

Name	Element	Atomic Number	Symbol	Group	Phase (+ heat of fusion, J/g)	Phase (+ heat of vaporization, J/g)	Type	Ionic Radius, Å	Atomic Radius, pm	Electronegativity	First Ionization Potential, eV	Density, g/cc (at STP)	Melting pt., °C	Boiling pt., °C	Type	Discoverer	Year	Year	Density, g/cc (at STP)	Ionic Radius, Å	Atomic Radius, pm	Atomic Radius, Fixed D, pm	
																							Wt. fixed decim. point
Hydrogen	H	1	1	1	gas	nonmetal	0.12	79	2.2	13.598	(0.09)	-258.975	-252.732	Nonmetal	Cavendish	1766	1766	1.008	0.0899	0.102	0.79	.79	
Helium	He	2	18	18	gas	noble gas	0.49	49	2.2	24.587	(0.18)	-272.05	-268.785	Noble Gas	Janssen	1868	1868	4.0026	(0.1785)	—	0.49	-.49	—
Lithium	Li	3	1	1	bcc	alkali metal	.75	2.1	0.98	5.392	0.53	180.7	1342	Alkaline Earth Metal	Arfvedson	1817	1817	6.9410	0.534	0.76	2.05	2.1	
Beryllium	Be	4	2	2	hex	alkaline earth metal	.35	1.4	1.57	9.322	1.8	1278	2970	Alkaline Earth Metal	Vauquelin	1798	1798	9.0122	1.848	0.35	1.4	1.4	
Boron	B	5	13	13	rho	metalloid	.23	1.2	2.04	8.298	2.3	2300	4002	metalloid	Gay-Lussac and Berthollet	1808	1808	10.81	2.34	0.23	1.17	1.2	
Carbon	C	6	14	14	hex	nonmetal	—	.91	2.55	11.26	2.3	3500	4827	nonmetal	Rutherford	—	—	12.01	2.26	—	0.91	.91	
Nitrogen	N	7	15	15	gas	nonmetal	.13	.75	3.04	14.534	(1.25)	-209.86	-195.65	nonmetal	Priestley/Scheele	1774	1774	16.00	(1.2506)	0.13	0.75	.75	
Oxygen	O	8	16	16	gas	nonmetal	1.4	.65	3.44	13.618	(1.43)	-222.65	-182.82	nonmetal	Mossand	1868	1868	19.00	(1.696)	1.33	0.57	.57	
Fluorine	F	9	17	17	gas	halogen	1.3	.57	3.98	17.422	(1.7)	-219.52	-188.05	halogen	Ramsay and Travers	1898	1898	20.18	(0.9)	—	0.51	.51	
Neon	Ne	10	18	18	gas	noble gas	—	.51	—	21.564	(0.9)	-248.447	-245.904	Noble Gas	Davy	1807	1807	22.99	0.971	1.02	2.23	2.2	
Sodium	Na	11	1	1	bcc	alkali metal	1.0	2.7	0.93	5.139	0.97	98	883	Alkaline Earth Metal	Black	1755	1755	24.31	1.738	0.72	1.72	1.7	
Magnesium	Mg	12	2	2	hex	alkaline earth metal	.72	1.7	1.31	7.646	1.7	649	1090	Alkaline Earth Metal	Wöhler	1827	1827	26.98	2.702	0.535	1.82	1.8	
Aluminum	Al	13	13	13	fcc	metal	.54	1.8	1.61	5.986	2.7	660.25	2467	metal	Berzelius	1824	1824	28.09	2.33	0.4	1.46	1.5	
Silicon	Si	14	14	14	fcc	metalloid	.4	1.5	1.9	8.151	2.3	1410	2355	metalloid	Brand	1669	1669	30.97	1.82	0.38	1.23	1.2	
Phosphorus	P	15	15	15	cub	nonmetal	.38	1.2	2.19	10.486	1.8	44.3	280	nonmetal	Scheele	1774	1774	32.06	2.07	0.37	1.09	.97	
Sulfur	S	16	16	16	orth	nonmetal	.37	1.1	2.58	10.36	2.1	115.36	444.75	nonmetal	Rayleigh and Ramsay	1894	1894	32.06	(3.214)	1.81	0.97	.97	
Chlorine	Cl	17	17	17	gas	halogen	1.8	.97	3.16	12.967	(3.2)	-100.84	-33.9	halogen	1807	1807	39.95	(1.7824)	—	0.88	.88		
