PERIODIC TABLE OF THE ELEMENTS

Table of Selected Radioactive Isotopes

n 1 (15.3 min) β^-
H 3 (12.26 y) β^-
Be 7 (53.3 d) EC
10 (1.6×10^{6} y) β^-
C 11 (20.40 min) β^+
14 (5730 y) β^-
F 18 (109.8 min) β^+
Na 22 (2.602 y) β^+, EC
24 (15.02 h) β^-
Mg 28 (20.9 h) β^-
Al 26 (7.2×10^{5} y) β^+, EC
P 32 (14.28 d) β^-
S 35 (87.2 d) β^-
Cl 36 (3.01×10^{5} y) β^-
38 (37.2 min) β^-
Ar 37 (35.02 d) EC
39 (265 y) β^-
K 40 (1.28×10^{9} y) EC
42 (12.36 h) β^-
Ca 45 (165 d) β^-
Sc 46 (83.80 d) β^-
Cr 51 (27.70 d) EC
Mn 53 (2×10^{6} y) EC
54 (312.0 d) EC
56 (2.578 h) β^-
Fe 59 (44.6 d) β^-
Co 56 (78.8d) β^+, EC
57 (270 d) EC
58 (71.3 d) β^+, EC
60 (5.272 y) β^-
Ni 57 (36.0 h) β^+, EC
59 (8×10^{4} y) EC
63 (92 y) β^-
Cu 64 (12.70 h) β^-, β^+, EC
67 (61.88 h) β^-
Zn 65 (244.1 d) β^+, EC
Ga 67 (78.2 h) EC
72 (14.10 h) β^-
Ge 68 (275 d) EC
As 73 (80.3 d) EC
74 (17.9 d) β^-, β^+, EC
Se 75 (118.5 d) β^-
79 (6.5×10^{4} y) β^-
Br 82 (35.34 h) β^-
Kr 81 (2.1×10^{5} y) EC
85 (10.72 y) β^-
Rb 86 (18.7 d) β^-
87 (4.8×10^{10} y) β^-
Sr 90 (28.8 y) β^-
Y 88 (106.6 d) β^+, EC
Zr 93 (1.5×10^{6} y) β^-
95 (64.0 d) β^-
Nb 94 (2.0×10^{4} y) β^-
95 (35.15 d) β^-
Mo 99 (66.02 h) β^-
Tc 97 (2.6×10^{6} y) EC
98 (4.2×10^{6} y) β^-
99 (2.13×10^{5} y) β^-
Ru 106 (367 d) β^-
Rh 101 (3.3 y) EC
Pd 103 (17.0 d) EC
107 (7×10^{6} y) β^-
Ag 108 (127 y) EC
110 (252 d) β^-
111 (7.45 d) β^-
Cd 109 (453 d) EC
In 114 (49.51 d) IT
Sn 121 (76 y) β^-
Sb 124 (60.20 d) β^-
125 (2.7 y) β^-
Te 121 m(154 d) IT
123 m(119.7 d) IT
127 m(109 d) IT
I 129 (1.6×10^{7} y) β^-
131 (8.040 d) β^-
Xe 133 (5.25 d) β^-
135 (9.10 h) β^-
Cs 134 (2.06 y) β^-
135 (2.9×10^{6} y) β^-
137 (30.17 y) β^-
Ba 140 (12.8 d) β^-
La 137 (6×10^{4} y) EC
140 (40.3 h) β^-
Ce 144 (284 d) β^-
