.03954 (102)							
		6	6.04494 (28)							
2	He	3	3.0160293097 (9)	0.000137 (3)	4.002602 (2)	g, r, a				
		4	4.0026032497 (10)	99.999863 (3)						
		5	5.012220 (50)							
		6	6.0188881 (11)							
		7	7.028030 (30)							
		8	8.033922 (8)							
		9	9.043820 (70)							
		10	10.052400 (80)							
		3	Li	4			4.02718 (23)		6.941 (2)	g, m, r, b, d
				5			5.012540 (50)			
6	6.0151223 (5)			7.59 (4)						
7	7.0160040 (5)			92.41 (4)						
8	8.0224867 (5)									
9	9.0267891 (21)									
10	10.035481 (16)									
11	11.043796 (29)									
12	12.05378 (107) #									
4	Be			5	5.04079 (429) #		9.012182 (3)			
				6	6.019726 (6)					
				7	7.0169292 (5)					
		8	8.00530509 (4)							
		9	9.0121821 (4)	100						
		10	10.0135337 (4)							
		11	11.021658 (7)							
		12	12.026921 (16)							
		13	13.03613 (54)							
		14	14.04282 (12)							
		5	B	7	7.029920 (80)				10.811 (7)	g, m, r
				8	8.0246067 (12)					
				9	9.0133288 (11)					
				10	10.0129370 (4)	19.9 (7)				
11	11.0093055 (5)			80.1 (7)						
12	12.0143521 (15)									
13	13.0177803 (12)									
14	14.025404 (23)									
15	15.031097 (24)									
16	16.039810 (60)									
17	17.04693 (15)									
18	18.05617 (86) #									
19	19.06373 (43) #									
6	C			8	8.037675 (25)		12.0107 (8)	g, r		
				9	9.0310401 (23)					
				10	10.0168531 (4)					
				11	11.0114338 (10)					
				12	12.0000000 (0)	98.93 (8)				
				13	13.0033548378 (10)	1.07 (8)				
		14	14.003241988 (4)							
		15	15.0105993 (9)							
		16	16.014701 (4)							
		17	17.022584 (19)							
		18	18.026760 (30)							
		19	19.03525 (12)							
		20	20.04032 (22)							
		21	21.04934 (54) #							
		22	22.05645 (97) #							
		7	N	10	10.04262 (43) #				14.0067 (2)	g, r, e
11	11.02680 (19)									
12	12.0186132 (11)									
13	13.00573858 (29)									
14	14.0030740052 (9)			99.632 (7)						
15	15.0001088984 (9)			0.368 (7)						

16 16.0061014 (28)
 17 17.008450 (16)
 18 18.014082 (21)
 19 19.017027 (18)
 20 20.023370 (60)
 21 21.02709 (10)
 22 22.03444 (21)
 23 23.04051 (76) #
 24 24.05050 (54) #

8	O	12	12.034405 (20)		15.9994 (3)	g, r
		13	13.024810 (10)			
		14	14.00859529 (8)			
		15	15.0030654 (5)			
		16	15.9949146221 (15)	99.757 (16)		
		17	16.99913150 (22)	0.038 (1)		
		18	17.9991604 (9)	0.205 (14)		
		19	19.003579 (3)			
		20	20.0040762 (13)			
		21	21.008655 (13)			
		22	22.009970 (60)			
		23	23.01569 (11)			
		24	24.02037 (33)			
		25	25.02914 (40) #			
		26	26.03775 (46) #			

9	F	14	14.03608 (43) #		18.9984032 (5)	
		15	15.01801 (14)			
		16	16.011466 (9)			
		17	17.00209524 (27)			
		18	18.0009377 (6)			
		19	18.99840320 (7)	100		
		20	19.99998132 (9)			
		21	20.9999489 (19)			
		22	22.002999 (13)			
		23	23.003570 (90)			
		24	24.008100 (70)			
		25	25.012090 (80)			
		26	26.01963 (13)			
		27	27.02689 (45)			
		28	28.03567 (55) #			
		29	29.04326 (62) #			

10	Ne	16	16.025757 (22)		20.1797 (6)	g, m, r, a
		17	17.017700 (50)			
		18	18.0056971 (16)			
		19	19.0018798 (6)			
		20	19.9924401759 (20)	90.48 (3)		
		21	20.99384674 (4)	0.27 (1)		
		22	21.99138551 (23)	9.25 (3)		
		23	22.99446734 (26)			
		24	23.993615 (11)			
		25	24.997790 (50)			
		26	26.000460 (60)			
		27	27.00762 (10)			
		28	28.01211 (12)			
		29	29.01935 (32)			
		30	30.02387 (88)			
		31	31.03311 (97) #			
		32	32.03991 (94) #			

11	Na	18	18.02718 (43) #		22.989770 (2)	
		19	19.013879 (13)			
		20	20.007348 (7)			
		21	20.9976551 (8)			
		22	21.9944368 (5)			
		23	22.98976967 (23)	100		
		24	23.99096333 (23)			
		25	24.9899544 (13)			
		26	25.992590 (15)			
		27	26.994010 (40)			
		28	27.998890 (80)			
		29	29.00281 (10)			
		30	30.00923 (10)			
		31	31.01360 (18)			
		32	32.01965 (52)			
		33	33.02739 (160)			
		34	34.03490 (113) #			
		35	35.04418 (166) #			

12	Mg	20	20.018863 (29)		24.3050 (6)	
		21	21.011714 (18)			

22 21.9995741 (15)
 23 22.9941249 (13)
 24 23.98504190 (20) 78.99 (4)
 25 24.98583702 (20) 10.00 (1)
 26 25.98259304 (21) 11.01 (3)
 27 26.98434074 (21)
 28 27.9838767 (22)
 29 28.988550 (30)
 30 29.990460 (70)
 31 30.996550 (80)
 32 31.99915 (10)
 33 33.00559 (16)
 34 34.00907 (28)
 35 35.01749 (47) #
 36 36.02245 (97) #
 37 37.03124 (97) #

13 Al 21 21.02804 (32) # 26.981538 (2)
 22 22.01952 (10) #
 23 23.007265 (27)
 24 23.999941 (4)
 25 24.9904286 (7)
 26 25.98689166 (21)
 27 26.98153844 (14) 100
 28 27.98191018 (15)
 29 28.9804448 (13)
 30 29.982960 (15)
 31 30.983946 (22)
 32 31.988120 (90)
 33 32.990870 (70)
 34 33.99693 (10)
 35 34.99994 (15)
 36 36.00635 (29)
 37 37.01031 (58)
 38 38.01690 (60) #
 39 39.02190 (64) #

14 Si 22 22.03453 (22) # 28.0855 (3) r
 23 23.02552 (21) #
 24 24.011546 (21)
 25 25.004107 (11)
 26 25.992330 (3)
 27 26.98670476 (17)
 28 27.9769265327 (20) 92.2297 (7)
 29 28.97649472 (3) 4.6832 (5)
 30 29.97377022 (5) 3.0872 (5)
 31 30.97536327 (7)
 32 31.9741481 (23)
 33 32.978001 (17)
 34 33.978576 (15)
 35 34.984580 (40)
 36 35.98669 (11)
 37 36.99300 (13)
 38 37.99598 (29)
 39 39.00230 (43) #
 40 40.00580 (54) #
 41 41.01270 (64) #
 42 42.01610 (75) #

15 P 24 24.03435 (54) # 30.973761 (2)
 25 25.02026 (21) #
 26 26.01178 (21) #
 27 26.999190 (40)
 28 27.992312 (4)
 29 28.9818014 (8)
 30 29.9783138 (4)
 31 30.97376151 (20) 100
 32 31.97390716 (20)
 33 32.9717253 (12)
 34 33.973636 (5)
 35 34.9733142 (20)
 36 35.978260 (14)
 37 36.979610 (40)
 38 37.98447 (15)
 39 38.98642 (16)
 40 39.99105 (21)
 41 40.99480 (50)
 42 42.00009 (54) #
 43 43.00331 (54) #
 44 44.00988 (75) #
 45 45.01514 (86) #
 46 46.02383 (97) #