Argon	Ar	18	18	18	gas	noble gas	—	.88	—	15.759	(1.8)	-189.19	-185.7	Noble Gas	Davy	1807	1807	39.95	0.862	1.38	2.77	2.8	
Potassium	K	19	1	1	bcc	alkali metal	1.4	2.8	0.82	4.341	0.85	63.35	759	Alkaline Earth Metal	Davy	1808	1808	40.08	1.55	0.99	2.23	2.2	
Calcium	Ca	20	2	2	fcc	alkaline earth metal	.61	1.3	1	6.113	1.55	839	1484	Alkaline Earth Metal	Nilson	1878	1878	44.96	2.99	0.745	2.09	2.1	
Scandium	Sc	21	3	3	hex	transition metal	.75	2.1	1.36	6.54	3	1539	2831	transition metal	Gregor	1791	1791	47.90	4.54	0.605	2	2.0	
Titanium	Ti	22	4	4	hex	transition metal	.61	2.0	1.54	6.82	4.5	1660	3287	transition metal	del Rio	1801	1801	50.94	6.11	0.59	1.92	1.9	
Vanadium	V	23	5	5	bcc	transition metal	.59	1.9	1.63	6.74	6.1	1902	3409	transition metal	Vauquelin	1797	1797	52.00	7.19	0.52	1.85	1.9	
Chromium	Cr	24	6	6	bcc	transition metal	.52	1.8	1.66	6.766	7.2	1857	2672	transition metal	Gahn, Scheele, and Brand	1774	1774	54.94	7.43	0.46	1.79	1.7	
Manganese	Mn	25	7	7	bcc	transition metal	.46	1.8	1.55	7.435	7.9	1244	1962	transition metal	Prehistoric	—	—	55.85	7.874	0.645	1.72	1.7	
Iron	Fe	26	8	8	bcc	transition metal	.65	1.7	1.83	7.87	7.9	1535	2750	transition metal	Brand	c.1735	1751	58.93	8.9	0.745	1.67	1.6	
Cobalt	Co	27	9	9	fcc	transition metal	.65	1.7	1.88	7.86	8.9	1495	2870	transition metal	Cronstedt	1751	1751	58.93	8.9	0.69	1.62	1.6	
Nickel	Ni	28	10	10	fcc	transition metal	.69	1.6	1.91	7.635	8.9	1453	2732	transition metal	Prehistoric	—	—	63.55	8.96	0.73	1.57	1.6	
Copper	Cu	29	11	11	fcc	transition metal	.73	1.6	1.9	7.726	9	1084.6	2567	transition metal	Prehistoric	—	—	65.38	7.13	0.74	1.53	1.5	
Zinc	Zn	30	12	12	hex	transition metal	.74	1.5	1.65	9.394	7.1	419.73	907	transition metal	de Boisbaudran	1875	1875	69.72	5.907	0.62	1.81	1.8	
Gallium	Ga	31	13	13	orth	metal	.62	1.8	1.81	5.999	5.3	29.9	2403	metal	Winkler	1866	1866	72.59	5.323	0.53	1.52	1.5	
Germanium	Ge	32	14	14	fcc	metalloid	.53	1.5	2.01	7.899	5.3	937.4	2830	metalloid	Albertus Magnus	1250	1250	74.92	5.72	0.58	1.33	1.3	
Arsenic	As	33	15	15	rho	metalloid	.58	1.3	2.18	9.81	5.7	808	603	metalloid	Berzelius	1817	1817	78.96	4.79	0.5	1.22	1.2	
Selenium	Se	34	16	16	hex	nonmetal	.5	1.2	2.55	9.752	4.8	221	685	nonmetal	Balard	1826	1826	79.90	3.119	1.96	1.12	1.1	
Bromine	Br	35	17	17	liq	halogen	2.0	1.1	2.96	11.814	3.1	-7.1	59.25	halogen	Ramsay and Travers	1898	1898	83.80	(3.75)	—	1.03	1.0	
Krypton	Kr	36	18	18	gas	noble gas	—	1.0	—	13.999	(3.8)	-157.22	-153.2	Noble Gas	Bunsen and Kirchoff	1868	1868	85.47	1.63	1.52	2.98	3.0	
