

Beryllium

U.S. Geological Survey mineral commodity specialist Kim B. Shedd has compiled the following information on beryllium, a metal used in computer and telecommunications, automotive electronics, medical instrumentation, and aerospace and defense applications.

Beryllium metal is lighter than aluminum and stiffer than steel. These and other properties, including its strength, dimensional stability, thermal properties and reflectivity, make it useful for aerospace and defense applications, such as satellite and space-vehicle structural components. Beryllium's nuclear properties, combined with its low density, make it useful as a neutron reflector and moderator in nuclear reactors. Because it is transparent to most X rays, beryllium is used as X-ray windows in medical, industrial and analytical equipment.

Beryllium's leading use is as an alloying element, improving the mechanical properties of other metals. For example, beryllium makes copper stronger while retaining copper's conductivity and corrosion resistance. Beryllium-copper strip and wire are used to make electronic connectors and contacts, as well as other parts for computers, telecommunications equipment, automotive electronics and home appliances.

Beryllium oxide ceramics are lightweight, very rigid electrical insulators that can withstand extreme temperatures and dissipate heat better than any other ceramic material. They are used as heat sinks in high-performance powered electronics and semiconductors, and as components in a wide variety of instruments, including aircraft and missile guidance systems, automobile ignition systems and sensors, and transmitters for radiofrequency applications.

In 2005, the estimated world production of beryllium ore was about 114 tons. The United States supplied about 80 percent of the total and was a net exporter of beryllium materials and articles. China was also a significant producer of beryllium ore.

Bertrandite is the principal beryllium mineral mined in the United States and is mined by open-pit methods from a large deposit of volcanic tuff in the Topaz-Spor Mountain area of western Utah. Proven bertrandite reserves in Utah total about 16,000 tons of contained beryllium. This amount is sufficient to last more than 100 years at current production levels.

Beryl is the principal beryllium mineral mined in the rest of the world. It is usually recovered by hand sorting from pegmatitic deposits, which are often being mined for other minerals such as feldspar and mica. Aquamarine and emerald are some of the many gem forms of the mineral beryl.

Identified world resources of beryllium have been estimated to be more than 80,000 tons of contained beryllium. About 65 percent of these resources lies in nonpegmatitic deposits in the United States, mostly in the Topaz-Spor Mountain and Gold Hill areas in Utah and the Seward Peninsula area in Alaska. Worldwide, only four plants process beryllium ores — one in Utah, one in Kazakhstan and two in China.

The United States maintains a stockpile of strategic materials for use during a national emergency. Following the breakup of the Soviet Union, the U.S. Department of Defense decided to sell most of its stocks of strategic materials, but because of its importance to certain defense applications, beryllium metal is one of only a few materials that will continue to be stockpiled under the current plan.

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Sample of beryllium ore. Image from *Minerals in Your World*.