Pr 142 (19.1 h) β^-
Nd 147 (11.1 d) β^-
Pm 145 (18 y) EC
147 (2.62 y) β^-
Sm 146 (7×10^{7} y) α
151 (93 y) β^-
Eu 152 (13 y) β^+, EC, β^-
154 (8.5 y) β^-
Gd 150 (2.1×10^{6} y) α
Tb 158 (1.2×10^{3} y) EC, β^-
160 (72.3 d) β^-
Ho 166 m(1.2×10^{3} y) β^-
Tm 170 (128.6 d) β^-
171 (1.92 y) β^-
Yb 169 (32.0 d) EC
175 (4.19 d) β^-
Lu 176 (3.7×10^{10} y) β^-
Ta 182 (115.0 d) β^-
W 181 (140 d) EC
185 (75.1 d) β^-
188 (69 d) β^-
Re 187 (5×10^{10} y) β^-
Os 194 (6.0 y) β^-
Ir 192 (74.2 d) β^-, β^+, EC
Au 195 (183 d) EC
196 (6.18 d) β^+, EC, β^-
198 (2.696 d) β^-
199 (3.15 d) β^-
Hg 203 (46.8 d) β^-
Tl 204 (3.77 y) β^-
Pb 202 (3×10^{5} y) EC
205 (3×10^{7} y) EC
210 (22.3 y) β^-, α
Bi 207 (38 y) EC
208 (3.7×10^{5} y) EC
210 (5.01 d) β^-, α
210 m(3×10^{6} y) α
Po 208 (2.90 y) α
209 (102 y) α
210 (138.38 d) α
At 209 (5.4 h) EC, α
210 (8.1 h) EC
211 (7.21 h) EC, α
Rn 222 (3.824 d) α
Fr 212 (19.3 min) EC, α
222 (15 min) β^-
223 (21.8 min) β^-
Ra 226 (1.60×10^{3} y) α
Ac 227 (21.77 y) $\beta^-\alpha$
Th 228 (1.913 y) α
230 (7.7×10^{4} y) α
232 (1.40×10^{10} y) α
Pa 231 (3.28×10^{4} y) α
U 233 (1.59×10^{5} y) α
234 (2.44×10^{5} y) α
235 (7.04×10^{8} y) α
236 (2.34×10^{7} y) α
238 (4.47×10^{9} y) α
Np 236 (1.1×10^{6} y) EC, β^-
237 (2.14×10^{6} y) α
239 (2.346 d) β^-
Pu 238 (87.75 y) α
239 (2.41×10^{4} y) α
240 (6.54×10^{3} y) α
242 (3.8×10^{5} y) α
244 (8.3×10^{7} y) α
Am 241 (432 y) α
243 (7.37×10^{3} y) α
Cm 242 (163.2 d) α
244 (18.12 y) α
247 (1.56×10^{7} y) α
248 (3.5×10^{5} y) α, SF
Bk 247 (1.4×10^{3} y) α
Cf 249 (351 y) α
251 (900 y) α
Es 252 (472 d) α
253 (20.47 d) α
254 (276 d) α
Fm 253 (20.1 h) α
257 (100.5 d) α
Md 258 (55 d) α
No 259 (58 min) α
Lr 260 (3.0 min) α
104 261 (65 s) α
105 262 (40 s) α
106 263 (0.9 s) α

