



GreenMet

CRITICAL MINERALS OF THE PERIODIC TABLE OF ELEMENTS

1 H Hydrogen 1.008																	2 He Helium 4.00260													
3 Li Lithium 7.0	4 Be Beryllium 9.012183	<p>Key:</p> <table border="1"> <tr> <td>atomic number Symbol name Atomic Mass, u</td> <td>atomic number Symbol name Atomic Mass, u</td> </tr> <tr> <td>2022 List</td> <td>2018 List</td> </tr> </table>														atomic number Symbol name Atomic Mass, u	atomic number Symbol name Atomic Mass, u	2022 List	2018 List	5 B Boron 10.81	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Flourine 18.99840316	10 Ne Neon 20.180					
atomic number Symbol name Atomic Mass, u	atomic number Symbol name Atomic Mass, u																													
2022 List	2018 List																													
11 Na Sodium 22.9897693	12 Mg Magnesium 24.305															13 Al Aluminum 26.981538	14 Si Silicon 28.085	15 P Phosphorus 30.97376200	16 S Sulphur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.9									
19 K Potassium 39.098	20 Ca Calcium 40.08	21 Sc Scandium 44.95591	22 Ti Titanium 47.87	23 V Vanadium 50.941	24 Cr Chromium 51.996	25 Mn Manganese 54.93804	26 Fe Iron 55.84	27 Co Cobalt 58.93319	28 Ni Nickel 58.693	29 Cu Copper 63.55	30 Zn Zinc 65.4	31 Ga Gallium 69.72	32 Ge Germanium 72.63	33 As Arsenic 72.63	34 Se Selenium 78.97	35 Br Bromine 79.904	36 Kr Krypton 83.80													
37 Rb Rubidium 85.468	38 Sr Strontium 87.6	39 Y Yttrium 88.9058	40 Zr Zirconium 91.22	41 Nb Niobium 92.906	42 Mo Molybdenum 96.0	43 Tc Technetium 97.90721	44 Ru Ruthenium 101.1	45 Rh Rhodium 101.1	46 Pd Palladium 106.4	47 Ag Silver 107.868	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.6	53 I Iodine 126.90	54 Xe Xenon 131.29													
55 Cs Caesium 132.9054520	56 Ba Barium 137.33															72 Hf Hafnium 178.5	73 Ta Tantalum 178.5	74 W Tungsten 183.8	75 Re Rhenium 186.21	76 Os Osmium 190.2	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.96657	80 Hg Mercury 200.59	81 Tl Thallium 204.383	82 Pb Lead 207	83 Bi Bismuth 208.9804	84 Po Polonium 208.98243	85 At Astatine 209.98715	86 Rn Radon 222.01758
87 Fr Francium 223.01973	88 Ra Radium 226.02541															104 Rf Rutherfordium 276.122	105 Db Dubnium 268.126	106 Sg Seaborgium 271.134	107 Bh Bohrium 274.144	108 Hs Hassium 277.152	109 Mt Meitnerium 278.156	110 Ds Darmstadtium 281.165	111 Rg Roentgenium 282.169	112 Cn Copernicium 285.177	113 Nh Nihonium 286.183	114 Fl Flerovium 289.191	115 Mc Moscovium 290.196	116 Lv Livermorium 293.205	117 Ts Tennessine 294.211	118 Og Oganesson 294.214

57 La Lanthanum 138.9055	58 Ce Cerium 140.12	59 Pr Praseodymium 140.9077	60 Nd Neodymium 144.24	61 Pm Promethium 144.91276	62 Sm Samarium 150.4	63 Eu Europium 151.96	64 Gd Gadolinium 157.2	65 Tb Terbium 158.92535	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93033	68 Er Erbium 167.93033	69 Tm Thulium 168.93422	70 Yb Ytterbium 173.05	71 Lu Lutetium 174.967
89 Ac Actinium 227.02775	90 Th Thorium 232.038	91 Pa Protactinium 231.0359	92 U Uranium 238.0289	93 Np Neptunium 237.04817	94 Pu Plutonium 244.06420	95 Am Americium 243.06138	96 Cm Curium 247.07035	97 Bk Berkelium 247.07035	98 Cf Californium 251	99 Es Einsteinium 252.0830	100 Fm Fermium 257.09511	101 Md Mendelevium 258.09843	102 No Nobelium 259.10100	103 Lr Lawrencium 262.110

