appendix

B

Properties of the Naturally Occurring Elements

Name	Symbol	Atomic Number	Atomic Weight* (^{12}C scale)	Density† (g/cm^3)	K_B‡ (keV)
Actinium	Ac	89	(227)	10.0	106.756
Aluminum	Al	13	26.982	2.70	1.560
Antimony	Sb	51	121.760	6.68	30.491
Argon	Ar	18	39.948	1.63§	3.203
Arsenic	As	33	74.922	5.75	11.867
Astatine	At	85	(210)	—	95.730
Barium	Ba	56	137.327	3.62	37.440
Beryllium	Be	4	9.012	1.85	0.111
Bismuth	Bi	83	208.980	9.79	90.526
Boron	B	5	10.811	2.34	0.188
Bromine	Br	35	79.904	3.10	13.474
Cadmium	Cd	48	112.411	8.69	26.711
Calcium	Ca	20	40.078	1.54	4.038
Carbon	C	6	12.011	2.2 (graphite) 3.51 (diamond)	0.284
Cerium	Ce	58	140.116	6.77	40.443
Cesium	Cs	55	132.905	1.87	35.985
Chlorine	Cl	17	35.453	2.90§	2.822
Chromium	Cr	24	51.996	7.15	5.989
Cobalt	Co	27	58.933	8.86	7.709
Copper	Cu	29	63.546	8.96	8.979
Dysprosium	Dy	66	162.500	8.55	53.789
Erbium	Er	68	167.260	9.07	57.486
Europium	Eu	63	151.964	5.24	48.519
Fluorine	F	9	18.998	1.55§	0.685
Francium	Fr	87	(223)	—	101.147
Gadolinium	Gd	64	157.250	7.90	50.239
Gallium	Ga	31	69.723	5.91	10.367
Germanium	Ge	32	72.610	5.32	11.103

Continued

Name	Symbol	Atomic Number	Atomic Weight* (^{12}C scale)	Density† (g/cm^3)	K_B‡ (keV)
Gold	Au	79	196.967	19.3	80.725
Hafnium	Hf	72	178.490	13.3	65.351
Helium	He	2	4.003	0.164§	0.025
Holmium	Ho	67	162.930	8.80	55.618
Hydrogen	H	1	1.008	0.082§	0.014
Indium	In	49	114.818	7.31	27.940
Iodine	I	53	126.904	4.93	33.169
Iridium	Ir	77	192.217	22.6	76.111
Iron	Fe	26	55.845	7.87	7.112
Krypton	Kr	36	83.800	3.43§	14.326
Lanthanum	La	57	138.906	6.15	38.925
Lead	Pb	82	207.200	11.3	88.005
Lithium	Li	3	6.941	0.534	0.055
Lutetium	Lu	71	174.967	9.84	63.314
Magnesium	Mg	12	24.305	1.74	1.305
Manganese	Mn	25	54.938	7.3	6.539
Mercury	Hg	80	200.590	13.5	83.102
Molybdenum	Mo	42	95.940	10.2	20.000
Neodymium	Nd	60	144.240	7.01	43.569
Neon	Ne	10	20.180	0.825§	0.867
Nickel	Ni	28	58.693	8.90	8.333
Niobium	Nb	41	92.906	8.57	18.986
Nitrogen	N	7	14.007	1.15§	0.402
Osmium	Os	76	190.230	22.59	73.871
Oxygen	O	8	15.999	1.31§	0.532
Palladium	Pd	46	106.420	12.0	24.345
Phosphorus	P	15	30.974	1.82 (white) 2.16 (red) 2.69 (black)	2.146
Platinum	Pt	78	195.078	21.5	78.395
Polonium	Po	84	(209)	9.2	93.105
Potassium	K	19	39.098	0.89	3.607
Praseodymium	Pr	59	140.908	6.77	41.991
Promethium	Pm	61	(145)	7.26	45.184
Protactinium	Pa	91	231.036	15.4	112.601
Radium	Ra	88	(226)	5	103.922
Radon	Rn	86	(222)	9.074§	98.404
Rhenium	Re	75	186.207	20.8	71.676
Rhodium	Rh	45	102.906	12.4	23.220
Rubidium	Rb	37	85.468	1.53	15.200
Ruthenium	Ru	44	101.070	12.1	22.117
Samarium	Sm	62	150.360	7.52	46.834
Scandium	Sc	21	44.067	2.99	4.493

Name	Symbol	Atomic Number	Atomic Weight* (^{12}C scale)	Density† (g/cm^3)	K_B‡ (keV)
Selenium	Se	34	78.960	4.81 (gray) 4.39 (α form) 4.28 (vitreous)	12.658
Silicon	Si	14	28.086	2.33	1.839
Silver	Ag	47	107.868	10.5	25.514
Sodium	Na	11	22.990	0.97	1.072
Strontium	Sr	38	87.620	2.64	16.105
Sulfur	S	16	32.066	2.07 (rhombic) 2.00 (monoclinic)	2.472
Tantalum	Ta	73	180.948	16.4	67.416
Technetium	Tc	43	(98)	11	21.044
Tellurium	Te	52	127.600	6.23	31.814
Terbium	Tb	65	158.925	8.23	51.996
Thallium	Tl	81	204.383	11.8	85.530
Thorium	Th	90	232.038	11.7	109.651
Thulium	Tm	69	168.934	9.32	59.390
Tin	Sn	50	118.710	5.77 (gray) 7.29 (white)	29.200
Titanium	Ti	22	47.867	4.51	4.966
Tungsten	W	74	183.840	19.3	69.525
Uranium	U	92	238.029	19.1	115.606
Vanadium	V	23	50.942	6.0	5.465
Xenon	Xe	54	131.290	5.37§	34.561
Ytterbium	Yb	70	173.040	6.90	61.332
Yttrium	Y	39	88.906	4.47	17.038
Zinc	Zn	30	65.390	7.13	9.659
Zirconium	Zr	40	91.224	6.52	17.998

*Values averaged for the elements in their natural abundance. For nuclides with no stable isotopes, value in parentheses corresponds to mass number of most stable isotope. Values from http://physics.nist.gov/PhysRefData. Accessed 16 June 2011.

†Values averaged for the elements in their natural abundance. Values from The Handbook of Chemistry and Physics, 91st ed., CRC Press, 2010-2011.

‡K-shell binding energies. Values from http://www.nist.gov/pml/data/xraytrans/index.cfm. Accessed 23 November 2011.

§Densities for gases in g/liter at 0° C and pressure of 1 atm.