

Critical Minerals Memory Match Game

What Are Critical Minerals?

The Energy Act of 2020 describes critical minerals as minerals, elements, substances, or materials that (1) are essential to the economic or national security of the United States, (2) have supply chains at risk of disruption, and (3) are vital for making a product without which the economic or national security of the United States would suffer (Nassar and others, 2025).

What's Inside?

Inside this packet you will find fun and informative facts to help you learn about some of the commodities on the 2025 List of Critical Minerals. A memory match game is also included so you can test your knowledge by matching critical minerals and their ores to some of their everyday uses.

2025 List of Critical Minerals

The U.S. Geological Survey (USGS) led the development of the 2025 List of Critical Minerals (Nassar and others, 2025; U.S. Geological Survey, 2025). The list contains 60 critical minerals. The periodic table below highlights in blue the 54 elements on the 2025 List of Critical Minerals. Graphite, barite, metallurgical coal, potash, phosphate rock, and fluor spar are also on the 2025 List of Critical Minerals.

H Hydrogen																	He Helium
Li Lithium	Be Beryllium											B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon
Na Sodium	Mg Magnesium											Al Aluminum	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon
K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton
Rb Rubidium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon
Cs Cesium	Ba Barium	Lanthanides	Hf Hafnium	Ta Tantalum	W Tungsten	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon
Fr Francium	Ra Radium	Actinides	Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Ds Darmstadtium	Rg Roentgenium	Cn Copernicium	Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Og Oganesson
Lanthanides (also known as rare earth elements)		La Lanthanum	Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium	
Actinides		Ac Actinium	Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	



Antimony

This element is used to make plastic items like soda bottles (Wintzer, and Guberman, 2015).



Aluminum

Besides iron, aluminum is the most used metal (U.S. Geological Survey, 2026b).

Chromium

South Africa is the leading producer of chromite ore (U.S. Geological Survey, 2026a).

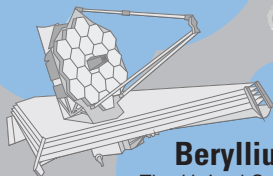


Zinc

Zinc is mixed with copper to make brass (Kropschot and Doebrich, 2011).

Copper

The U.S. electrical grid contains an estimated 150 million tonnes of copper (Bauer and others, 2023).



Beryllium

The United States is the world leader in mine production of beryllium (U.S. Geological Survey, 2026a).

Graphite

Gets its name from the word graphein, which means "writing" in Greek (Robinson and others, 2017).



Rare Earth Elements

"Rare" refers to the discovery of these elements in minerals that are scarce. These elements are actually more abundant than gold (Gschneidner, 1966).

Tungsten

Scheelite, an ore mineral for tungsten, glows blue under shortwave ultraviolet light.



Barite

The mineral barite is quite heavy for a mineral that is not a metal.



Titanium

Titanium is used to make medical implants, because it is nonreactive in the human body. Living bone will fuse to titanium metal (Woodruff and Bedinger, 2013).

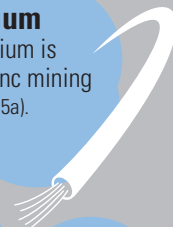


Indium

A film of indium-tin oxide turns electrical data to optical data in flat-panel displays and touchscreens (Mercer, 2015b).

Germanium

Most germanium is a byproduct of zinc mining (Mercer, 2015a).



Fluorspar

Most fluorspar is used to make anhydrous hydrofluoric acid (U.S. Geological Survey, 2026a).

Memory Match Game Instructions

1. Cut out the tiles on the next page.
2. Shuffle the tiles and spread them out with the U.S. Geological Survey identifier side up.
3. Players take turns flipping over two tiles, searching for the pair with the same critical mineral ore image. If the tiles are a match, the player keeps the matching pair and takes another turn. If the tiles are not a match, the tiles are turned back over, and it is the next player's turn.
4. The game continues until all tiles are matched. The player with the most pairs wins the game.

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Photographs and images are from the U.S. Geological Survey, Smithsonian Institution, and Adobe Stock.

Want to Learn More?

Follow the QR code to discover more educational resources about critical minerals and their uses.



<https://www.usgs.gov/mission-areas/geology-energy-minerals/science/education>



Bastnaesite

Rare Earth Elements



Graphite



Chalcopyrite

Copper



Fluorspar



Uses

phosphores, magnets in electronics, defense radar



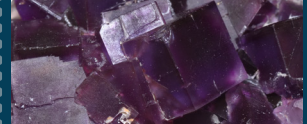
Uses

lithium-ion batteries, brake linings, lubricants



Uses

plumbing, electrical wires, brass instruments



Uses

hydrofluoric acid, toothpaste, telescope lenses



Stibnite

Antimony

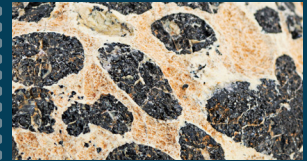


Bertrandite

Beryllium



Barite



Chromite

Chromium



Uses

flame retardant, lead-acid batteries, brake pad rubber



Uses

fighter jets, fiber-optics, high-speed computers



Uses

paint, X-ray, contrast medium, oil and gas drilling fluid



Uses

stainless steel, yellow road paint, dental tools



Ilmenite

Titanium



Bauxite

Aluminum, Gallium



Sphalerite

Zinc, Germanium, Indium



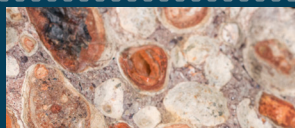
Scheelite

Tungsten



Uses

white paint pigment, dental implants, spacecraft parts



Uses

light-emitting diode (LED) lights, airplane parts, beverage cans



Uses

sunscreen, night vision goggles, liquid crystal display (LCD) displays



Uses

jet engines, cutting tools, lightbulb filaments



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Memory Match
Game



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