Selected Radioactive Isotopes

Naturally occurring radioactive isotopes are designated by a mass number in blue (although some are also manufactured). Letter m indicates an isomer of another isotope of the same mass number. Half-lives follow in parentheses, where s, min, h, d, and y stand respectively for seconds, minutes, hours, days, and years. The table includes mainly the longer-lived radioactive isotopes; many others have been prepared. Isotopes known to be radioactive but with half-lives exceeding 10^{19} y have not been included. Symbols describing the principal mode (or modes) of decay are as follows (these processes are generally accompanied by gamma radiation):

- α alpha particle emission
- β^- beta particle (electron) emission
- β^+ positron emission
- EC orbital electron capture
- IT isomeric transition from upper to lower isomeric state
- SF spontaneous fission

Elements

Groups: IA (H, Li, Na, K, Rb, Cs, Fr); IIA (Be, Mg, Ca, Sr, Ba, Ra); IIIA (Sc, Y, La, Ac); IVA (Ti, Zr, Hf, 104); VA (V, Nb, Ta, 105); VIA (Cr, Mo, W, 106); VIIA (Mn, Tc, Re, 107); VIIIA (Fe, Co, Ni; Ru, Rh, Pd; Os, Ir, Pt; 108, 109); IB (Cu, Ag, Au); IIB (Zn, Cd, Hg); IIIB (B, Al, Ga, In, Tl); IVB (C, Si, Ge, Sn, Pb); VB (N, P, As, Sb, Bi); VIB (O, S, Se, Te, Po); VIIB (F, Cl, Br, I, At); VIII (He, Ne, Ar, Kr, Xe, Rn)

