Platinum - Pt

Chemical properties of platinum - Health effects of platinum - Environmental effects of platinum

Atomic number	78
Atomic mass	195.09 g.mol $^{-1}$
Electronegativity according to Pauling	2.2
Density	21.4 g.cm^{-3} at 20°C
Melting point	1772 °C
Boiling point	3800 °C
Vanderwaals radius	0.138 nm
Ionic radius	0.096 nm (+2)
Isotopes	13
Electronic shell	[Xe] 4f^{14} 5d^{9} 6s^{1}
Energy of first ionisation	867 kJ.mol $^{-1}$
Energy of second ionisation	1788 kJ.mol $^{-1}$
Discovered by	Julius Scaliger in 1735

Platinum

The name platinum is derived from the Spanish "platina", meaning "little silver".

Platinum is a lustrous silvery-white, malleable, ductile metal and a member of group 10 of the periodic table of the elements. It has the third highest density, behind osmium and iridium. Platinum is unaffected by air and water, but will dissolve in hot *aqua* regia, in hot concentrated phosphoric and sulphuric acids, and in molten alkali. It is as resistant as gold to corrosion and tarnishing. Indeed, platinum will not oxidize in air no matter how strongly it is heated.

It has a coefficient of expansion almost equal to that of soda-lime-silica glass, and is therefore used to make sealed electrodes in glass systems. Hydrogen and oxygen gas mixtures explode in the presence of platinum wire.

There are six naturally occurring isotopes : the most abundant are platinum-194, which accounts for 33%, platinum-195 (34%) and platinum-196 (25%). The others are platinum-198 (7%), platinum-192 (1%) and platinum-190 (0.01%). The latter is weakly radioactive, with a half life of 700 billion years, while the other five are non-radioactive.

Applications

Platinum has many uses. Its wear- and tarnish-resistance characteristics are well-suited for making fine jewelry. Platinum and its alloys are used in surgical tools, laboratory utensils, electrical resistance wires, and electrical contact points. It is used (30%) as a catalyst in the catalytic converter, an optional component of the gasoline-fuelled automobile exhaust system. The largest use (50%) of platinum is for jewellery, another 20% is used in industry: platinum is used in the chemical, electrical, glass and aircraft industries, each accounting for about 10 tonnes of the metal per year. The glass industry uses platinum for optical fibers and liquid crystal display glass, especially for laptops.

Platinum in the environment

Platinum primary occurrence is with other metal ores associated with basic igneous rocks. Platinum nuggets occur naturally as the uncombined metal, as does an alloy of platinum-iridium. Three-quarters of the world's platinum comes from South Africa, where it occurs as cooperite, while Russia is the second largest produced, followed by North America. World production of platinum is around 155 tonnes a year and reserves total more than 30.000 tonnes

Health effects of platinum

Platinum is a noble metal. The concentrations of platinum in the soil, water and air are very minimal. In some places deposits can be found that are very rich in platinum, mainly in South Africa, the Soviet Union and the United States. Platinum is used as a component of several metal products, such as electrodes and it can be used as a catalyser of a number of chemical reactions.

Platinum bonds are often applied as a medicine to cure cancer. The health effects of platinum are strongly dependent upon the kind of bonds that are shaped and the exposure level and immunity of the person that is exposed.

Platinum as a metal is not very dangerous, but platinum salts can cause several health effects, such as:

- DNA alterations
- Cancer
- Allergic reactions of the skin and the mucous membrane
- Damage to organs, such as intestines, kidneys and bone marrow
- Hearing damage