Rhenium - Re

Chemical properties of rhenium - Environmental effects of rhenium - Chemical effects of rehnium

Atomic number	75
Atomic mass	186.23 $g.mol^{-1}$
Electronegativity according to Pauling	1.9
Density	20.5 $g.cm^{-3}$ at 20°C
Melting point	3170 °C
Boiling point	5627 °C
Vanderwaals radius	0.138 nm
Ionic radius	unknown
Isotopes	9
Electronic shell	[Xe] $4f^{14}$ $5d^{5}$ $6s^{2}$
Energy of first ionisation	759 $kJ.mol^{-1}$
Standard potential	0.25 V (ReO^{2}/ Re)
Discovered by	Walter Noddack in 1925

Rhenium

Rhenium is a silvery metal but rarely seen as such on account of its high melting point, which is the third highest after carbon and tungsten. Rhenium is very hard, it resists corrosion but slowly tarnishes in moist air.

Applications

Rhenium is used as an important component in superalloys for blades in turbine engines and this is the major use today. Rhenium is an ideal metal for use at very high temperatures, which makes it suitable for rockets motors. Rhenium is added to tungsten and molybdenum to form alloys that are used as filaments for ovens and lamps. It is also used in thermocouples which can measure temperatures above 2000 C, and for electrical contacts which stand up well to electric arcs.

Rhenium, alloyed with platinum, was used in petroleum-reforming catalysis in the production of high-octane hydrocarbons, used for lead free gasoline.

Other applications are rhenium-tungsten alloys in X-raytubes and rotating X-ray anodes. Rhenium-molybdenum alloys are superconductors at a temperature of 10K. Rhenium has occasionally been used for plating jewerly.

Rhenium in the environment

Rhenium does not occur as the free uncombined metal, and no mineable ore has been found. The ores gadolinite and molybdenite may contain a little rhenium and it is from the latter of these that rhenium is extracted via the flue dusts of molybdenium smelters. World annual production is now around 5 tonne and the estimated reserves of rhenium are 3500 tonnes, found mainly in USA, Russia and Chile.

Health effects of rhenium

Little is known about rhenium toxicity.

Potential health effects: May cause eye irritation. May cause skin irritation. Liquid may cause burns to skin and eyes. Ingestion: May cause irritation of the digestive tract. Inhalation: May cause respiratory tract irritation.

The toxicological properties of this substance have not been fully investigated. Vapors may cause dizziness or suffocation.

Environmental effects of rhenium

There is so little rhenium in the environment that virtually nothing is known of how it would behave in soil, plants anr animals. There are no instances of pollution by rhenium salts from mining or industry. No information was found on the environmental toxicity of rhenium.