Atomic Number	Symbol	Name	Atomic Weight	Oxidation States	Boiling Point, K	Melting Point, K	Density	Electron Configuration
1	H	Hydrogen	1.00794	1	20.28	13.81	0.0899†	$1s^1$
2	He	Helium	4.00260		4.216	0.95 (26 atm)	0.1785†	$1s^2$
3	Li	Lithium	6.941	1	1615	453.7	0.53	$1s^22s^1$
4	Be	Beryllium	9.01218	2	3243	1560	1.85	$1s^22s^2$
5	B	Boron	10.811	3	4275	2365	2.34	$1s^22s^2p^1$
6	C	Carbon	12.011	±4,2	5100*	3825*	2.26	$1s^22s^2p^2$
7	N	Nitrogen	14.0067	±3,5,4,2	77.344	63.15	1.251†	$1s^22s^2p^3$
8	O	Oxygen	15.9994	-2	90.188	54.8	1.429†	$1s^22s^2p^4$
9	F	Fluorine	18.99840	-1	85.0	53.55	1.696†	$1s^22s^2p^5$
10	Ne	Neon	20.1797		27.10	24.55	0.900†	$1s^22s^2p^6$
11	Na	Sodium	22.98977	1	1156	371.0	0.97	$[Ne]3s^1$
12	Mg	Magnesium	24.305	2	1380	922	1.74	$[Ne]3s^2$
13	Al	Aluminum	26.98154	3	2740	933.5	2.70	$[Ne]3s^2p^1$
14	Si	Silicon	28.0855	4,2	2630	1683	2.33	$[Ne]3s^2p^2$
15	P	Phosphorus	30.97376	±3,5,4	553	317.3	1.82	$[Ne]3s^2p^3$
16	S	Sulfur	32.066	±2,4,6	717.82	392.2	2.07	$[Ne]3s^2p^4$
17	Cl	Chlorine	35.4527	±1,3,5,7	239.18	172.17	3.214†	$[Ne]3s^2p^5$
18	Ar	Argon	39.948		87.45	83.95	1.784†	$[Ne]3s^2p^6$
19	K	Potassium	39.0983	1	1033	336.8	0.86	$[Ar]4s^1$
20	Ca	Calcium	40.078	2	1757	1112	1.55	$[Ar]4s^2$
21	Sc	Scandium	44.9559	3	3109	1814	2.99	$[Ar]3d^14s^2$
22	Ti	Titanium	47.88	4,3	3560	1935	4.54	$[Ar]3d^24s^2$
23	V	Vanadium	50.9415	5,4,3,2	3650	2163	6.11	$[Ar]3d^34s^2$
24	Cr	Chromium	51.996	6,3,2	2945	2130	7.19	$[Ar]3d^54s^1$
25	Mn	Manganese	54.9380	7,6,4,2,3	2235	1518	7.44	$[Ar]3d^54s^2$
26	Fe	Iron	55.847	2,3	3023	1808	7.874	$[Ar]3d^64s^2$
27	Co	Cobalt	58.9332	2,3	3143	1768	8.90	$[Ar]3d^74s^2$
28	Ni	Nickel	58.6934	2,3	3005	1726	8.90	$[Ar]3d^84s^2$
29	Cu	Copper	63.546	2,1	2840	1356.6	8.96	$[Ar]3d^{10}4s^1$
30	Zn	Zinc	65.39	2	1180	692.73	7.13	$[Ar]3d^{10}4s^2$
31	Ga	Gallium	69.723	3	2478	302.92	5.91	$[Ar]3d^{10}4s^2p^1$
32	Ge	Germanium	72.61	4	3107	1211.5	5.32	$[Ar]3d^{10}4s^2p^2$
33	As	Arsenic	74.9216	±3,5	876 (subl.)	1090 (36 atm)	5.78	$[Ar]3d^{10}4s^2p^3$
34	Se	Selenium	78.96	-2,4,6	958	494	4.79	$[Ar]3d^{10}4s^2p^4$
35	Br	Bromine	79.904	±1,5,7	331.85	265.95	3.12	$[Ar]3d^{10}4s^2p^5$
36	Kr	Krypton	83.80	0,2	120.85	116	3.75†	$[Ar]3d^{10}4s^2p^6$
37	Rb	Rubidium	85.4678	1	961	312.63	1.532	$[Kr]5s^1$
38	Sr	Strontium	87.62	2	1655	1042	2.54	$[Kr]5s^2$
39	Y	Yttrium	88.9059	3	3611	1795	4.47	$[Kr]4d^15s^2$
40	Zr	Zirconium	91.224	4	4682	2128	6.51	$[Kr]4d^25s^2$
41	Nb	Niobium	92.9064	5,3	5015	2742	8.57	$[Kr]4d^45s^1$
