

# Lithium



**Lithium is a silvery-white alkali metal that's necessary for so many of our everyday tech items that we call it a "critical mineral".**

**It's a good conductor of heat and electricity but is also so highly reactive and flammable that it's never found in pure form in nature.**

**Lithium is used mostly for batteries (phones, computers, and electric vehicles) and heat-resistant glass and ceramic glazes, but is also used for lubricating grease, rocket fuel propellant, and pharmaceuticals (medicine).**



## Where does lithium come from?

### → Brines

Geographically-isolated basins in arid climates that also have nearby geothermal or igneous activity are prime locations for development of lithium brine deposits.

**Brine** (extremely saline groundwater) in these closed basins can contain dissolved lithium salts. Once extracted and evaporated, the concentrated lithium salts can be processed into lithium carbonate and other materials.

Current major lithium brine deposits are found in South America (Argentina, Bolivia, Chile), New Zealand, China, and the western U.S. (Nevada, California).

### → Pegmatites

Pegmatites are intrusive igneous rocks like granite, but they have excessively large mineral crystals. These large crystals form during the late stages of underground magma cooling, when extremely hot, ion-rich water separates from magma.

**Spodumene** minerals (photo) are commonly found in lithium-bearing granite pegmatites and are found in many locations around the world, including North Carolina.

Spodumene is mined to produce lithium carbonate and lithium metal and is mined both above and below ground.



Check out this 2021 [map](#) from the British Geological Survey that shows worldwide brine and pegmatite lithium deposits, occurrences, and mines.

# Lithium in North Carolina

Footprint Mineral Company operated the Kings Mountain lithium mine from 1938 to 1988. Albemarle Corporation now owns that mine and is planning to begin lithium production again by 2027. Piedmont Lithium is hoping to build a 1,500-acre lithium mine along the same geologic trend in Gaston County, 30 miles west of Charlotte.

## Where is lithium found in North Carolina?

### Kings Mountain

Lithium production in North Carolina has been mostly from pegmatites in rocks along the west side of the Kings Mountain shear zone. Pegmatites here are **350-330 million years old!**

A **shear zone** is a zone of weakness in Earth's crust and mantle that occurs along a fault. Excess pressure and heat from magma causes rocks to deform but not break. Hot, ion-rich water can circulate in shear zones, causing the formation of rocks like pegmatites that contain spodumene minerals.

The Kings Mountain shear zone runs northeast to southwest (pink line on the map) and separates the Cat Square **terrane** from the Kings Mountain **terrane**. Most lithium production occurs along the west side of the shear zone in the Cat Square terrane.

The pegmatites in this area are found in metamorphic rocks like mica schist and amphibolite.



### What was Earth like 350-330 million years ago?

- ★ Dinosaurs didn't yet exist
- ★ Pangea had not yet formed
- ★ Vast tropical, swampy forests covered most of Europe and North America

### What is a geologic terrane?

Geologic terranes are large areas of rocks that are accreted (added to) continents during plate tectonic collisions. They differ from nearby terranes by rock type and rock origin. The Cat Square Terrane (below in gray) is separated from the Kings Mountain Terrane (purple) by the Kings Mountain shear zone.

Notice the lithium mines, prospects and occurrences that are along the west side of the shear zone.

### Legend

- NC Lithium Mine, Prospects, and Occurrences
- Geologic Faults

#### NC Terranes

- Cat Square terrane
- Kings Mountain terrane
- Late Paleozoic intrusives
- Charlotte terrane

