Yttrium - Y

Chemical properties of Yttrium - Health effects of yttrium - Environmental effects of yttrium

Atomic number	39
Atomic mass	88.9059 g.mol $^{-1}$
Electronegativity according to Pauling	1.2
Density	4.47 g.cm^{-3} at 20°C
Melting point	1500 °C
Boiling point	3336 °C
Vanderwaals radius	0.106 nm (+3)
Isotopes	10
Electronic shell	[Kr] 4d^{1} 5s^{2}
Energy of first ionisation	626 kJ.mol $^{-1}$
Energy of second ionisation	1185 kJ.mol $^{-1}$
Energy of third ionisation	1980 kJ.mol $^{-1}$
Discovered by	Johann Gadolin in 1794

Yttirum

Yttrium is a highly crystalline iron-gray, rare-earth metal. Yttrium is fairly stable in air, because it is proteced by the formation by the formation of a stable oxide film on its surface, but oxidizes readily when heated. It reacts with water decomposing it to release hydrogen gas, and it reacts with mineral acids. Shavings or turnings of the metal can ignite in air when they exceed 400 °C. When yttrium is finely divided it is very unstable in air.

Applications

The largest use of the element is as its oxide yttria, Y_2O_3, which is used in making red phosphors for color television picture tubes. Yttrium metal has found some use alloyed in small amounts with other metals and It is used to increase the strength of aluminium and magnesium alloys. When added to cast iron it make the metal more workable. Although metals are generally very good at conducting heat, there is an alloy of yttrium with chromium and aluminium which is heat resistant. Yttrium oxide in glass makes it heat- and shock-resistant, and is used for camera lenses. Yttrium oxide is suitable to making superconductors, which are metal oxides which conduct electricity without any loss of energy.

Yttrium in the environment

Yttrium never occurs in nature as a free element. It is found in almost all rare earth minerals and in uranium ores. The yellow-brown ore xenotime can contain as much as 50% yttrium phophate (YPO4) and is mined in Malaysia. Yttrium is found in the rare-earth mineral monazite, of which it makes 2.5%, and in smaller quantities in other minerals such as barnasite, fergusonite and smarskite. The output of yttrium is about 600 tonnes per year, measured as yttrium oxide, and world reserves are estimated to be around 9 million tonnes.

Health effects of yttrium

Yttrium is one of the rare chemicals, that can be found in houses in equipment such as colour televisions, fluorescent lamps, energy-saving lamps and glasses. All rare chemicals have comparable properties.

Yttrium can rarely be found in nature, as it occurs in very small amounts. Yttrium is usually found only in two different kinds of ores. The use of yttrium is still growing, due to the fact that it is suited to produce catalysers and to polish glass.

Yttrium is mostly dangerous in the working environment, due to the fact that damps and gasses can be inhaled with air. This can cause lung embolisms, especially during long-term exposure. Yttrium can also cause cancer with humans, as it enlarges the chances of lung cancer when it is inhaled. Finally, it can be a threat to the liver when it accumulates in the human body.

Effects of yttrium on the Environment

Yttrium is dumped in the environment in many different places, mainly by petrol-producing industries. It can also enter the environment when household equipment is thrown away. Yttrium will gradually accumulate in soils and water soils and this will eventually lead to increasing concentrations in humans, animals and soil particles.

With water animals yttrium causes damage to cell membranes, which has several negative influences on reproduction and on the functions of the nervous system.