

Yttrium Encyclopedia Article

Yttrium

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Yttrium

Yttrium is the second element in Group 3 of the **periodic table**, one of the transition **metals**. It has an **atomic number** of 39, an atomic **mass** of 88.9059, and a chemical symbol of Y.

Properties

Yttrium has typical metallic properties with a melting point of 2,748°F (1,509°C), a **boiling point** of about 5,400°F (3,000°C), and a **density** of 4.47 grams per cubic centimeter. Yttrium is a moderately active element that reacts with cold **water** slowly and hot water more rapidly. It dissolves in both acids and alkalis. Yttrium does not react with **oxygen** at room **temperature**, but does so at higher temperatures. As a powder, it may react explosively with hot oxygen.

Occurrence and Extraction

Yttrium is a moderately abundant element in the Earth's crust with an abundance estimated at about 28-70 parts per million. As with many other elements, the abundance of yttrium varies in other parts of the solar system. Rocks brought back from the Moon, for example, tend to have a higher **concentration** of yttrium than those in the Earth's crust. The primary ore of yttrium is monazite, which occurs in beach sand in Brazil, India, Florida, and other parts of the world.

Discovery and Naming

Yttrium was the first new element to be discovered in a rock found in 1787 by a Swedish army lieutenant outside the town of Ytterby, Sweden. The rock was eventually to yield nine new elements. Yttrium was discovered by the Swedish chemist Carl Gustav Mosander, who named the element in honor of the town near which the rock was found.

Uses

About two-thirds of all yttrium produced goes to the manufacture of phosphors used in television picture tubes, computer monitors, and specialized fluorescent lights. An increasingly important use of the element is in the production of special **lasers** made of yttrium, **aluminum**, and synthetic garnet, the YAG laser. One use of the YAG laser is in making very precise measurements at long distances. As an example, the National Aeronautics and Space Administration used a YAG laser in 1996 to measure the dimensions of the asteroid Eros and to map its surface features.