

Antimony - Sb

Chemical properties of antimony - Health effects of antimony - Environmental effects of antimony

Atomic number	51
Atomic mass	121.75 g.mol ⁻¹
Electronegativity according to Pauling	1.9
Density	6.684 g.cm ⁻³
Melting point	631 °C
Boiling point	1587 °C
Vanderwaals radius	0.159 nm
Ionic radius	0.245 nm (-3); 0.062 nm (+5); 0.076 nm (+3)
Isotopes	12
Electronic Shell	[Kr] 4d ¹⁰ 5s ² 5p ³
Energy of first ionisation	834 kJ.mol ⁻¹
Energy of second ionisation	1595 kJ.mol ⁻¹
Energy of third ionisation	2443 kJ.mol ⁻¹
Standard potential	0.21 V (Sb ³⁺ / Sb)
Discovered by	The ancients



Antimony

Antimony is a semimetallic chemical element which can exist in two forms: the metallic form is bright, silvery, hard and brittle; the non metallic form is a grey powder. Antimony is a poor conductor of heat and electricity, it is stable in dry air and is not attacked by dilute acids or alkalis. Antimony and some of its alloys expand on cooling.

Antimony has been known since ancient times. It is sometimes found free in nature, but is usually obtained from the ores stibnite (Sb₂S₃) and valentinite (Sb₂O₃). Nicolas Lémery, a French chemist, was the first person to scientifically study antimony and its compounds. He published his findings in 1707. Antimony makes up about 0.00002% of the earth's crust.

Applications

Very pure antimony is used to make certain types of semiconductor devices, such as diodes and infrared detectors. Antimony is alloyed with lead to increase lead's durability. Antimony alloys are also used in batteries, low friction metals, type metal and cable sheathing, among other products. Antimony compounds are used to make flame-proofing materials, paints, ceramic enamels, glass and pottery. The ancient Egyptians used antimony, in the form of stibnite, for black eye make-up.

Antimony in the environment

Antimony occurs naturally in the environment. But it also enters the environment through several applications by humans. Antimony is an important metal in the world economy. Annual production is about 50.000 tonnes per year, with virgin materials coming mainly from china, Russia, Bolivia and South Africa. World reserves exceed 5 million tonnes. In Finland there is a deposit of elemental antimony.

Health effects of antimony

Especially people that work with antimony can suffer the effects of exposure by breathing in antimony dusts. Human exposure to antimony can take place by breathing air, drinking water and eating foods that contain it, but also by skin contact with soil, water and other substances that contain it. Breathing in antimony that is bound to hydrogen in the gaseous phase, is what mainly causes the health effects.

Exposure to relatively high concentrations of antimony (9 mg/m³ of air) for a longer period of time can cause irritation of the eyes, skin and lungs.

As the exposure continues more serious health effects may occur, such as lung diseases, heart problems, diarrhea, severe vomiting and stomach ulcers.

It is not known whether antimony can cause cancer or reproductive failure.

Antimony is used as a medicine for parasitic infections, but people who have had too much of the medicine or were sensitive to it have experienced health effects in the past. These health effects have made us more aware of the dangers of exposure to antimony.

Effects of antimony on the environment

Antimony can be found in soils, waters and air in very small amounts. Antimony will mainly pollute soils. Through groundwater it can travel great distances towards other locations and surface waters.

Laboratory tests with rats, rabbits and guinea pigs have shown us that relatively high levels of antimony may kill small animals. Rats may experience lung, heart, liver and kidney damage prior to death.