42	Mo	Molybdenum	95.94	6,5,4,3,2	4912	2896	10.22	$[Kr]4d^55s^1$
43	Tc	Technetium	(98)	7	4538	2477	11.5	$[Kr]4d^55s^2$
44	Ru	Ruthenium	101.07	2,3,4,6,8	4425	2610	12.37	$[Kr]4d^75s^1$
45	Rh	Rhodium	102.9055	2,3,4	3970	2236	12.41	$[Kr]4d^85s^1$
46	Pd	Palladium	106.42	2,4	3240	1825	12.0	$[Kr]4d^{10}$
47	Ag	Silver	107.868	1	2436	1235.08	10.50	$[Kr]4d^{10}5s^1$
48	Cd	Cadmium	112.41	2	1040	594.26	8.65	$[Kr]4d^{10}5s^2$
49	In	Indium	114.82	3	2350	429.78	7.31	$[Kr]4d^{10}5s^2p^1$
50	Sn	Tin	118.710	4,2	2876	505.12	7.31	$[Kr]4d^{10}5s^2p^2$
51	Sb	Antimony	121.757	±3,5	1860	903.91	6.69	$[Kr]4d^{10}5s^2p^3$
52	Te	Tellurium	127.60	-2,4,6	1261	722.72	6.24	$[Kr]4d^{10}5s^2p^4$
53	I	Iodine	126.9045	±1,5,7	457.5	386.7	4.93	$[Kr]4d^{10}5s^2p^5$
54	Xe	Xenon	131.29	0,2,4,6	165.1	161.39	5.90†	$[Kr]4d^{10}5s^2p^6$
55	Cs	Cesium	132.9054	1	944	301.54	1.87	$[Xe]6s^1$
56	Ba	Barium	137.33	2	2078	1002	3.59	$[Xe]6s^2$
57	La ★	Lanthanum	138.9055	3	3737	1191	6.15	$[Xe]5d^16s^2$
72	Hf	Hafnium	178.49	4	4875	2504	13.31	$[Xe]4f^{14}5d^26s^2$
73	Ta	Tantalum	180.9479	5	5730	3293	16.65	$[Xe]4f^{14}5d^36s^2$
74	W	Tungsten	183.85	6,5,4,3,2	5825	3695	19.3	$[Xe]4f^{14}5d^46s^2$
75	Re	Rhenium	186.207	7,6,4,2,-1	5870	3455	21.0	$[Xe]4f^{14}5d^56s^2$
76	Os	Osmium	190.2	2,3,4,6,8	5300	3300	22.6	$[Xe]4f^{14}5d^66s^2$
77	Ir	Iridium	192.22	2,3,4,6	4700	2720	22.5	$[Xe]4f^{14}5d^76s^2$
78	Pt	Platinum	195.08	2,4	4100	2042.1	21.45	$[Xe]4f^{14}5d^96s^1$
79	Au	Gold	196.9665	3,1	3130	1337.58	19.3	$[Xe]4f^{14}5d^{10}6s^1$
80	Hg	Mercury	200.59	2,1	629.88	234.31	13.55	$[Xe]4f^{14}5d^{10}6s^2$
81	Tl	Thallium	204.383	3,1	1746	577	11.85	$[Xe]4f^{14}5d^{10}6s^2p^1$
82	Pb	Lead	207.2	4,2	2023	600.65	11.35	$[Xe]4f^{14}5d^{10}6s^2p^2$
83	Bi	Bismuth	208.9804	3,5	1837	544.59	9.75	$[Xe]4f^{14}5d^{10}6s^2p^3$
84	Po	Polonium	(209)	4,2,6	—	527	9.3	$[Xe]4f^{14}5d^{10}6s^2p^4$
85	At	Astatine	(210)	±1,3,5,7	610*	575	—	$[Xe]4f^{14}5d^{10}6s^2p^5$
86	Rn	Radon	(222)	0,2	211.4	202	9.73	$[Xe]4f^{14}5d^{10}6s^2p^6$
87	Fr	Francium	(223)	1	950	300	—	$[Rn]7s^1$
88	Ra	Radium	226.0254	2	1413	973	5.0	$[Rn]7s^2$
89	Ac ★★	Actinium	(227)	3	3470*	1324	10.07	$[Rn]6d^17s^2$
104	Rf	(Rutherfordium)	(261)		—	—	—	$[Rn]5f^{14}6d^27s^2$
105	Ha	(Hahnium)	(262)		—	—	—	$[Rn]5f^{14}6d^37s^2$
106	Sg	(Seaborgium)	(263)		—	—	—	$[Rn]5f^{14}6d^47s^2$
107	Uns	(Unnilseptium)	(262)		—	—	—	$[Rn]5f^{14}6d^57s^2$
108	Uno	(Unniloctium)	(265)		—	—	—	$[Rn]5f^{14}6d^67s^2$
109	Une	(Unnilnonium)	(266)		—	—	—	$(Rn)5f^{14}6d^77s^2$

