

# Praseodymium - Pr

## Chemical properties of praseodymium - Health effects of praseodymium - Environmental effects of praseodymium

<b>Atomic number</b>	59
<b>Atomic mass</b>	140.91 g.mol <sup>-1</sup>
<b>Electronegativity according to Pauling</b>	1.1
<b>Density</b>	6.8 g.cm <sup>-3</sup> at 20°C
<b>Melting point</b>	931 °C
<b>Boiling point</b>	3512 °C
<b>Vanderwaals radius</b>	unknown
<b>Ionic radius</b>	0.101 nm (+3)
<b>Isotopes</b>	5
<b>Electronic shell</b>	[ Xe ] 4f <sup>3</sup> 6s <sup>2</sup>
<b>Energy of first ionisation</b>	522 kJ.mol <sup>-1</sup>
<b>Energy of second ionisation</b>	1016 kJ.mol <sup>-1</sup>
<b>Energy of third ionisation</b>	2082.4 kJ.mol <sup>-1</sup>
<b>Energy of fourth ionisation</b>	3752 kJ.mol <sup>-1</sup>
<b>Energy of fifth ionisation</b>	5534 kJ.mol <sup>-1</sup>
<b>Standard Potential</b>	- 2.47 V
<b>Discovered by</b>	von Welsbach in 1885

### Praseodymium

Praseodymium is a soft malleable, silvery-yellow metal. It is a member of the lanthanide group of the periodic table of elements. It reacts slowly with oxygen: when exposed to air it forms a green oxide that does not protect it from further oxidation. It is more resistant to corrosion in air than the other rare metals, but it still needs to be stored under oil or coated with plastic. It reacts rapidly with water.

#### *Applications*

A major use of the metal is in a pyrophoric alloy used in cigarettes lighter flints. Praseodymium compounds have different uses: the oxide is used in carbon electrodes for arc lighting, and it is known for its ability to give glass a nice yellow colour. This glass filters out the infrared radiation, so it is used in the goggles which protect the eyes of welders. The salts are used to colour enamel and glass. Praseodymium can be used as an alloying agent with magnesium to create high strength metals that are used in aircraft engines.

Praseodymium 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. The use of praseodymium is still growing, due to the fact that it is suited to produce catalysts and to polish glass.

#### *Praseodymium in the environment*

Praseodymium is one of the more abundant of rare-earth elements. It is four times more abundant than [tin](#). Praseodymium is usually found only in two different kinds of ores.

The major commercial ores in which praseodymium is found are monazite and bastnasite. The main mining areas are China, USA, Brazil, India, Sri Lanka and Australia. Reserves of praseodymium are estimated to be around 2 million tonnes. World production of praseodymium is about 2500 tonnes per year.

## Health effects of praseodymium

Like all rare metals praseodymium is of low to moderate toxicity. Soluble praseodymium salts are mildly toxic by ingestion, but insoluble salts are non toxic. They are skin and eye irritants. Praseodymium 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. Praseodymium can be a threat to the liver when it accumulates in the human body.

## Environmental effects of praseodymium

Praseodymium 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. Praseodymium 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 praseodymium causes damage to cell membranes, which has several negative influences on reproduction and on the functions of the nervous system.