16	S	26	26.02788 (32) #		32.065 (5)	g, r
		27	27.01880 (22) #			
		28	28.00437 (17)			
		29	28.996610 (50)			
		30	29.984903 (3)			
		31	30.9795544 (16)			
		32	31.97207069 (12)	94.93 (31)		
		33	32.97145850 (12)	0.76 (2)		
		34	33.96786683 (11)	4.29 (28)		
		35	34.96903214 (10)			
		36	35.96708088 (25)	0.02 (1)		
		37	36.97112572 (27)			
		38	37.971163 (8)			
		39	38.975140 (50)			
		40	39.97547 (25)			
		41	40.98003 (23)			
		42	41.98149 (35)			
		43	42.98660 (90)			
		44	43.98832 (54) #			
		45	44.99482 (64) #			
		46	45.99957 (75) #			
		47	47.00762 (86) #			
		48	48.01299 (97) #			
		49	49.02201 (107) #			

17	Cl	28	28.02851 (54) #		35.453 (2)	m
		29	29.01411 (21) #			
		30	30.00477 (21) #			
		31	30.992420 (50)			
		32	31.985689 (7)			
		33	32.9774518 (6)			
		34	33.97376197 (13)			
		35	34.96885271 (4)	75.78 (4)		
		36	35.96830695 (8)			
		37	36.96590260 (5)	24.22 (4)		
		38	37.96801055 (12)			
		39	38.9680077 (19)			
		40	39.970420 (30)			
		41	40.970650 (70)			
		42	41.97317 (12)			
		43	42.97420 (17)			
		44	43.97854 (24)			
		45	44.97970 (70)			
		46	45.98412 (54) #			
		47	46.98795 (64) #			
		48	47.99485 (75) #			
		49	48.99989 (86) #			
		50	50.00773 (97) #			
		51	51.01353 (107) #			

18	Ar	30	30.02156 (32) #		39.948 (1)	g, r, a
		31	31.01213 (22) #			
		32	31.997660 (50)			
		33	32.989930 (30)			
		34	33.980270 (3)			
		35	34.9752567 (8)			
		36	35.96754628 (27)	0.3365 (30)		
		37	36.9667759 (3)			
		38	37.9627322 (5)	0.0632 (5)		
		39	38.964313 (5)			
		40	39.962383123 (3)	99.6003 (30)		
		41	40.9645008 (7)			
		42	41.963050 (40)			
		43	42.965670 (80)			
		44	43.965365 (22)			
		45	44.968090 (60)			
		46	45.968090 (40)			
		47	46.97219 (11)			
		48	47.97507 (32) #			
		49	48.98218 (54) #			
		50	49.98594 (75) #			
		51	50.99324 (75) #			
		52	51.99817 (97) #			
		53	53.00623 (107) #			

19	K	32	32.02192 (54) #		39.0983 (1)	
		33	33.00726 (21) #			
		34	33.99841 (32) #			
		35	34.988012 (21)			
		36	35.981293 (8)			
		37	36.97337691 (29)			

38	37.9690801 (8)	
39	38.9637069 (3)	93.2581 (44)
40	39.96399867 (29)	0.0117 (1)
41	40.96182597 (28)	6.7302 (44)
42	41.9624031 (3)	
43	42.960716 (10)	
44	43.961560 (40)	
45	44.960700 (11)	
46	45.961976 (17)	
47	46.961678 (9)	
48	47.965513 (26)	
49	48.967450 (80)	
50	49.97278 (30)	
51	50.97638 (54) #	
52	51.98261 (75) #	
53	52.98712 (75) #	
54	53.99399 (97) #	
55	54.99939 (107) #	

20	Ca	34	34.01412 (32) #	40.078 (4)	<i>g, r, f</i>
		35	35.004770 (70) #		
		36	35.993090 (40)		
		37	36.985872 (24)		
		38	37.976319 (5)		
		39	38.9707177 (19)		
		40	39.9625912 (3)	96.941 (156)	
		41	40.9622783 (4)		
		42	41.9586183 (4)	0.647 (23)	
		43	42.9587668 (5)	0.135 (10)	
		44	43.9554811 (9)	2.086 (110)	
		45	44.9561859 (10)		
		46	45.9536928 (25)	0.004 (3)	
		47	46.9545465 (25)		
		48	47.952534 (4)	0.187 (21)	
		49	48.955673 (4)		
		50	49.957518 (10)		
		51	50.96147 (10)		
		52	51.96510 (50)		
		53	52.97005 (54) #		
		54	53.97468 (75) #		
		55	54.98055 (75) #		
		56	55.98579 (97) #		
		57	56.99236 (107) #		

21	Sc	36	36.01492 (54) #	44.955910 (8)	
		37	37.00305 (32) #		
		38	37.99470 (32) #		
		39	38.984790 (26)		
		40	39.977964 (4)		
		41	40.9692513 (3)		
		42	41.9655168 (4)		
		43	42.9611510 (20)		
		44	43.9594030 (19)		
		45	44.9559102 (12)	100	
		46	45.9551703 (12)		
		47	46.9524080 (22)		
		48	47.952235 (6)		
		49	48.950024 (4)		
		50	49.952187 (17)		
		51	50.953603 (22)		
		52	51.95665 (25)		
		53	52.95924 (32) #		
		54	53.96300 (50)		
		55	54.96743 (110) #		
		56	55.97266 (75) #		
		57	56.97704 (75) #		
		58	57.98307 (86) #		
		59	58.98804 (97) #		

22	Ti	38	38.00977 (27) #	47.867 (1)	
		39	39.00132 (11) #		
		40	39.99050 (17)		
		41	40.983130 (40) #		
		42	41.973032 (6)		
		43	42.968523 (7)		
		44	43.9596902 (8)		
		45	44.9581243 (13)		
		46	45.9526295 (12)	8.25 (3)	
		47	46.9517638 (10)	7.44 (2)	
		48	47.9479471 (10)	73.72 (3)	
		49	48.9478708 (10)	5.41 (2)	
		50	49.9447921 (11)	5.18 (2)	

51 50.9466160 (14)
52 51.946898 (8)
53 52.94973 (11)
54 53.95087 (25)
55 54.95512 (26)
56 55.95799 (30)
57 56.96290 (100) #
58 57.96611 (75) #
59 58.97196 (75) #
60 59.97564 (86) #
61 60.98202 (97) #

23 V 40 40.01109 (54) # 50.9415 (1)
41 40.99974 (27) #
42 41.99123 (21) #
43 42.98065 (25) #
44 43.974400 (90) #
45 44.965782 (18)
46 45.9601995 (16)
47 46.9549069 (12)
48 47.9522545 (28)
49 48.9485169 (14)
50 49.9471628 (14) 0.250 (4)
51 50.9439637 (14) 99.750 (4)
52 51.9447797 (14)
53 52.944343 (4)
54 53.946444 (16)
55 54.94724 (11)
56 55.95036 (26)
57 56.95236 (27)
58 57.95665 (28)
59 58.95930 (35)
60 59.96450 (60)
61 60.96741 (75) #
62 61.97314 (75) #
63 62.97675 (97) #

24 Cr 42 42.00643 (32) # 51.9961 (6)
43 42.997710 (90) #
44 43.98547 (14) #
45 44.97916 (11) #
46 45.968362 (22)
47 46.962907 (15)
48 47.954036 (8)
49 48.9513411 (28)
50 49.9460496 (14) 4.345 (13)
51 50.9447718 (14)
52 51.9405119 (15) 83.789 (18)
53 52.9406538 (15) 9.501 (17)
54 53.9388849 (15) 2.365 (7)
55 54.9408442 (16)
56 55.940645 (10)
57 56.94375 (10)
58 57.94425 (26)
59 58.94863 (27)
60 59.94973 (28)
61 60.95409 (30)
62 61.95580 (40)
63 62.96186 (75) #
64 63.96420 (75) #
65 64.97037 (97) #