Rubidium	Rb	37	1	1	bcc	alkali metal	1.5	3.0	0.82	4.177	1.6	39.64	688	Alkaline Earth Metal	Davy	1808	1808	87.62	2.54	1.12	2.45	2.5	
Strontium	Sr	38	2	2	fcc	alkaline earth metal	1.1	2.5	0.95	5.695	2.5	769	1384	Alkaline Earth Metal	Klaproth	1789	1789	88.91	4.47	0.9	2.27	2.3	
Yttrium	Y	39	3	3	hex	transition metal	.72	2.3	1.22	6.38	4.5	1526	3338	transition metal	Hatchett	1801	1801	92.91	8.57	0.69	2.08	2.1	
Zirconium	Zr	40	4	4	hex	transition metal	.69	2.1	1.33	6.84	6.5	1852	4377	transition metal	Scheele	1778	1778	95.94	10.22	0.65	2.01	2.0	
Niobium	Nb	41	5	5	bcc	transition metal	.65	2.0	1.6	6.88	8.6	2468	4744	transition metal	Perrier and Segré	1937	1937	(98)	11.5	0.56	1.95	1.9	
Molybdenum	Mo	42	6	6	bcc	transition metal	.65	2.0	1.6	7.099	10.2	2617	4612	transition metal	Klaus	1844	1844	101.1	12.37	0.68	1.89	1.9	
Technetium	Tc	43	7	7	hex	transition metal	.56	2.0	1.9	7.28	11.5	2200	4877	transition metal	Wollaston	1803	1803	102.4	12.41	0.68	1.83	1.8	
Ruthenium	Ru	44	8	8	hex	transition metal	.68	1.9	2.2	7.37	12.4	2250	3900	transition metal	Prehistoric	—	—	107.9	12.02	0.86	1.79	1.8	
Rhodium	Rh	45	9	9	fcc	transition metal	.68	1.8	2.28	7.46	12.4	1966	3727	transition metal	Stromeyer	1817	1817	112.4	8.65	0.97	1.71	1.7	
Palladium	Pd	46	10	10	fcc	transition metal	.68	1.8	2.2	8.34	12.4	1552	2964	transition metal	Reich and Richter	1863	1863	114.82	7.31	0.8	2	2	
Silver	Ag	47	11	11	fcc	transition metal	1.3	1.8	1.93	7.576	10.5	961	2163	transition metal	Prehistoric	—	—	118.7	7.31	0.69	1.72	1.7	
Cadmium	Cd	48	12	12	hex	metal	.8	2.0	1.78	8.993	8.7	321.18	765	metal	Early historic times	—	—	121.8	6.684	0.76	1.53	1.5	
Indium	In	49	13	13	tet	metal	.69	1.7	1.96	7.344	7.3	156.76	2073	metal	von Reichenstein	1811	1811	126.9	6.24	0.97	1.42	1.4	
Tin	Sn	50	14	14	tet	metal	.69	1.7	1.96	7.344	7.3	232.06	2270	metal	Courtois	1811	1811	126.9	4.93	2.2	1.32	1.3	
Antimony	Sb	51	15	15	rho	metalloid	.76	1.5	2.05	8.641	6.7	630.9	1587	metalloid	Ramsay and Travers	1898	1898	132.9	(5.9)	—	1.24	1.2	
Tellurium	Te	52	16	16	hex	metalloid	.97	1.4	2.1	9.009	6.2	449.65	988	metalloid	Bunsen and Kirchoff	1868	1868	137.3	1.873	1.67	3.34	3.3	
Iodine	I	53	17	17	orth	halogen	2.2	1.3	2.66	10.451	4.9	113.5	185.4	halogen	Davy	1808	1808	137.3	3.59	1.35	2.78	2.8	
Xenon	Xe	54	18	18	gas	noble gas	—	1.2	—	12.13	(5.9)	-111.7	-107.97	Noble Gas	Mosander	1839	1839	137.3	6.15	1.061	2.74	2.7	
Cesium	Cs	55	1	1	bcc	alkali metal	1.7	3.3	0.79	3.894	1.9	28.55	671	Alkaline Earth Metal	Berzelius and Welsbach	1803	1803	140.1	6.77	1.034	2.7	2.7	
Barium	Ba	56	2	2	bcc	alkaline earth metal	1.4	2.8	0.89	5.212	3.6	729	1898	Alkaline Earth Metal	von Welsbach	1885	1885	140.9	7.01	0.995	2.64	2.6	