Critical Minerals Legend

Al	Aluminum	Metallurgy and many sectors of the economy	Ni	Nickel	Batteries and metallurgy
As	Arsenic	Pesticides and semiconductors	Nb	Niobium	Metallurgy
Ba	Barium	Hydrocarbon production	Pd	Palladium	Catalytic converters and catalysts
Be	Beryllium	Aerospace and defense	Pt	Platinum	Catalytic converters and catalysts
Bi	Bismuth	Medical, metallurgy and atomic research	Rb	Rubidium	Research and development
C	Carbon	Batteries, fuel cells and lubricants	Ru	Ruthenium	Catalysts, electronics, computer chips
Co	Cobalt	Batteries and metallurgy	Rh	Rhodium	Catalytic converters, catalysts, and electrical components
Cr	Chromium	Metallurgy	Sb	Antimony	Flame retardants and lead-acid batteries
Cs	Cesium	Research & development	Sc	Scandium	Ceramics, fuel cells and metallurgy
F	Fluorine	Cement, industrial chemicals, and metallurgy	Sn	Tin	Metallurgy
Ga	Gallium	Integrated circuits and optical devices	Ta	Tantalum	Capacitors and metallurgy
Ge	Germanium	Defense and fiber optics	Te	Tellurium	Metallurgy, solar cells, and thermoelectric devices
Hf	Hafnium	Ceramics, nuclear control rods, and metallurgy	Ti	Titanium	Metallurgy and pigments
In	Indium	Liquid crystal displays	V	Vanadium	Batteries, catalysts, and metallurgy
Ir	Iridium	Anode coatings for electrochemical processes & chemical catalysts	W	Tungsten	Metallurgy
Li	Lithium	Batteries	Y	Yttrium	Catalysts, ceramics, lasers, metallurgy and phosphors
Mg	Magnesium	Metallurgy	Zn	Zinc	Metallurgy
Mn	Manganese	Batteries and metallurgy	Zr	Zirconium	Metallurgy and nuclear

Rare Earths (aka Lanthanides)

Light Rare Earths (Atomic Numbers 57-63)

Ce	Cerium	Catalytic converters, ceramics, glass, and metallurgy
Eu	Europium	Nuclear control rods and phosphors
La	Lanthanum	Batteries, catalysts, ceramics, glass and metallurgy
Nd	Neodymium	Catalysts, lasers and permanent magnets
Pr	Praseodymium	Aerospace alloys, batteries, ceramics, colorants and permanent magnets
Sm	Samarium	Cancer treatments, nuclear, and permanent magnets

Heavy Rare Earths (Atomic Numbers 64-71)

Dy	Dysprosium	Data storage devices, lasers and permanent magnets
Er	Erbium	Fiber optics, glass colorant, lasers and optical amplifiers
Gd	Gadolinium	Medical imaging, metallurgy, and permanent magnets
Ho	Holmium	Lasers, nuclear control rods, and permanent magnets
Lu	Lutetium	Cancer therapies, electronics and medical imaging
Tb	Terbium	Fiber optics, lasers, permanent magnets, and solid state devices
Tm	Thulium	Lasers and metallurgy
Yb	Ytterbium	Catalysts, lasers, metallurgy and scintillators

Critical Minerals Pronunciation Guide

Al	Aluminum	Ah-LOOM-in-um	Ni	Nickel	NICK-ull
As	Arsenic	ARE-suh-nick	Nb	Niobium	nee-O-bee-um
Ba	Barium	BEAR-ee-um	Pd	Palladium	puh-LAY-dee-um
Be	Beryllium	buh-REEL-ee-um	Pt	Platinum	PLAT-in-um
Bi	Bismuth	BIZ-muth	Rb	Rubidium	roo-BID-ee-um
C	Carbon	CAR-bun	Ru	Ruthenium	roo-THEE-nee-um
Co	Cobalt	CO-bault	Rh	Rhodium	ROW-dee-um
Cr	Chromium	CROW-me-um	Sb	Antimony	ANT-uh-MO-knee
Cs	Cesium	SEE-zee-um	Sc	Scandium	SCAN-dee-um
F	Fluorine	FLOOR-een	Sn	Tin	TIN
Ga	Gallium	GAL-ee-um	Ta	Tantalum	TAN-tuh-lum
Ge	Germanium	jour-MAIN-ee-um	Te	Tellurium	tuh-LURE-EE-UM
Hf	Hafnium	HALF-nee-um	Ti	Titanium	tie-TAY-nee-um
In	Indium	IN-dee-um	V	Vanadium	vun-NAY-dee-um
Ir	Iridium	ih-RID-ee-um	W	Tungsten	TONGUE-stin
Li	Lithium	LITH-ee-um	Y	Yttrium	IT-tree-um
Mg	Magnesium	mag-NEE-zee-um	Zn	Zinc	zink
Mn	Manganese	MANG-guh-knees	Zr	Zirconium	zir-CONE-ee-um

Rare Earths (aka Lanthanides)

Light Rare Earths (Atomic Numbers 57-63)

Ce	Cerium	SEAR-ee-um
Eu	Europium	your-ROW-pea-um
La	Lanthanum	LAN-thah-NUM
Nd	Neodymium	nee-o-DIM-ee-um
Pr	Praseodymium	PRAY-zee-o-DIM-ee-um
Sm	Samarium	suh-MARE-ee-um

Heavy Rare Earths (Atomic Numbers 64-71)

Dy	Dysprosium	dis-PRO-zee-um
Er	Erbium	UR-bee-um
Gd	Gadolinium	GAD-el-IN-ee-um
Ho	Holmium	HOLE-me-um
Lu	Lutetium	loo-TEE-she-um
Tb	Terbium	TUR-bee-um
Tm	Thulium	THOOL-ee-um
Yb	Ytterbium	it-TOUR-bee-um