25 Mn 44 44.00687 (54) # 54.938049 (9)
45 44.99451 (32) #
46 45.98672 (12) #
47 46.97610 (17) #
48 47.968870 (80) #
49 48.959623 (26)
50 49.9542440 (15)
51 50.9482155 (14)
52 51.9455701 (25)
53 52.9412947 (15)
54 53.9403632 (18)
55 54.9380496 (14) 100
56 55.9389094 (15)
57 56.938287 (4)
58 57.939990 (30)
59 58.940450 (30)
60 59.94319 (29)
61 60.94446 (28)
62 61.94797 (28)
63 62.94981 (30)

64 63.95373 (35)
65 64.95610 (60)
66 65.96082 (75) #
67 66.96382 (86) #

26	Fe	45	45.01456 (43) #	55.845 (2)
		46	46.00081 (38) #	
		47	46.99289 (28) #	
		48	47.98056 (11) #	
		49	48.97361 (17) #	
		50	49.962990 (60)	
		51	50.956825 (16)	
		52	51.948117 (11)	
		53	52.9453123 (23)	
		54	53.9396148 (14)	5.845 (35)
		55	54.9382980 (14)	
		56	55.9349421 (15)	91.754 (36)
		57	56.9353987 (15)	2.119 (10)
		58	57.9332805 (15)	0.282 (4)
		59	58.9348805 (15)	
		60	59.934077 (4)	
		61	60.936749 (22)	
		62	61.936770 (16)	
		63	62.94012 (20)	
		64	63.94087 (30)	
		65	64.94494 (30)	
		66	65.94598 (35)	
		67	66.95000 (50)	
		68	67.95251 (75) #	
		69	68.95770 (86) #	

27	Co	48	48.00176 (43) #	58.933200 (9)
		49	48.98972 (28) #	
		50	49.98154 (18) #	
		51	50.97072 (16) #	
		52	51.963590 (70) #	
		53	52.954225 (19)	
		54	53.9484641 (14)	
		55	54.9420031 (15)	
		56	55.9398439 (26)	
		57	56.9362962 (15)	
		58	57.9357576 (19)	
		59	58.9332002 (15)	100
		60	59.9338222 (15)	
		61	60.9324794 (17)	
		62	61.934054 (22)	
		63	62.933615 (22)	
		64	63.935814 (22)	
		65	64.936485 (14)	
		66	65.93983 (29)	
		67	66.94061 (30)	
		68	67.94436 (35)	
		69	68.94520 (40)	
		70	69.94981 (75) #	
		71	70.95173 (86) #	
		72	71.95641 (86) #	

28	Ni	50	49.99593 (28) #	58.6934 (2)
		51	50.98772 (28) #	
		52	51.975680 (90) #	
		53	52.96846 (17) #	
		54	53.957910 (50)	
		55	54.951336 (12)	
		56	55.942136 (12)	
		57	56.939800 (3)	
		58	57.9353479 (15)	68.0769 (89)
		59	58.9343516 (15)	
		60	59.9307906 (15)	26.2231 (77)
		61	60.9310604 (15)	1.1399 (6)
		62	61.9283488 (15)	3.6345 (17)
		63	62.9296729 (15)	
		64	63.9279696 (16)	0.9256 (9)
		65	64.9300880 (16)	
		66	65.929115 (17)	
		67	66.931570 (20)	
		68	67.931845 (18)	
		69	68.93518 (15)	
		70	69.93614 (35)	
		71	70.94000 (40)	
		72	71.94130 (50)	
		73	72.94608 (64) #	
		74	73.94791 (75) #	

75 74.95297 (86) #
 76 75.95533 (97) #
 77 76.96083 (107) #
 78 77.96380 (118) #

29	Cu	52	51.99718 (28) #	63.546 (3)	r
		53	52.98555 (28) #		
		54	53.97671 (23) #		
		55	54.96605 (32) #		
		56	55.95856 (15) #		
		57	56.949216 (17)		
		58	57.9445407 (27)		
		59	58.9395041 (18)		
		60	59.9373681 (27)		
		61	60.9334622 (19)		
		62	61.932587 (4)		
		63	62.9296011 (15)	69.17 (3)	
		64	63.9297679 (15)		
		65	64.9277937 (19)	30.83 (3)	
		66	65.9288730 (19)		
		67	66.927750 (9)		
		68	67.929640 (50)		
		69	68.929425 (9)		
		70	69.932409 (16)		
		71	70.932620 (40)		
		72	71.93552 (21) #		
		73	72.93649 (32) #		
		74	73.94020 (43) #		
		75	74.94170 (54) #		
		76	75.94599 (64) #		
		77	76.94795 (75) #		
		78	77.95281 (86) #		
		79	78.95528 (97) #		
		80	79.96189 (97) #		

30	Zn	54	53.99295 (43) #	65.409 (4)	
		55	54.98398 (27) #		
		56	55.97238 (28) #		
		57	56.96491 (15) #		
		58	57.954600 (50)		
		59	58.949270 (40)		
		60	59.941832 (11)		
		61	60.939514 (18)		
		62	61.934334 (11)		
		63	62.9332156 (23)		
		64	63.9291466 (18)	48.63 (60)	
		65	64.9292451 (18)		
		66	65.9260368 (16)	27.90 (27)	
		67	66.9271309 (17)	4.10 (13)	
		68	67.9248476 (17)	18.75 (51)	
		69	68.9265535 (18)		
		70	69.925325 (4)	0.62 (3)	
		71	70.927727 (11)		
		72	71.926861 (7)		
		73	72.929780 (40)		
		74	73.929460 (50)		
		75	74.932940 (80)		
		76	75.93339 (13)		
		77	76.93709 (14)		
		78	77.93857 (17)		
		79	78.94268 (29) #		
		80	79.94441 (18)		
		81	80.95048 (43) #		
		82	81.95484 (43) #		

31	Ga	56	55.99491 (28) #	69.723 (1)	m
		57	56.98293 (28) #		
		58	57.97425 (23) #		
		59	58.96337 (18) #		
		60	59.95706 (12) #		
		61	60.94917 (21) #		
		62	61.944180 (30)		
		63	62.93914 (11)		
		64	63.936838 (4)		
		65	64.9327393 (19)		
		66	65.931592 (4)		
		67	66.9282049 (19)		
		68	67.9279835 (22)		
		69	68.925581 (3)	60.108 (9)	
		70	69.926028 (3)		
		71	70.9247050 (19)	39.892 (9)	
		72	71.9263694 (22)		

73 72.925170 (7)
 74 73.926940 (80)
 75 74.926501 (7)
 76 75.92893 (10)
 77 76.929280 (60)
 78 77.931660 (90)
 79 78.93292 (13)
 80 79.93659 (13)
 81 80.93775 (21)
 82 81.94316 (32) #
 83 82.94687 (54) #
 84 83.95234 (64) #

32	Ge	58	57.99101 (34) #		72.64 (1)	h
		59	58.98175 (30) #			
		60	59.97019 (25) #			
		61	60.96379 (32) #			
		62	61.95465 (15) #			
		63	62.94964 (21) #			
		64	63.94157 (27)			
		65	64.93944 (11)			
		66	65.933850 (30)			
		67	66.932738 (5)			
		68	67.928097 (7)			
		69	68.927972 (3)			
		70	69.9242504 (19)	20.84 (87)		
		71	70.9249540 (19)			
		72	71.9220762 (16)	27.54 (34)		
		73	72.9234594 (16)	7.73 (5)		
		74	73.9211782 (16)	36.28 (73)		
		75	74.9228595 (16)			
		76	75.9214027 (16)	7.61 (38)		
		77	76.9235485 (20)			
		78	77.922853 (4)			
		79	78.92540 (10)			
		80	79.925445 (25)			
		81	80.92882 (13)			
		82	81.92955 (26)			
		83	82.93451 (32) #			
		84	83.93731 (43) #			
		85	84.94269 (54) #			
		86	85.94627 (64) #			