* Estimated Values

The A & B subgroup designations, applicable to elements in rows 4, 5, 6 and 7, are those recommended by the International Union of Pure and Applied Chemistry.

The names for elements 104-106 have been proposed, but not formally accepted by the IUPAC.

Atomic Number	Symbol	Name	Atomic Weight	Oxidation States	Boiling Point, K	Melting Point, K	Density	Electron Configuration
★ 58	Ce	Cerium	140.12	3,4	3715	1071	6.77	$[Xe]4f^26s^2$
59	Pr	Praseodymium	140.9077	3,4	3785	1204	6.77	$[Xe]4f^36s^2$
60	Nd	Neodymium	144.24	3	3347	1294	7.01	$[Xe]4f^46s^2$
61	Pm	Promethium	(145)	3	3273	1315	7.22	$[Xe]4f^56s^2$
62	Sm	Samarium	150.36	3,2	2067	1347	7.52	$[Xe]4f^66s^2$
63	Eu	Europium	151.965	3,2	1800	1095	5.24	$[Xe]4f^76s^2$
64	Gd	Gadolinium	157.25	3	3545	1585	7.90	$[Xe]4f^75d^16s^2$
65	Tb	Terbium	158.9253	3,4	3500	1629	8.23	$[Xe]4f^96s^2$
66	Dy	Dysprosium	162.50	3	2840	1685	8.55	$[Xe]4f^{10}6s^2$
67	Ho	Holmium	164.9303	3	2968	1747	8.80	$[Xe]4f^{11}6s^2$
68	Er	Erbium	167.26	3	3140	1802	9.07	$[Xe]4f^{12}6s^2$
69	Tm	Thulium	168.9342	3,2	2223	1818	9.32	$[Xe]4f^{13}6s^2$
70	Yb	Ytterbium	173.04	3,2	1469	1092	6.97	$[Xe]4f^{14}6s^2$
71	Lu	Lutetium	174.967	3	3668	1936	9.84	$[Xe]4f^{14}5d^16s^2$
★★ 90	Th	Thorium	232.0381	4	5060	2028	11.72	$[Rn]6d^27s^2$
91	Pa	Protactinium	231.0359	5,4	4300*	1845	15.4	$[Rn]5f^26d^17s^2$
92	U	Uranium	238.029	6,5,4,3	4407	1408	18.95	$[Rn]5f^36d^17s^2$
93	Np	Neptunium	237.0482	6,5,4,3	4175*	912	20.2	$[Rn]5f^46d^17s^2$
94	Pu	Plutonium	(244)	6,5,4,3	3505	913	19.84	$[Rn]5f^67s^2$
95	Am	Americium	(243)	6,5,4,3	2880	1449	13.7	$[Rn]5f^77s^2$
96	Cm	Curium	(247)	3	—	1620	13.5	$[Rn]5f^76d^17s^2$
97	Bk	Berkelium	(247)	4,3	—	—	14*	$[Rn]5f^86d^17s^2$
98	Cf	Californium	(251)		—	1170*	—	$[Rn]5f^{10}7s^2$
99	Es	Einsteinium	(252)	3	—	1130*	—	$[Rn]5f^{11}7s^2$
100	Fm	Fermium	(257)	3	—	1800*	—	$[Rn]5f^{12}7s^2$
101	Md	Mendelevium	(258)	3	—	1100*	—	$[Rn]5f^{13}7s^2$
102	No	Nobelium	(259)	2,3	—	1100*	—	$[Rn]5f^{14}7s^2$
103	Lr	Lawrencium	(260)	3	—	1900*	—	$[Rn]5f^{14}6d^17s^2$

KEY

30			65.38
1180		2	
692.73		Zn	
7.14			
	$[Ar]3d^{10}4s^2$		
	Zinc		

ATOMIC NUMBER; ATOMIC WEIGHT (2); BOILING POINT, K; MELTING POINT, K; OXIDATION STATES (Bold most stable); SYMBOL (1); DENSITY at 300 K (3) (g/cm³); ELECTRON CONFIGURATION; NAME

NOTES:

(1) Black — solid.
Red — gas.
Blue — liquid.
Outline — synthetically prepared.

(2) Based upon carbon-12. ( ) indicates most stable or best known isotope.

(3) Entries marked with daggers refer to the gaseous state at 273 K and 1 atm and are given in units of g/l.

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Catalog Number S-18806

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TABLE OF PERIODIC PROPERTIES OF THE ELEMENTS

Percent Ionic Character of a Single Chemical Bond

Difference in electronegativity	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2
Percent ionic character %	0.5	1	2	4	6	9	12	15	19	22	26	30	34	39	43	47	51	55	59	63	67	70	74	76	79	82	84	86	88	89	91	92

DATA CONCERNING THE MORE STABLE ELEMENTARY (SUBATOMIC) PARTICLES					
	Neutron	Proton	Electron*	Neutrino*	Photon
Symbol	n	p	e (e⁻)	ν	γ
Rest mass (kg)	1.67495×10^{-27}	1.67265×10^{-27}	9.1095×10^{-31}	~0	0
Relative atomic mass (^{12}C = 12)	1.008665	1.007276	5.48580×10^{-4}	~0	0
Charge (C)	0	1.60219×10^{-19}	-1.60219×10^{-19}	0	0
Radius (m)	0 ± 10^{-15}	0 ± 10^{-15}	$<1\times10^{-16}$	~0	0
Spin quantum number	1/2	1/2	± 1/2	1/2	1
Magnetic Moment†	$-1.913\ \mu_N$	$2.793\ \mu_N$	$1.001\ \mu_B$	0	0