Lanthanum	La	57	3	3	hex	lanthanide	1.1	2.7	1.1	5.58	6.2	920	3457	lanthanide	Marinsky et al.	1945	1945	145.0	7.3	0.979	2.62	2.6	
Cerium	Ce	58	4	4	fcc	lanthanide	1.0	2.7	1.12	5.54	6.8	798	3426	lanthanide	Boisbaudran	1879	1879	150.4	7.52	0.964	2.59	2.6	
Praseodymium	Pr	59	5	5	hex	lanthanide	1.0	2.6	1.13	5.46	6.8	931	3512	lanthanide	Demarcay	1880	1880	157.3	5.24	0.947	2.56	2.5	
Neodymium	Nd	60	6	6	hex	lanthanide	1.0	2.6	1.14	5.53	7	1016	3608	lanthanide	Mosander	1843	1843	158.9	7.895	0.938	2.54	2.5	
Promethium	Pm	61	7	7	hex	lanthanide	.98	2.6	1.13	5.554	7.5	931	3512	lanthanide	de Boisbaudran	1866	1866	162.5	8.23	0.923	2.51	2.5	
Samarium	Sm	62	8	8	rho	lanthanide	.96	2.6	1.17	5.64	7.5	1072	1791	lanthanide	Delafontaine and Soret	1878	1878	164.9	8.8	0.901	2.47	2.5	
Europium	Eu	63	9	9	bcc	lanthanide	.95	2.6	1.2	5.67	5.2	822	1597	lanthanide	Mosander	1843	1843	158.9	9.07	0.881	2.45	2.5	
Gadolinium	Gd	64	10	10	hex	lanthanide	.94	2.6															

Bismuth	83	Bi	209.	15	rho	r	Metal	1.0	1.6	2.02	7.289	9.8	271.52	1564	Metal	6	19	Geoffroy the Younger	1753	209.0	9.75	1.03	1.63	1.6	
Polonium	84	Po	(209)	16	cub	c	Metalloid	2.3	1.5	2	8.42	9.3	254	962	Metalloid	7	34	Curie	1898	(209)	9.3	2.3	1.53	1.5	
Astatine	85	At	(210)	17			Halogen	—	1.4	2.2	9.65	—	302	337	Halogen	4	21	Corson et al.	1940	(210)	—	—	1.43	1.4	
Radon	86	Rn	(222)	18	gas	g	Noble Gas	—	1.3	—	10.748	(9.7)	—	-71	-62	Noble Gas	8	20	Dorn	1900	(222)	(9.73)	—	1.34	1.3
Francium	87	Fr	(223)	1	bcc	b	Alkali Metal	1.8	—	0.7	3.83	—	27	677	Alkali Metal	2	21	Perey	1939	(223)	—	—	1.8	—	
Radium	88	Ra	226.	2	bcc	b	Alkaline Earth Metal	1.4	—	0.9	5.279	5.5	700	1536	Alkaline Earth Metal	3	15	Pierre and Marie Curie	1898	226.0	—	5.5	1.43	—	
Actinium	89	Ac	227.	3	fcc	f	Actinide	1.1	—	1.1	5.17	10.1	1050	3200	Actinide	1	11	Debieme/Giesel	1899/1902	227.0	10.07	1.119	—	—	
Thorium	90	Th	232.	19	fcc	f	Actinide	.97	—	1.3	6.08	11.7	1755	4788	Actinide	1	12	Berzelius	1828	232.0	11.724	0.972	—	—	
Protactinium	91	Pa	231.	20	orth	o	Actinide	.78	—	1.5	5.89	15.4	1600	4027	Actinide	1	14	Hahn and Meitner	1917	231	15.4	0.78	—	—	
Uranium	92	U	238.	21	orth	o	Actinide	.52	—	1.38	6.05	19.	1132	4134	Actinide	1	15	Peligot	1841	238.0	18.95	0.52	—	—	
Neptunium	93	Np	237.	22	orth	o	Actinide	.75	—	1.36	6.19	20.	640	3902	Actinide	1	153	McMillan and Abelson	1940	237.0	20.2	0.75	—	—	
Plutonium	94	Pu	(244)	23	mno	m	Actinide	.89	—	1.28	6.06	20.	640	3230	Actinide	1	163	Seaborg et al.	1940	(244)	19.84	0.887	—	—	
Americium	95	Am	(243)	24	hex	h	Actinide	.98	—	1.3	5.993	13.7	994	2607	Actinide	1	133	Seaborg et al.	1944	(243)	13.67	0.982	—	—	