33	As	60	59.99313 (64) #		74.92160 (2)	
		61	60.98062 (64) #			
		62	61.97320 (32) #			
		63	62.96369 (54) #			
		64	63.95757 (38) #			
		65	64.94948 (42) #			
		66	65.94437 (22) #			
		67	66.93919 (11)			
		68	67.93679 (11)			
		69	68.932280 (30)			
		70	69.930930 (50)			
		71	70.927115 (5)			
		72	71.926753 (5)			
		73	72.923825 (4)			
		74	73.9239291 (24)			
		75	74.9215964 (18)	100		
		76	75.9223939 (18)			
		77	76.9206477 (23)			
		78	77.921829 (11)			
		79	78.920948 (6)			
		80	79.922578 (23)			
		81	80.922133 (6)			
		82	81.92450 (21)			
		83	82.92498 (24)			
		84	83.92906 (32) #			
		85	84.93181 (32) #			
		86	85.93623 (43) #			
		87	86.93958 (54) #			
		88	87.94456 (64) #			
		89	88.94923 (64) #			

34	Se	65	64.96466 (64) #		78.96 (3)	r
		66	65.95521 (32) #			
		67	66.95009 (21) #			
		68	67.94187 (32) #			
		69	68.939560 (40)			
		70	69.93350 (22) #			
		71	70.93227 (22) #			
		72	71.927112 (13)			

73		72.926767 (12)		
74		73.9224766 (16)	0.89 (4)	
75		74.9225236 (16)		
76		75.9192141 (16)	9.37 (29)	
77		76.9199146 (16)	7.63 (16)	
78		77.9173095 (16)	23.77 (28)	
79		78.9184998 (16)		
80		79.9165218 (20)	49.61 (41)	
81		80.9179929 (21)		
82		81.9167000 (22)	8.73 (22)	
83		82.919119 (4)		
84		83.918465 (16)		
85		84.922240 (30)		
86		85.924271 (17)		
87		86.928520 (40)		
88		87.931420 (50)		
89		88.93602 (32) #		
90		89.93942 (43) #		
91		90.94537 (54) #		
92		91.94933 (64) #		
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35	Br	67.96479 (54) #	79.904 (1)	
		68.95825 (58) #		
		69.95018 (34) #		
		70.94462 (39) #		
		71.93925 (32) #		
		72.93650 (28)		
		73.93179 (14)		
		74.929891 (16)		
		75.925776 (15)		
		76.924542 (10)		
		77.921380 (3)		
		78.921146 (4)		
		79.9183376 (20)	50.69 (7)	
		80.9185300 (20)		
		81.916291 (3)	49.31 (7)	
		82.916805 (3)		
		83.915180 (5)		
		84.916504 (27)		
		85.915608 (21)		
		86.918797 (12)		
		87.920711 (19)		
		88.924070 (40)		
		89.926390 (60)		
		90.930630 (80)		
		91.933970 (80)		
		92.939260 (50)		
		93.94310 (32) #		
		94.94868 (43) #		
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36	Kr	69.96532 (54) #	83.798 (2)	g, m, a
		70.95601 (43) #		
		71.95051 (32) #		
		72.94191 (29)		
		73.93893 (15)		
		74.933260 (60)		
		75.931034 (17)		
		76.925948 (11)		
		77.924668 (9)		
		78.920386 (7)	0.35 (1)	
		79.920083 (4)		
		80.916378 (4)	2.28 (6)	
		81.916592 (3)		
		82.9134846 (28)	11.58 (14)	
		83.914136 (3)	11.49 (6)	
		84.911507 (3)	57.00 (4)	
		85.912527 (3)		
		86.9106103 (12)	17.30 (22)	
		87.9133543 (14)		
		88.914447 (14)		
		89.917630 (60)		
		90.919524 (20)		
		91.923440 (60)		
		92.926153 (13)		
		93.93127 (11)		
		94.93436 (32) #		
		95.93984 (43) #		
		96.94307 (54) #		
		97.94856 (54) #		
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37	Rb	71.96532 (54) #	85.4678 (3)	g
		72.95908 (54) #		

73	72.95037 (52) #	
74	73.94447 (77)	
75	74.938569 (8)	
76	75.935071 (8)	
77	76.930407 (8)	
78	77.928141 (8)	
79	78.923997 (7)	
80	79.922519 (8)	
81	80.918994 (7)	
82	81.918208 (8)	
83	82.915112 (7)	
84	83.914385 (3)	
85	84.9117893 (25)	72.17 (2)
86	85.9111671 (25)	
87	86.9091835 (27)	27.83 (2)
88	87.911319 (5)	
89	88.912280 (6)	
90	89.914809 (9)	
91	90.916534 (9)	
92	91.919725 (7)	
93	92.922033 (8)	
94	93.926407 (9)	
95	94.929319 (21)	
96	95.934284 (27)	
97	96.937340 (30)	
98	97.941700 (40)	
99	98.94542 (16)	
100	99.94987 (32) #	
101	100.95320 (18)	
102	101.95921 (54) #	

38	Sr	73	72.96597 (64) #	87.62 (1)	g, r, f
		74	73.95631 (54) #		
		75	74.94992 (32) #		
		76	75.94161 (32) #		
		77	76.93776 (16)		
		78	77.932179 (8)		
		79	78.929707 (9)		
		80	79.924525 (8)		
		81	80.923213 (8)		
		82	81.918401 (6)		
		83	82.917555 (9)		
		84	83.913425 (4)	0.56 (1)	
		85	84.912933 (4)		
		86	85.9092624 (24)	9.86 (1)	
		87	86.9088793 (24)	7.00 (1)	
		88	87.9056143 (24)	82.58 (1)	
		89	88.9074529 (24)		
		90	89.9077376 (29)		
		91	90.910210 (6)		
		92	91.911030 (7)		
		93	92.914022 (8)		
		94	93.915360 (8)		
		95	94.919358 (8)		
		96	95.921680 (26)		
		97	96.926149 (20)		
		98	97.928471 (27)		
		99	98.93332 (15)		
		100	99.93535 (14)		
		101	100.94052 (13)		
		102	101.94302 (12)		
		103	102.94895 (54) #		
		104	103.95233 (75) #		

39	Y	77	76.94962 (32) #	88.90585 (2)	
		78	77.94350 (43) #		
		79	78.93735 (48)		
		80	79.93434 (43) #		
		81	80.929130 (70)		
		82	81.92679 (11)		
		83	82.922350 (50)		
		84	83.92039 (10)		
		85	84.916427 (27)		
		86	85.914888 (15)		
		87	86.9108778 (28)		
		88	87.9095034 (29)		
		89	88.9058479 (25)	100	
		90	89.9071514 (25)		
		91	90.907303 (3)		
		92	91.908947 (10)		
		93	92.909582 (11)		
		94	93.911594 (8)		

95 94.912824 (8)
 96 95.915898 (23)
 97 96.918131 (13)
 98 97.922220 (26)
 99 98.924635 (26)
 100 99.927760 (80)
 101 100.93031 (10)
 102 101.933560 (90)
 103 102.93694 (32) #
 104 103.94145 (43) #
 105 104.94509 (54) #
 106 105.95022 (75) #

40	Zr	79	78.94916 (43) #	91.224 (2)	g
		80	79.94055 (32) #		
		81	80.93682 (32)		
		82	81.93109 (55)		
		83	82.92865 (10)		
		84	83.92325 (21) #		
		85	84.92147 (11)		
		86	85.916470 (30)		
		87	86.914817 (9)		
		88	87.910226 (11)		
		89	88.908889 (4)		
		90	89.9047037 (23)	51.45 (40)	
		91	90.9056450 (23)	11.22 (5)	
		92	91.9050401 (23)	17.15 (8)	
		93	92.9064756 (23)		
		94	93.9063158 (25)	17.38 (28)	
		95	94.9080427 (25)		
		96	95.908276 (3)	2.80 (9)	
		97	96.910951 (3)		
		98	97.912746 (21)		
		99	98.916511 (21)		
		100	99.917760 (40)		
		101	100.921140 (30)		
		102	101.922980 (50)		
		103	102.92660 (12)		
		104	103.92878 (43) #		
		105	104.93305 (43) #		
		106	105.93591 (54) #		
		107	106.94086 (64) #		
		108	107.94428 (75) #		

