

K THE CHEMICAL ELEMENTS

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight ^[1]	Percentage of Naturally Occurring Elements in the Universe
Hydrogen	H	1	1.008	75
Helium	He	2	4.003	23
Lithium	Li	3	6.94	6×10^{-7}
Beryllium	Be	4	9.012	1×10^{-7}
Boron	B	5	10.821	1×10^{-7}
Carbon	C	6	12.011	0.5
Nitrogen	N	7	14.007	0.1
Oxygen	O	8	15.999	1
Fluorine	F	9	18.998	4×10^{-5}
Neon	Ne	10	20.180	0.13
Sodium	Na	11	22.990	0.002
Magnesium	Mg	12	24.305	0.06
Aluminum	Al	13	26.982	0.005
Silicon	Si	14	28.085	0.07
Phosphorus	P	15	30.974	7×10^{-4}
Sulfur	S	16	32.06	0.05
Chlorine	Cl	17	35.45	1×10^{-4}
Argon	Ar	18	39.948	0.02
Potassium	K	19	39.098	3×10^{-4}

Table K1

¹ Where mean atomic weights have not been well determined, the atomic mass numbers of the most stable isotopes are given in parentheses.

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Calcium	Ca	20	40.078	0.007
Scandium	Sc	21	44.956	3×10^{-6}
Titanium	Ti	22	47.867	3×10^{-4}
Vanadium	V	23	50.942	3×10^{-4}
Chromium	Cr	24	51.996	0.0015
Manganese	Mn	25	54.938	8×10^{-4}
Iron	Fe	26	55.845	0.11
Cobalt	Co	27	58.933	3×10^{-4}
Nickel	Ni	28	58.693	0.006
Copper	Cu	29	63.546	6×10^{-6}
Zinc	Zn	30	65.38	3×10^{-5}
Gallium	Ga	31	69.723	1×10^{-6}
Germanium	Ge	32	72.630	2×10^{-5}
Arsenic	As	33	74.922	8×10^{-7}
Selenium	Se	34	78.971	3×10^{-6}
Bromine	Br	35	79.904	7×10^{-7}
Krypton	Kr	36	83.798	4×10^{-6}
Rubidium	Rb	37	85.468	1×10^{-6}
Strontium	Sr	38	87.62	4×10^{-6}
Yttrium	Y	39	88.906	7×10^{-7}
Zirconium	Zr	40	91.224	5×10^{-6}
Niobium	Nb	41	92.906	2×10^{-7}

Table K1

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Molybdenum	Mo	42	95.95	5×10^{-7}
Technetium	Tc	43	(98)	—
Ruthenium	Ru	44	101.07	4×10^{-7}
Rhodium	Rh	45	102.906	6×10^{-8}
Palladium	Pd	46	106.42	2×10^{-7}
Silver	Ag	47	107.868	6×10^{-8}
Cadmium	Cd	48	112.414	2×10^{-7}
Indium	In	49	114.818	3×10^{-8}
Tin	Sn	50	118.710	4×10^{-7}
Antimony	Sb	51	121.760	4×10^{-8}
Tellurium	Te	52	127.60	9×10^{-7}
Iodine	I	53	126.904	1×10^{-7}
Xenon	Xe	54	131.293	1×10^{-6}
Cesium	Cs	55	132.905	8×10^{-8}
Barium	Ba	56	137.327	1×10^{-6}
Lanthanum	La	57	138.905	2×10^{-7}
Cerium	Ce	58	140.116	1×10^{-6}
Praseodymium	Pr	59	140.907	2×10^{-7}
Neodymium	Nd	60	144.242	1×10^{-6}
Promethium	Pm	61	(145)	—
Samarium	Sm	62	150.36	5×10^{-7}
Europium	Eu	63	151.964	5×10^{-8}