Curium	96	Cm	(247)	25	hex	h	Actinide	.97	—	1.3	6.02	13.5	1067	3110	Actinide	1	133	Seaborg et al.	1944	(247)	13.5	0.97	—	—	
Berkelium	97	Bk	(247)	26	hex	h	Actinide	.95	—	1.3	6.23	14.8	986	—	Actinide	1	83	Seaborg et al.	1949	(247)	14.78	0.949	—	—	
Californium	98	Cf	(251)	27	hex	h	Actinide	.93	—	1.3	6.3	15.1	900	—	Actinide	1	123	Seaborg et al.	1950	(251)	15.1	0.934	—	—	
Einsteinium	99	Es	(252)	28	hex	h	Actinide	—	—	1.3	6.42	—	860	—	Actinide	1	123	Ghiorso et al.	1952	(252)	—	—	0.925	—	
Fermium	100	Fm	(257)	29	—	—	Actinide	—	—	1.3	6.5	—	1527	—	Actinide	1	103	Ghiorso et al.	1953	(257)	—	—	—	—	
Mendelevium	101	Md	(258)	30	—	—	Actinide	—	—	1.3	6.58	—	827	—	Actinide	1	33	Ghiorso et al.	1955	(258)	—	—	—	—	
Nobelium	102	No	(259)	31	—	—	Actinide	—	—	1.3	6.65	—	827	—	Actinide	1	73	Ghiorso et al.	1958	(259)	—	—	1.1	—	
Lawrencium	103	Lr	(262)	32	—	—	Actinide	—	—	—	—	—	1627	—	Actinide	1	203	Ghiorso et al.	1961	(262)	—	—	—	—	
Rutherfordium	104	Rf	(261)	4	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	Ghiorso et al.	1969	(261)	—	—	—	—	
Dubnium	105	Db	(262)	5	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	Ghiorso et al.	1970	(262)	—	—	—	—	
Seaborgium	106	Sg	(263)	6	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	Ghiorso et al.	1974	(263)	—	—	—	—	
Bohrium	107	Bh	(262)	7	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	Armbruster and Münzenberg	1981	(262)	—	—	—	—	
Hassium	108	Hs	(265)	8	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	Armbruster and Münzenberg	1983	(265)	—	—	—	—	
Meitnerium	109	Mt	266.	9	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	GSI, Darmstadt, West Germany	1982	266	—	—	—	—	
Ununnilium	110	Unn	—	10	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	—	—	—	—	—	—	—	
Unununium	111	Uuu	—	11	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	—	—	—	—	—	—	—	
Ununbium	112	Uub	—	12	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	—	—	—	—	—	—	—	
	113	—	—	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ununquadium	114	Uuq	—	14	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	—	—	—	—	—	—	—	
	115	—	—	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ununhexium	116	Uuh	—	16	—	—	Transactinide	—	—	—	—	—	—	—	Transactinide	10	—	—	—	—	—	—	—	—	
	117	—	—	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Ununoctium	118	Uuo	—	18	—	—	Noble Gas	—	—	—	—	—	—	—	Noble Gas	8	—	—	—	—	—	—	—	—	

Actinide	1
Alkali Metal	2
Alkaline Earth Metal	3
Halogen	4
Lanthanide	5
Metal	6
Metalloid	7
Noble Gas	8
Nonmetal	9
Transactinide	10
Transition Metal	11