41	Nb	81	80.94905 (43) #	92.90638 (2)	
		82	81.94313 (32) #		
		83	82.93670 (34)		
		84	83.93357 (32) #		
		85	84.92791 (24)		
		86	85.925040 (90)		
		87	86.920360 (70)		
		88	87.91796 (22) #		
		89	88.913500 (40)		
		90	89.911264 (5)		
		91	90.906991 (3)		
		92	91.9071932 (29)		
		93	92.9063775 (24)	100	
		94	93.9072835 (24)		
		95	94.9068352 (20)		
		96	95.908100 (4)		
		97	96.9080971 (28)		
		98	97.910331 (6)		
		99	98.911618 (14)		
		100	99.914181 (28)		
		101	100.915252 (20)		
		102	101.918040 (40)		
		103	102.919140 (70)		
		104	103.92246 (12)		
		105	104.92393 (11)		
		106	105.92819 (32) #		
		107	106.93031 (43) #		
		108	107.93501 (54) #		
		109	108.93763 (54) #		
		110	109.94268 (64) #		

42	Mo	83	82.94874 (54) #	95.94 (2)	g
		84	83.94009 (43) #		
		85	84.93659 (43) #		
		86	85.93070 (47)		
		87	86.92733 (24)		
		88	87.921953 (22)		
		89	88.919481 (17)		

90	89.913936 (7)	
91	90.911751 (12)	
92	91.906810 (4)	14.84 (35)
93	92.906812 (4)	
94	93.9050876 (20)	9.25 (12)
95	94.9058415 (20)	15.92 (13)
96	95.9046789 (20)	16.68 (2)
97	96.9060210 (20)	9.55 (8)
98	97.9054078 (20)	24.13 (31)
99	98.9077116 (20)	
100	99.907477 (6)	9.63 (23)
101	100.910347 (6)	
102	101.910297 (22)	
103	102.913200 (70)	
104	103.913760 (70)	
105	104.916970 (80)	
106	105.918134 (23)	
107	106.92169 (17)	
108	107.92358 (21) #	
109	108.92781 (32) #	
110	109.92973 (43) #	
111	110.93451 (54) #	
112	111.93684 (64) #	
113	112.94203 (64) #	

43	Tc	85	84.94894 (54) #	[98]
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86	85.94288 (32) #	
87	86.93653 (32) #	
88	87.93283 (32) #	
89	88.92754 (23)	
90	89.92356 (26)	
91	90.91843 (22)	
92	91.915260 (28)	
93	92.910248 (4)	
94	93.909656 (5)	
95	94.907656 (6)	
96	95.907871 (6)	
97	96.906365 (5)	
98	97.907216 (4)	
99	98.9062546 (21)	
100	99.9076576 (23)	
101	100.907314 (26)	
102	101.909213 (10)	
103	102.909179 (11)	
104	103.911440 (50)	
105	104.911660 (60)	
106	105.914355 (15)	
107	106.91508 (16)	
108	107.91848 (14)	
109	108.91963 (23) #	
110	109.92339 (43) #	
111	110.92505 (43) #	
112	111.92924 (54) #	
113	112.93133 (64) #	
114	113.93588 (64) #	
115	114.93828 (75) #	

44	Ru	87	86.94918 (64) #	101.07 (2)	g
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88	87.94042 (54) #	
89	88.93611 (54) #	
90	89.92978 (43) #	
91	90.92638 (54)	
92	91.92012 (32) #	
93	92.917050 (90)	
94	93.911360 (14)	
95	94.910413 (13)	
96	95.907598 (8)	5.54 (14)
97	96.907555 (9)	
98	97.905287 (7)	1.87 (3)
99	98.9059393 (21)	12.76 (14)
100	99.9042197 (22)	12.60 (7)
101	100.9055822 (22)	17.06 (2)
102	101.9043495 (22)	31.55 (14)
103	102.9063237 (22)	
104	103.905430 (4)	18.62 (27)
105	104.907750 (4)	
106	105.907327 (8)	
107	106.90991 (13)	
108	107.91019 (13)	
109	108.913200 (70)	
110	109.91397 (25)	
111	110.91756 (32) #	

112 111.91855 (58) #
 113 112.92254 (54) #
 114 113.92400 (39) #
 115 114.92831 (64) #
 116 115.93016 (75) #
 117 116.93479 (86) #
 118 117.93703 (97) #

45	Rh	89	88.94938 (54) #	102.90550 (2)	
		90	89.94287 (54) #		
		91	90.93655 (43) #		
		92	91.93198 (43) #		
		93	92.92574 (43) #		
		94	93.92170 (48) #		
		95	94.91590 (16)		
		96	95.914518 (14)		
		97	96.911340 (40)		
		98	97.910716 (13)		
		99	98.908132 (8)		
		100	99.908117 (22)		
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		102	101.906843 (5)		
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		104	103.906655 (3)		
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		106	105.907285 (8)		
		107	106.906751 (13)		
		108	107.90873 (11)		
		109	108.908736 (13)		
		110	109.91095 (24)		
		111	110.91166 (22) #		
		112	111.91461 (54) #		
		113	112.91542 (43) #		
		114	113.91885 (32) #		
		115	114.92012 (54)		
		116	115.92371 (54) #		
		117	116.92535 (64) #		
		118	117.92943 (75) #		
		119	118.93136 (86) #		
		120	119.93578 (86) #		
		121	120.93808 (97) #		

46	Pd	91	90.94948 (64) #	106.42 (1)	g, r
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		93	92.93591 (43) #		
		94	93.92877 (43) #		
		95	94.92469 (43) #		
		96	95.91822 (16)		
		97	96.91648 (32)		
		98	97.912721 (23)		
		99	98.911768 (16)		
		100	99.908505 (12)		
		101	100.908289 (19)		
		102	101.905608 (3)	1.02 (1)	
		103	102.906087 (3)		
		104	103.904035 (5)	11.14 (8)	
		105	104.905084 (5)	22.33 (8)	
		106	105.903483 (5)	27.33 (3)	
		107	106.905128 (7)		
		108	107.903894 (4)	26.46 (9)	
		109	108.905954 (4)		
		110	109.905152 (12)	11.72 (9)	
		111	110.907640 (40)		
		112	111.907313 (19)		
		113	112.910150 (40)		
		114	113.910365 (26)		
		115	114.913680 (70)		
		116	115.914160 (60)		
		117	116.91784 (32) #		
		118	117.91898 (23)		
		119	118.92268 (32) #		
		120	119.92403 (43) #		
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		122	121.92980 (54) #		
		123	122.93426 (64) #		

47	Ag	94	93.94278 (54) #	107.8682 (2)	g
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		96	95.93068 (43) #		
		97	96.92400 (43) #		
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		99	98.91760 (16)		

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 113 112.906566 (18)
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 125 124.93054 (43) #
 126 125.93450 (43) #
 127 126.93688 (54) #

48 Cd 96 95.93977 (54) # 112.411 (8) g
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 98 97.92758 (22) #
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 128 127.92776 (32)
 129 128.93226 (43) #
 130 129.93398 (43) #

49 In 98 97.94224 (54) # 114.818 (3)
 99 98.93461 (54) #
 100 99.93115 (41)
 101 100.92656 (32) #
 102 101.92471 (41)
 103 102.919914 (27)
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 106 105.913461 (15)
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 110 109.907169 (13)
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 112 111.905533 (6)
 113 112.904061 (4) 4.29 (5)
 114 113.904917 (3)

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118	117.906355(9)	
119	118.905846(8)	
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124	123.913180(50)	
125	124.913600(30)	
126	125.916460(40)	
127	126.917340(40)	
128	127.920170(50)	
129	128.92166(14)	
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131	130.926770(80)	
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133	132.93834(43)#	
134	133.94466(54)#	

50	Sn	100	99.93895(46)#	118.710(7)	g
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101	100.93606(54)#	
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108	107.911970(50)	
109	108.911287(11)	
110	109.907853(17)	
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113	112.905173(4)	
114	113.902782(3)	0.66(1)
115	114.903346(3)	0.34(1)
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117	116.902954(3)	7.68(7)
118	117.901606(3)	24.22(9)
119	118.903309(3)	8.59(4)
120	119.9021966(27)	32.58(9)
121	120.9042369(27)	
122	121.9034401(29)	4.63(3)
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124	123.9052746(15)	5.79(5)
125	124.9077849(16)	
126	125.907654(11)	
127	126.910351(27)	
128	127.910535(29)	
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137	136.94579(64)#	

