Germanium Encyclopedia Article

Germanium

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Germanium

The element germanium is named for the country of Germany, where it was discovered by Clemens Alexander Winkler (1838-1904). Winkler, who was a very precise and careful scientist, was puzzled when he analyzed silver ore and could not account for seven percent of its content. After four months of tests, Winkler finally isolated a new element from the ore. Dmitry Mendeleev had predicted the existence of the element, which he had called eka-silicon, in 1871.

Germanium (symbol Ge) is a silvery-gray metal with properties somewhat similar to those of silicon and tin. It is easily obtained from coal, ores, and other minerals. Coal that contains germanium was probably formed from plants that absorbed the metal from the soil. Pure germanium (atomic number 32) takes the form of a brittle crystal.

For half a century after its discovery, germanium found little use. In 1922, its oxide compound proved helpful in treating anemia. Then in 1948, Walter Brattain and other researchers used the metal to make the world's first transistor, which replaced vacuum tubes in computers and other electronic equipment. As a so-called semiconducter, germanium can either conduct electrical current (switch it on) or resist it (switch it off). Although germanium is still used in certain electronic components, silicon devices and integrated circuits began to replace germanium components in the mid-1960s.

In alloy with some metals, such as aluminum, magnesium, and copper, germanium increases their strength, while it facilitates the rolling of several other metals. Germanium compounds are used in optical electronics, such as digital displays for watches and calculators, and in optical instruments that make use of infrared light, such as microscopes, wide-angle camera lenses, and detection systems. Other applications for the metal include low-temperature thermometers, fluorescent lights, storage batteries, and reflectors.

Scientists continue to find new uses for this versatile metal. For instance, in the late 1990s, researchers at Michigan Technological University were experimenting with using germanium and tin to create hundreds of tiny wires quickly. Tin is reluctant to mix with germanium, so when the two metals are heated together, the germanium is pushed up into randomly placed ridges. These so-called "quantum wires," which are just a few dozen atoms across, might one day be useful in lasers.