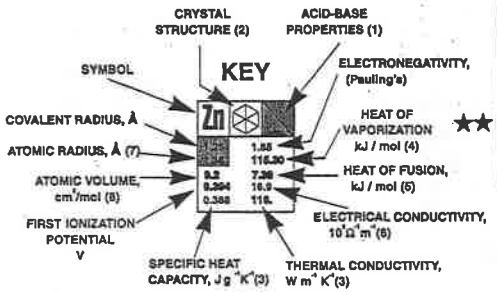
* The positron (e+) has properties similar to those of the (negative) electron or beta particle except that its charge has opposite sign (+). The antineutrino ($\bar{\nu}$) has properties similar to those of the neutrino except that its spin (or rotation) is opposite in relation to its direction of propagation.
An antineutrino accompanies release of an electron in radioactive β (particle) decay, whereas a neutrino accompanies the release of a positron in β^+ decay.

†μ_B=Bohr magneton and μ_N=Nuclear magneton.

GROUP IA	IIA	IIIA	IVA	VA	VIA	VIIA	VIIIA			IB	IIB	IIIB	IVB	VB	VIB	VIIB	VIII
H												B	C	N	O	F	He
2.10												2.04	2.55	3.04	3.44	3.98	—
0.4581												507.8	~715	2.7928	3.4109	3.2698	0.084
0.0543												4.60	22.6	5.30	—	17.30	0.36	14.0	0.222	17.10	0.26	16.90	0.34
—												8.298	5×10^{-13}	11.260	0.07	14.534	—	13.618	—	17.422	—	21.564	—
0.1815												1.026	27.0	0.709	80-220	1.043	0.02598	0.92	0.2674	0.824	0.0279	1.030	0.0493
Li	Be											Al	Si	P	S	Cl	Ar
0.98	1.57											1.61	1.90	2.19	2.58	3.16	—
147.1	297											290.8	359	12.4	10	10.20	6.506
3.0	11.7											10.0	10.7	12.1	50.2	17.0	0.63	15.30	1.73	18.7	3.21	24.2	1.188
11.7	25											5.986	27.7	8.151	4×10^{-4}	10.486	10^{-16}	10.360	5×10^{-16}	12.967	—	15.759	—
84.7	200											0.90	227	0.70	148	0.769	0.335	0.710	0.269	0.48	0.0089	0.520	0.0177
Na	Mg																
0.93	1.31																
98.01	127.6																
2.601	8.95																
20.1	22.4																
141	156																
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
0.82	1.00	1.36	1.54	1.63	1.66	1.55	1.83	1.88	1.91	1.90	1.65	1.81	2.01	2.18	2.55	2.96	—
76.9	154.67	304.80	425.2	446.7	339.5	219.74	349.5	373.3	377.5	300.5	115.30	256.06	334.3	22.4	36.32	14.725	9.029
2.33	29.90	16.11	22.8	20	7.22	14.64	13.8	16.19	17.2	13.14	5.59	31.8	27.7	36.32	8.54	5.286	1.638
16.4	8.113	1.5	2.6	4.0	7.9	0.5	11.2	17.9	14.6	60.7	16.9	1.8	3 x 10^{-4}	3	8	0.122	0.00949
102.5	0.667	15.8	21.9	30.7	93.7	7.82	80.2	100	90.7	401	116	40.6	59.9	50	2.04		
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
0.82	0.95	1.22	1.33	1.6	2.16	1.9	2.2	2.28	2.20	1.93	1.69	1.78	1.96	2.05	2.1	2.66	2.6
69.2	136.9	393.3	590.5	690.1	390.4	302.0	367.77	495.39	393.3	250.63	99.87	226.35	390.37	67.97	50.63	20.9	12.64
2.34	8.3	17.15	21	26.9	36	33	25.52	31.76	16.74	11.30	6.07	3.26	7.2	19.83	17.49	7.76	2.30
47.8	5.695	1.8	2.3	6.6	17.3	0.001	14.9	22	10.0	62.9	14.7	3.4	8.7	2.6	2×10^{-4}	10^{-11}	—
58.2	35.3	17.2	22.7	53.7	138	50.6	117	150	71.8	429	96.8	81.6	66.6	24.3	2.25	0.449	0.00569
Cs	Ba	La*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
0.79	0.89	1.10	1.3	1.5	2.36	1.9	2.2	2.20	2.28	2.54	2.00	2.04	2.33	2.02	2.0	2.2	—
67.740	140.2	399.57	661.07	737.0	422.58	707.1	627.6	563.58	510.45	324.43	59.30	162.09	177.9	179	120	30*	16.40
2.092	8.01	11.3	21.76	36	35.40	33.05	29.29	26.36	19.66	12.36	2.292	4.27	4.77	11.0	13	12*	2.9
5.3	3.5	1.9	4.65	3.4	7.89	8.1	12.3	21.3	9.4	48.8	1.0	5.6	4.8	0.9	0.7	—	—	—	—	50.5	—
35.9	18.4	13.5	13.0	23.0	57.5	174	87.6	147	71.6	317	8.34	44.1	35.3	7.57	20	1.7	—	—	—	0.0994	0.00364*
Fr	Ra	Ac**	Rf	Ha	Sg	Uns	Uno	Une									
0.7	0.89	1.1	—	—	—	—	—	—									
64*	136.82	—	—	—	—	—	—	—									
2.1*	8.37	—	—	—	—	—	—	—									
—	—	—	—	—	—	—	—	—									
15	18.6	12	—	—	—	—	—	—									