51	Sb	103	102.94012(54)#	121.760(1)	g
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104	103.93629(39)#	
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114	113.90910(22)	
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116	115.906797(6)	
117	116.904840(10)	
118	117.905532(4)	
119	118.903946(9)	
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122	121.9051754(24)	
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 137 136.93531 (43) #
 138 137.94096 (54) #
 139 138.94571 (64) #

52	Te	106	105.93770 (43) #	127.60 (3)	g, h
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		126	125.9033055 (20)	18.84 (25)	
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		131	130.9085219 (22)		
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		136	135.920100 (50)		
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		139	138.93473 (43) #		
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53	I	108	107.94329 (39) #	126.90447 (3)	
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		119	118.910180 (70)		
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		121	120.907366 (12)		
		122	121.907592 (6)		
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 144 143.94961 (54) #

54	Xe	110	109.94448 (43) #	131.293 (6)	g, m
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		116	115.92174 (26) #		
		117	116.92056 (19)		
		118	117.91657 (107)		
		119	118.91555 (13)		
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		123	122.908471 (17)		
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		125	124.9063982 (21)		
		126	125.904269 (7)	0.09 (1)	
		127	126.905180 (4)		
		128	127.9035304 (15)	1.92 (3)	
		129	128.9047795 (9)	26.44 (24)	
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		133	132.905906 (4)		
		134	133.9053945 (9)	10.44 (10)	
		135	134.907207 (11)		
		136	135.907220 (8)	8.87 (16)	
		137	136.911563 (8)		
		138	137.913990 (40)		
		139	138.918787 (23)		
		140	139.921640 (70)		
		141	140.92665 (10)		
		142	141.92970 (11)		
		143	142.93489 (24) #		
		144	143.93823 (34) #		
		145	144.94367 (43) #		
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		147	146.95301 (54) #		

55	Cs	112	111.95033 (33) #	132.90545 (2)	
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		114	113.94142 (33) #		
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		120	119.920678 (11)		
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		122	121.916122 (18)		
		123	122.912990 (13)		
		124	123.912246 (13)		
		125	124.909725 (8)		
		126	125.909448 (13)		
		127	126.907418 (9)		
		128	127.907748 (6)		
		129	128.906063 (5)		
		130	129.906706 (9)		
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		132	131.906430 (4)		
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		135	134.905972 (3)		
		136	135.907306 (4)		
		137	136.907084 (3)		
		138	137.911011 (10)		
		139	138.913358 (5)		
		140	139.917277 (9)		
		141	140.920044 (11)		
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150 149.95797 (54) #
151 150.96200 (75) #

56 Ba 114 113.95094 (48) # 137.327 (7)

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117 116.93886 (70) #
118 117.93344 (54) #
119 118.93105 (109)
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121 120.92449 (33)
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123 122.91885 (32) #
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57 La 117 116.95001 (96) # 138.9055 (2) g

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123 122.92624 (43) #
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 154 153.95440 (86) #
 155 154.95813 (97) #

58	Ce	119	118.95276 (97) #		140.116 (1)	g, f
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		126	125.92410 (43) #			
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		128	127.91887 (32) #			
		129	128.91809 (22) #			
		130	129.91469 (66) #			
		131	130.91442 (44)			
		132	131.91149 (21) #			
		133	132.91155 (21) #			
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		135	134.909146 (12)			
		136	135.907140 (50)	0.185 (2)		
		137	136.907780 (50)			
		138	137.905986 (11)	0.251 (2)		
		139	138.906647 (8)			
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		141	140.908271 (3)			
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		145	144.917230 (40)			
		146	145.918690 (70)			
		147	146.922510 (60)			
		148	147.92439 (13)			
		149	148.928290 (80)			
		150	149.93023 (13)			
		151	150.93404 (32) #			
		152	151.93638 (43) #			
		153	152.94058 (54) #			
		154	153.94332 (64) #			
		155	154.94804 (75) #			
		156	155.95126 (86) #			
		157	156.95634 (97) #			

59	Pr	121	120.95536 (86) #		140.90765 (2)	
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		130	129.92338 (32) #			
		131	130.92006 (47)			
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		133	132.91620 (21) #			
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		135	134.91314 (16)			
		136	135.912650 (50)			
		137	136.910680 (50)			
		138	137.910749 (16)			
		139	138.908932 (9)			
		140	139.909071 (7)			
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		143	142.910812 (3)			
		144	143.913301 (4)			
		145	144.914507 (8)			
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		147	146.918980 (40)			
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		149	148.923791 (11)			
		150	149.927000 (90)			
		151	150.928230 (40)			
		152	151.93160 (32) #			
		153	152.93365 (32) #			
		154	153.93739 (43) #			
		155	154.93999 (54) #			

156 155.94412 (64) #
157 156.94717 (75) #
158 157.95178 (86) #
159 158.95523 (97) #

60	Nd	126	125.94307 (75) #	144.24 (3)	g, f
		127	126.94050 (64) #		
		128	127.93539 (64) #		
		129	128.93325 (39) #		
		130	129.92878 (54) #		
		131	130.92710 (50)		
		132	131.92312 (32) #		
		133	132.92221 (32) #		
		134	133.91865 (36) #		
		135	134.91824 (22) #		
		136	135.915020 (60)		
		137	136.914640 (80)		
		138	137.91193 (22) #		
		139	138.911920 (50)		
		140	139.909310 (21)		
		141	140.909605 (4)		
		142	141.907719 (3)	27.2 (5)	
		143	142.909810 (3)	12.2 (2)	
		144	143.910083 (3)	23.8 (3)	
		145	144.912569 (3)	8.3 (1)	
		146	145.913112 (3)	17.2 (3)	
		147	146.916096 (3)		
		148	147.916889 (3)	5.7 (1)	
		149	148.920144 (3)		
		150	149.920887 (4)	5.6 (2)	
		151	150.923825 (4)		
		152	151.924680 (30)		
		153	152.927695 (29)		
		154	153.92948 (12)		
		155	154.93263 (16)		
		156	155.93520 (43) #		
		157	156.93927 (54) #		
		158	157.94187 (64) #		
		159	158.94639 (75) #		
		160	159.94939 (86) #		
		161	160.95433 (97) #		

61	Pm	128	127.94826 (97) #	[145]	
		129	128.94316 (86) #		
		130	129.94045 (75) #		
		131	130.93580 (64) #		
		132	131.93375 (54) #		
		133	132.92972 (54) #		
		134	133.92849 (42) #		
		135	134.92462 (35) #		
		136	135.92345 (22)		
		137	136.92071 (15) #		
		138	137.91945 (34) #		
		139	138.916760 (60)		
		140	139.915800 (30)		
		141	140.913607 (29)		
		142	141.912950 (50)		
		143	142.910928 (4)		
		144	143.912586 (4)		
		145	144.912744 (4)		
		146	145.914692 (5)		
		147	146.915134 (3)		
		148	147.917468 (7)		
		149	148.918329 (5)		
		150	149.920979 (22)		
		151	150.921203 (6)		
		152	151.923490 (80)		
		153	152.924113 (12)		
		154	153.926550 (80)		
		155	154.928100 (30)		
		156	155.931060 (40)		
		157	156.93320 (32) #		
		158	157.93669 (43) #		
		159	158.93913 (54) #		
		160	159.94299 (64) #		
		161	160.94586 (75) #		
		162	161.95029 (86) #		
		163	162.95352 (97) #		

