

Barium - Ba

Chemical properties of barium - Health effects of barium - Environmental effects of barium

Atomic number	56
Atomic mass	137.33 g.mol ⁻¹
Electronegativity according to Pauling	0.9
Density	3.5 g.cm ⁻³ at 20 °C
Melting point	725 °C
Boiling point	1640 °C
Vanderwaals radius	0.222 nm
Ionic radius	0.135
Isotopes	16
Electronic shell	[Xe] 6s ²
Energy of first ionisation	502.7 kJ.mol ⁻¹
Energy of second ionisation	965 kJ.mol ⁻¹
Standard potential	- 2.90 V
Discovered by	Sir Humphrey Davy in 1808



Barium

Barium is a silvery-white metal that can be found in the environment, where it exists naturally. It occurs combined with other chemicals, such as sulfur, carbon or oxygen. It is very light and its density is half that of iron. Barium oxidizes in air, reacts vigorously with water to form the hydroxide, liberating hydrogen. Barium reacts with almost all the non-metals, forming often poisoning compounds.

Applications

Barium is often used in barium-nickel alloys for spark-plug electrodes and in vacuum tubes as drying and oxygen-removing agent. It is also used in fluorescent lamps: impure barium sulfide phosphoresces after exposure to the light.

Barium compounds are used by the oil and gas industries to make drilling mud. Drilling mud simplifies drilling through rocks by lubricating the drill.

Barium compounds are also used to make paint, bricks, tiles, glass, and rubber. Barium nitrate and chlorate give fireworks a green colour.

Barium in the environment

Barium is surprisingly abundant in the Earth's crust, being the 14th most abundant element. High amounts of barium may only be found in soils and in food, such as nuts, seaweed, fish and certain plants.

Because of the extensive use of barium in the industries human activities add greatly to the release of barium in the environment. As a result barium concentrations in air, water and soil may be higher than naturally occurring concentrations on many locations.

Barium enters the air during mining processes, refining processes, and during the production of barium compounds. It can also enter the air during coal and oil combustion.

The chief mined ores are barite, which is also the most common and witherite. The main mining areas are UK, Italy, Czech Republic, USA and Germany. Each year about 6 million tonnes are produced and reserves are expected to exceed 400 million tonnes.

Health effects of barium

The amount of barium that is detected in food and water usually is not high enough to become a health concern.

People with the greatest risk to barium exposure with additional health effects are those that work in the barium industry. Most of the health risks that they can undergo are caused by breathing in air that contains barium sulphate or barium carbonate.

Many hazardous waste sites contain certain amounts of barium. People that live near them may be exposed to harmful levels. The exposure will then be caused by breathing dust, eating soil or plants, or drinking water that is polluted with barium. Skin contact may also occur.

The health effects of barium depend upon the water-solubility of the compounds. Barium compounds that dissolve in water can be harmful to human health. The uptake of very large amounts of barium that are water-soluble may cause paralyses and in some cases even death.

Small amounts of water-soluble barium may cause a person to experience breathing difficulties, increased blood pressures, heart rhythm changes, stomach irritation, muscle weakness, changes in nerve reflexes, swelling of brains and liver, kidney and heart damage.

Barium has not been shown to cause cancer with humans. There is no proof that barium can cause infertility or birth defects.