The A & B subgroup designations, applicable to elements in rows 4, 5, 6 and 7, are those recommended by the International Union of Pure and Applied Chemistry.

★	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
	1.12	1.13	1.14	1.13	1.17	1.2	1.20	1.1	1.22	1.23	1.24	1.25	1.1	1.27
	312.63	282.68	283.68	—	191.63	175.72	311.71	—	230	251.04	292.88	191*	128*	355*
	10.04	10.48	10.88	22.4	—	38.9	10.46	19.9	11.06	15.49	18.7	17.15	16.4	17.18	18.1	16.8*	24.8	7.7*	17.8	18.6*
	5.42	5.49	6.6	5.55	2	5.67	1.1	6.15	0.8	4.02	1.1	4.101	1.2	6.184	1.3	6.254	3.7	5.43	1.5
	0.192	0.190	16.5	—	17.9*	0.197	12.3	0.182	12.9	0.336	10.6	0.18	11.1	0.173	10.7	0.165	16.2	0.168	14.3	0.16	16.8	0.155	24.9	0.15	16.4
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr
	1.3	1.5	1.38	1.36	1.28	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	543.92	—	422.58	—	—	—	—	—	—	—	—	—	—	—
	15.65	15.0	13.48	21.1	12.32	20.8	18.3	—	—	—	—	—	—	—
	7.1	5.88	5.6	6.03	3.6	6.19	0.8	6.06	0.7	6.0	0.7	6.02	—	6.23	—	6.3	—	6.42	—	6.50	—	6.58	—	6.65	—	—	—
	54	—	47	27.6	6.3	0.13*	6.74	—	10*	—	10*	—	10*	6.3	10*	10*	10*	10*	10*	—	10*	—	10*	—	10*	—	10*



NOTES: (1) For representative oxides (higher valence) of group. Oxide is acidic if color is red, basic if color is blue and amphoteric if both colors are shown. Intensity of color indicates relative strength.

(2) Cubic, face centered; cubic, body centered; cubic; hexagonal; rhombohedral; tetragonal; orthorhombic; monoclinic.

(3) At 300 K (27°C)
(4) At boiling point
(5) At melting point
(6) Generally at 293K (20°C) for polycrystalline material
(7) Quantum mechanical value for free atom
(8) From density at 300 K (27°C) for liquid and solid elements; values for gaseous elements refer to liquid state at boiling point

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SIDE 2