62	Sm	130	129.94863 (97) #	150.36 (3)	g
		131	130.94589 (97) #		
		132	131.94082 (75) #		

133 132.93873 (64) #
 134 133.93402 (54) #
 135 134.93235 (54) #
 136 135.92830 (43) #
 137 136.92705 (12)
 138 137.92354 (32) #
 139 138.922302 (16)
 140 139.918991 (16)
 141 140.918469 (13)
 142 141.915193 (11)
 143 142.914624 (4)
 144 143.911995 (4) 3.07 (7)
 145 144.913406 (4)
 146 145.913037 (4)
 147 146.914893 (3) 14.99 (18)
 148 147.914818 (3) 11.24 (10)
 149 148.917180 (3) 13.82 (7)
 150 149.917271 (3) 7.38 (1)
 151 150.919928 (3)
 152 151.919728 (3) 26.75 (16)
 153 152.922094 (3)
 154 153.922205 (3) 22.75 (29)
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 156 155.925526 (10)
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 158 157.929990 (80)
 159 158.93320 (32) #
 160 159.93514 (43) #
 161 160.93883 (54) #
 162 161.94122 (64) #
 163 162.94536 (75) #
 164 163.94828 (86) #
 165 164.95298 (97) #

63	Eu	132	131.95416 (97) #	151.964 (1)	g
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		134	133.94632 (75) #		
		135	134.94172 (64) #		
		136	135.93950 (54) #		
		137	136.93521 (54) #		
		138	137.93345 (43) #		
		139	138.92984 (16) #		
		140	139.928080 (60)		
		141	140.924890 (30)		
		142	141.923400 (30)		
		143	142.920287 (14)		
		144	143.918774 (19)		
		145	144.916261 (5)		
		146	145.917200 (8)		
		147	146.916741 (4)		
		148	147.918154 (19)		
		149	148.917926 (5)		
		150	149.919698 (8)		
		151	150.919846 (3)	47.81 (3)	
		152	151.921740 (3)		
		153	152.921226 (3)	52.19 (3)	
		154	153.922975 (3)		
		155	154.922889 (3)		
		156	155.924751 (6)		
		157	156.925419 (7)		
		158	157.927840 (80)		
		159	158.929084 (9)		
		160	159.93197 (22) #		
		161	160.93368 (32) #		
		162	161.93704 (43) #		
		163	162.93921 (54) #		
		164	163.94299 (64) #		
		165	164.94572 (75) #		
		166	165.94997 (86) #		
		167	166.95305 (97) #		

64	Gd	136	135.94707 (75) #	157.25 (3)	g
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		142	141.92823 (32) #		
		143	142.92674 (22)		
		144	143.92279 (22) #		
		145	144.921690 (40)		
		146	145.918305 (6)		

147	146.919089(4)	
148	147.918110(4)	
149	148.919336(5)	
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154	153.920862(3)	2.18(3)
155	154.922619(3)	14.80(12)
156	155.922120(3)	20.47(9)
157	156.923957(3)	15.65(2)
158	157.924101(3)	24.84(7)
159	158.926385(3)	
160	159.927051(3)	21.86(19)
161	160.929666(3)	
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163	162.93399(32)#	
164	163.93586(43)#	
165	164.93938(54)#	
166	165.94160(64)#	
167	166.94557(64)#	
168	167.94836(75)#	
169	168.95287(86)#	

65	Tb	138	137.95287(86)#	158.92534(2)
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139	138.94803(75)#
140	139.94554(96)#
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142	141.93886(82)#
143	142.93475(43)#
144	143.93253(32)#
145	144.92888(24)#
146	145.927180(50)
147	146.924037(13)
148	147.924300(30)
149	148.923242(5)
150	149.923654(9)
151	150.923098(5)
152	151.924070(40)
153	152.923431(5)
154	153.924690(50)
155	154.923500(13)
156	155.924744(5)
157	156.924021(3)
158	157.925410(3)
159	158.925343(3)
160	159.927164(3)
161	160.927566(3)
162	161.929480(40)
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165	164.93488(21)#
166	165.93805(32)#
167	166.94005(43)#
168	167.94364(54)#
169	168.94622(64)#
170	169.95025(75)#
171	170.95330(86)#

100

66	Dy	140	139.95379(97)#	162.500(1)	g
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141	140.95119(75)#	
142	141.94627(85)#	
143	142.94383(54)#	
144	143.93907(43)#	
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155	154.925749(13)	
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158	157.924405(4)	0.10(1)
159	158.925736(3)	
160	159.925194(3)	2.34(8)
161	160.926930(3)	18.91(24)
162	161.926795(3)	25.51(26)

163 162.928728(3) 24.90(16)
 164 163.929171(3) 28.18(37)
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 171 170.94648(54)#
 172 171.94911(64)#
 173 172.95344(75)#

67 Ho 142 141.95986(107)# 164.93032(2)
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 144 143.95164(64)#
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 175 174.95405(64)#

68 Er 144 143.96059(86)# 167.259(3) g
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 147 146.94931(54)#
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69	Tm	146	145.96650 (75) #	168.93421 (2)
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		149	148.95265 (64) #	
		150	149.94967 (54) #	
		151	150.94543 (15) #	
		152	151.94430 (32) #	
		153	152.942028 (23)	
		154	153.94142 (12) #	
		155	154.939192 (14)	
		156	155.939010 (60)	
		157	156.93676 (11)	
		158	157.93700 (13) #	
		159	158.934810 (70)	
		160	159.93509 (33)	
		161	160.93340 (10)	
		162	161.933970 (30)	
		163	162.932648 (7)	
		164	163.933451 (20)	
		165	164.932432 (4)	
		166	165.933553 (12)	
		167	166.932849 (3)	
		168	167.934170 (4)	
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		170	169.935798 (3)	
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		173	172.939600 (6)	
		174	173.942160 (50)	
		175	174.943830 (50)	
		176	175.94699 (11)	
		177	176.94904 (32) #	
		178	177.95264 (43) #	
		179	178.95534 (54) #	

70	Yb	148	147.96676 (86) #	173.04 (3)	g
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		151	150.95525 (34) #		
		152	151.95017 (38) #		
		153	152.94921 (32) #		
		154	153.94624 (11) #		
		155	154.94579 (32) #		
		156	155.942850 (40)		
		157	156.942660 (60)		
		158	157.939858 (11)		
		159	158.94015 (10)		
		160	159.93756 (22) #		
		161	160.93785 (24) #		
		162	161.93575 (22) #		
		163	162.93627 (11)		
		164	163.93452 (11) #		
		165	164.935398 (22)		
		166	165.933880 (9)		
		167	166.934947 (5)		
		168	167.933894 (5)	0.13 (1)	
		169	168.935187 (5)		
		170	169.934759 (3)	3.04 (15)	
		171	170.936322 (3)	14.28 (57)	
		172	171.9363777 (30)	21.83 (67)	
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		174	173.9388581 (30)	31.83 (92)	
		175	174.9412725 (30)		
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		177	176.945257 (3)		
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		180	179.95233 (43) #		
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71	Lu	150	149.97267 (75) #	174.967 (1)	g
		151	150.96715 (65) #		
		152	151.96361 (75) #		
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		154	153.95710 (54) #		
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		156	155.95291 (32) #		
		157	156.950102 (23)		
		158	157.94917 (13) #		
		159	158.946620 (50)		
		160	159.94602 (25) #		
		161	160.94354 (26) #		

162 161.94322 (24) #
 163 162.94120 (24)
 164 163.94122 (13) #
 165 164.939610 (90)
 166 165.93976 (17)
 167 166.93831 (11)
 168 167.938700 (90)
 169 168.937649 (6)
 170 169.938472 (20)
 171 170.937910 (3)
 172 171.939082 (4)
 173 172.938927 (3)
 174 173.9403335 (30)
 175 174.9407679 (28) 97.41 (2)
 176 175.9426824 (28) 2.59 (2)
 177 176.9437550 (28)
 178 177.945951 (3)
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 184 183.96117 (43) #

72 Hf 154 153.96425 (75) # 178.49 (2) f
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 158 157.95465 (11) #
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 160 159.950710 (40)
 161 160.950330 (80)
 162 161.947203 (12)
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 164 163.94442 (21) #
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 170 169.93965 (21) #
 171 170.94049 (21) #
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 175 174.941503 (3)
 176 175.9414018 (29) 5.26 (7)
 177 176.9432200 (27) 18.60 (9)
 178 177.9436977 (27) 27.28 (7)
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73 Ta 156 155.97169 (64) # 180.9479 (1)
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 158 157.96637 (54) #
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 160 159.96136 (33) #
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 162 161.95715 (14) #
 163 162.954320 (80)
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 165 164.95082 (24) #
 166 165.95047 (32) #
 167 166.94797 (46) #
 168 167.94779 (39) #
 169 168.94592 (22) #
 170 169.94609 (21) #
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 177 176.944472 (4)
 178 177.94575 (11)
 179 178.945934 (6)

