Thulium - Tm

Chemical properties of thulium - Health effects of thulium - Environmental effects of thulium

Atomic number	69
Atomic mass	168.93 $g.mol^{-1}$
Electronegativity according to Pauling	1.2
Density	9.3 $g.cm^{-3}$ at 20°C
Melting point	1545 °C
Boiling point	1947 °C
Vanderwaals radius	unknown
Ionic radius	unknown
Isotopes	5
Electronic shell	[Xe] $4f^{13}$ $6s^{2}$
Energy of first ionisation	595.3 $kJ.mol^{-1}$
Energy of second ionisation	1160,7$kJ.mol^{-1}$
Energy of third ionisation	2284 $kJ.mol^{-1}$
Standard potential	- 2.28 V
Discovered by	Theodore Cleve 1879

Thulium

Thulium is a **lanthanide** element, it has a bright silvery-gray luster and can be cut by a knife. It is the least abundant of the **rare earths** and its **metal** is easy to work. It slowly tarnishes in air, but is more resistant to oxidation than most rare-earth elements. It also has some **corrosion** resistance in dry air and good **ductility**. Naturally occurring thulium is made entirely of the **stable isotope** Tm-169.

Applications

The pure metal and compound have few commercial uses: because it is very rare and expensive and has little to offer, thulium find little application outside chemical research. Thulium has been used to create **lasers**. When stable thulium (Tm-169) is bombarded in a **nuclear reactor** it can later serve as a **radiation** source in portable **X-ray** devices. It also has potential use in ceramic magnetic materials called **ferrites**, which are used in **microwave** equipment. Thulium-doped calcium sulphate has been used in personal radiation dosimeters because it can register, by its fluorescence, especially low levels.

Thulium in the environment

The element is never found in nature in pure form but it is found in small quantities in **minerals** with other rare earths. It is principally extracted from **monazite**, which contains about 0.007% of thulium and bastnasite (about 0.0008%). The chief ores are in China, US, Brazil, India, Sri Lanka and Australia. Reserves of thulium are estimated to be about 100.000 tonnes. World production is about 50 tonnes per year as thulium oxide. Thulium is the second rarest lanthanide element, after promethium.

Health effects of thulium

Soluble thulium salts are regarded as slightly toxic in taken in large amounts, but the soluble salts are completely not toxic.

Effects of thulium on the environment

Thulium poses no environmental threat to plants and animals.