Table K1

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Molybdenum	Mo	42	95.95	5×10^{-7}
Technetium	Tc	43	(98)	—
Ruthenium	Ru	44	101.07	4×10^{-7}
Rhodium	Rh	45	102.906	6×10^{-8}
Palladium	Pd	46	106.42	2×10^{-7}
Silver	Ag	47	107.868	6×10^{-8}
Cadmium	Cd	48	112.414	2×10^{-7}
Indium	In	49	114.818	3×10^{-8}
Tin	Sn	50	118.710	4×10^{-7}
Antimony	Sb	51	121.760	4×10^{-8}
Tellurium	Te	52	127.60	9×10^{-7}
Iodine	I	53	126.904	1×10^{-7}
Xenon	Xe	54	131.293	1×10^{-6}
Cesium	Cs	55	132.905	8×10^{-8}
Barium	Ba	56	137.327	1×10^{-6}
Lanthanum	La	57	138.905	2×10^{-7}
Cerium	Ce	58	140.116	1×10^{-6}
Praseodymium	Pr	59	140.907	2×10^{-7}
Neodymium	Nd	60	144.242	1×10^{-6}
Promethium	Pm	61	(145)	—
Samarium	Sm	62	150.36	5×10^{-7}
Europium	Eu	63	151.964	5×10^{-8}

Table K1

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Gadolinium	Gd	64	157.25	2×10^{-7}
Terbium	Tb	65	158.925	5×10^{-8}
Dysprosium	Dy	66	162.500	2×10^{-7}
Holmium	Ho	67	164.930	5×10^{-8}
Erbium	Er	68	167.259	2×10^{-7}
Thulium	Tm	69	168.934	1×10^{-8}
Ytterbium	Yb	70	173.054	2×10^{-7}
Lutetium	Lu	71	174.967	1×10^{-8}
Hafnium	Hf	72	178.49	7×10^{-8}
Tantalum	Ta	73	180.948	8×10^{-9}
Tungsten	W	74	183.84	5×10^{-8}
Rhenium	Re	75	186.207	2×10^{-8}
Osmium	Os	76	190.23	3×10^{-7}
Iridium	Ir	77	192.217	2×10^{-7}
Platinum	Pt	78	195.084	5×10^{-7}
Gold	Au	79	196.967	6×10^{-8}
Mercury	Hg	80	200.592	1×10^{-7}
Thallium	Tl	81	204.38	5×10^{-8}
Lead	Pb	82	207.2	1×10^{-6}
Bismuth	Bi	83	208.980	7×10^{-8}
Polonium	Po	84	(209)	—
Astatine	At	85	(210)	—

Table K1

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Radon	Rn	86	(222)	—
Francium	Fr	87	(223)	—
Radium	Ra	88	(226)	—
Actinium	Ac	89	(227)	—
Thorium	Th	90	232.038	4×10^{-8}
Protactinium	Pa	91	231.036	—
Uranium	U	92	238.029	2×10^{-8}
Neptunium	Np	93	(237)	—
Plutonium	Pu	94	(244)	—
Americium	Am	95	(243)	—
Curium	Cm	96	(247)	—
Berkelium	Bk	97	(247)	—
Californium	Cf	98	(251)	—
Einsteinium	Es	99	(252)	—
Fermium	Fm	100	(257)	—
Mendelevium	Md	101	(258)	—
Nobelium	No	102	(259)	—
Lawrencium	Lr	103	(262)	—
Rutherfordium	Rf	104	(267)	—
Dubnium	Db	105	(268)	—
Seaborgium	Sg	106	(271)	—
Bohrium	Bh	107	(272)	—

Table K1

The Chemical Elements

Element	Symbol	Atomic Number	Atomic Weight	Percentage of Naturally Occurring Elements in the Universe
Hassium	Hs	108	(270)	—
Meitnerium	Mt	109	(276)	—
Darmstadtium	Ds	110	(281)	—
Roentgenium	Rg	111	(280)	—
Copernicium	Cn	112	(285)	—
Ununtrium	Uut	113	(284)	—
Flerovium	Fl	114	(289)	—
Ununpentium	Uup	115	(288)	—
Livermorium	Lv	116	(293)	—
Ununseptium	Uus	117	(294)	—
Ununoctium	Uuo	118	(294)	—

Table K1

Note: Some of the newest elements near the bottom of the table have suggested names that are still under review, and those names are not yet listed here. For example, Tennessine is suggested for element 117, after the state where the Oak Ridge National Laboratory is located.