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182	181.950152(3)	
183	182.951373(3)	
184	183.954009(28)	
185	184.955559(15)	
186	185.958550(60)	
187	186.96041(32)#	
188	187.96371(32)#	

74	W	158	157.97394(75)#	183.84(1)
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		161	160.96709(33)#	
		162	161.96334(11)#	
		163	162.96253(33)#	
		164	163.958980(40)	
		165	164.958340(90)	
		166	165.955020(13)	
		167	166.95467(33)#	
		168	167.95186(21)#	
		169	168.95176(34)#	
		170	169.94929(51)#	
		171	170.94946(30)#	
		172	171.94742(29)#	
		173	172.94783(40)#	
		174	173.94616(32)#	
		175	174.94677(21)#	
		176	175.94559(21)#	
		177	176.94662(32)#	
		178	177.94585(11)	
		179	178.947072(17)	
		180	179.946706(5)	0.12(1)
		181	180.948198(6)	
		182	181.948206(3)	26.50(16)
		183	182.9502245(29)	14.31(4)
		184	183.9509326(29)	30.64(2)
		185	184.9534206(30)	
		186	185.954362(3)	28.43(19)
		187	186.957158(3)	
		188	187.958487(4)	
		189	188.96191(21)	
		190	189.96318(24)	

75	Re	160	159.98149(64)#	186.207(1)
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		163	162.97197(12)#	
		164	163.97032(33)#	
		165	164.967050(80)	
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		167	166.96256(14)#	
		168	167.96161(43)#	
		169	168.95883(22)#	
		170	169.95816(43)#	
		171	170.95555(37)#	
		172	171.95529(33)#	
		173	172.95306(48)#	
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		175	174.95139(48)#	
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		177	176.95027(21)#	
		178	177.95085(22)	
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		182	181.95121(11)	
		183	182.950821(9)	
		184	183.952524(6)	
		185	184.9529557(30)	37.40(2)
		186	185.954987(3)	
		187	186.9557508(30)	62.60(2)
		188	187.9581123(30)	
		189	188.959228(9)	
		190	189.96182(23)	
		191	190.963124(11)	
		192	191.96596(21)#	

76	Os	162	161.98382(75)#	190.23(3)	<i>g, r, f</i>
		163	162.98205(64)#		
		164	163.97793(38)#		
		165	164.97648(33)#		

166 165.97253 (11) #
 167 166.97155 (33) #
 168 167.967830 (40)
 169 168.967080 (90)
 170 169.963570 (14)
 171 170.96304 (33) #
 172 171.96008 (21) #
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77 Ir 165 164.98758 (43) # 192.217 (3)

166 165.98551 (55) #
 167 166.98154 (11) #
 168 167.97997 (35) #
 169 168.97639 (10)
 170 169.97503 (16) #
 171 170.97178 (14) #
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78 Pt 168 167.98804 (38) # 195.078 (2)

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79 Au 171 170.99177 (27) # 196.96655 (2)
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80 Hg 175 174.99141 (34) # 200.59 (2)
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81	Tl	177	176.99688 (24) #	204.3833 (2)
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180	179.99019 (48) #	
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187	186.97617 (43) #	
188	187.97592 (24) #	
189	188.97369 (37) #	
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192	191.97214 (22) #	
193	192.97055 (27) #	
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82	Pb	181	180.99671 (17) #	207.2 (1)	<i>g, r, f</i>
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83	Bi	185	184.99771 (24) #	208.98038 (2)
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100

84 Po 190 189.99511 (51) # [209]
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85 At 193 193.00019 (43) # [210]
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86 Rn 196 196.00231(22)# [222]
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87 Fr 200 200.00650(25)# [223]
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88 Ra 203 203.00921(25)# [226]
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89 Ac 207 207.01209 (25) # [227]

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90 Th 210 210.01503 (17) # 232.0381 (1) g

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91 Pa 213 213.02118 (27) 231.03588 (2)
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92 U 218 218.02349 (10) # 238.02891 (3) g, m, r, d, f
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93 Np 225 225.033900 (80) [237]
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94 Pu 228 228.038730 (30) [244]
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95 Am 231 231.04556 (32) # [243]
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96 Cm 233 233.05080 (43) # [247]
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236 236.05141 (22) #
237 237.05289 (22) #
238 238.053020 (40)
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97 Bk 235 235.05658 (43) # [247]
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98 Cf 237 237.06207 (54) # [251]
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256 256.09344 (32) #

99 Es 240 240.06892 (43) # [252]
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100 Fm 242 242.07343 (43) # [257]
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101 Md 245 245.08102 (40) # [258]
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257 257.095535 (4)
258 258.098425 (5)
259 259.10050 (22) #
260 260.10365 (34) #

102 No 249 249.08782 (37) # [259]

250 250.08749 (22) #
251 251.08896 (19) #
252 252.088966 (14)
253 253.09065 (26) #
254 254.090949 (19)
255 255.093232 (13)
256 256.094276 (9)
257 257.096850 (30)
258 258.09820 (22) #
259 259.10102 (11) #
260 260.10264 (22) #
261 261.10574 (32) #
262 262.10752 (58) #

103 Lr 251 251.09436 (32) # [262]
252 252.09533 (32) #
253 253.09526 (24) #
254 254.09659 (36) #
255 255.09677 (22) #
256 256.09876 (24) #
257 257.09961 (22) #
258 258.10188 (11) #
259 259.102990 (80) #
260 260.10557 (12) #
261 261.10694 (22) #
262 262.10969 (32) #
263 263.11139 (39) #

104 Rf 253 253.10068 (49) # [261]
254 254.10017 (31) #
255 255.10149 (22) #
256 256.101180 (29)
257 257.10307 (29) #
258 258.10357 (22) #
259 259.105630 (80) #
260 260.10643 (22) #
261 261.10875 (11) #
262 262.10992 (30) #
263 263.11254 (20) #
264 264.11398 (48) #

105 Db 255 255.10740 (45) # [262]
256 256.10811 (39) #
257 257.10786 (25) #
258 258.10944 (37) #
259 259.10972 (31) #
260 260.11143 (25) #
261 261.11211 (25) #
262 262.11415 (20) #
263 263.11508 (18) #
264 264.11747 (25) #
265 265.11866 (30) #

106 Sg 258 258.11315 (45) # [266]
259 259.11465 (23) #
260 260.114440 (40)
261 261.11620 (30) #
262 262.11648 (30) #
263 263.11831 (13) #
264 264.11892 (30) #
265 265.12107 (15) #
266 266.12193 (31) #

107 Bh 260 260.12180 (66) # [264]
261 261.12180 (26) #
262 262.12301 (40) #
263 263.12315 (45) #
264 264.12473 (30) #
265 265.12520 (41) #
266 266.12701 (38) #
267 267.12774 (37) #

108 Hs 263 263.12871 (39) # [277]
264 264.128410 (50)
265 265.13000 (32) #
266 266.13004 (44) #
267 267.13177 (11) #
268 268.13216 (44) #
269 269.13411 (46) #
277

109 Mt 265 265.13657 (50) # [268]

266 266.13794 (38) #
267 267.13753 (62) #
268 268.13882 (34) #
269 269.13911 (59) #
270 270.14072 (66) #
271 271.14123 (65) #

110 Uun 267 267.14396 (41) # [281]
268 268.14353 (54) #
269 269.14514 (31) #
270 270.14463 (70) #
271 271.14608 (20) #
272 272.14631 (70) #
273 273.14925 (47) #
281

111 Uuu 272 272.15348 (36) # [272]

112 Uub 285 [285]

114 Uuq 289 [289]

116 Uuh 292 [292]