

## Zinc - Zn

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

Atomic number	30
Atomic mass	65.37 g.mol <sup>-1</sup>
Electronegativity according to Pauling	1.6
Density	7.11 g.cm <sup>-3</sup> at 20°C
Melting point	420 °C
Boiling point	907 °C
Vanderwaals radius	0.138 nm
Ionic radius	0.074 nm (+2)
Isotopes	10
Electronic shell	[Ar] 3d <sup>10</sup> 4s <sup>2</sup>
Energy of first ionisation	904.5 kJ.mol <sup>-1</sup>
Energy of second ionisation	1723 kJ.mol <sup>-1</sup>
Standard potential	- 0.763 V
Discovered	Andreas Marggraf in 1746



## Zinc

Zinc is a lustrous bluish-white metal. It is found in group IIb of the periodic table. It is brittle and crystalline at ordinary temperatures, but it becomes ductile and malleable when heated between 110°C and 150°C. It is a fairly reactive metal that will combine with oxygen and other non-metals, and will react with dilute acids to release hydrogen.

### Applications

It is used principally for galvanizing iron, more than 50% of metallic zinc goes into galvanizing steel, but is also important in the preparation of certain alloys. It is used for the negative plates in some electric batteries and for roofing and gutters in building construction.

Zinc is the primary metal used in making American pennies, is used in die casting in the automobile industry. Zinc oxide is used as a white pigment in watercolours or paints, and as an activator in the rubber industry. As a pigment zinc is used in plastics, cosmetics, photocopier paper, wallpaper, printing inks etc, while in rubber production its role is to act as a catalyst during manufacture and as a heat disperser in the final product. Zinc metal is included in most single tablet, it is believed to possess anti-oxidant properties, which protect against premature aging of the skin and muscles of the body.

### Zinc in the environment

Zinc is a very common substance that occurs naturally. Many foodstuffs contain certain concentrations of zinc. Drinking water also contains certain amounts of zinc, which may be higher when it is stored in metal tanks. Industrial sources or toxic waste sites may cause the zinc amounts in drinking water to reach levels that can cause health problems.

Zinc occurs naturally in air, water and soil, but zinc concentrations are rising unnaturally, due to addition of zinc through human activities. Most zinc is added during industrial activities, such as mining, coal and waste combustion and steel processing. Some soils are heavily contaminated with zinc, and these are to be found in areas where zinc has to be mined or refined, or where sewage sludge from industrial areas has been used as fertilizer.

Zinc is the 23rd most abundant element in the Earth's crust. The dominant ore is zinc blende, also known as sphalerite. Other important zinc ores are wurtzite, smithsonite and hemimorphite. The main zinc mining areas are Canada, Russia, Australia, USA and Peru'. World production exceeds 7 million tonnes a year and commercially exploitable reserves exceed 100 million tonnes. More than 30% of the world's need for zinc is met by recycling.

## Health effects of zinc

Zinc is a trace element that is essential for human health. When people absorb too little zinc they can experience a loss of appetite, decreased sense of taste and smell, slow wound healing and skin sores. Zinc-shortages can even cause birth defects.

Although humans can handle proportionally large concentrations of zinc, too much zinc can still cause eminent health problems, such as stomach cramps, skin irritations, vomiting, nausea and anaemia. Very high levels of zinc can damage the pancreas and disturb the protein metabolism, and cause arteriosclerosis. Extensive exposure to zinc chloride can cause respiratory disorders.

In the work place environment zinc contagion can lead to a flu-like condition known as metal fever. This condition will pass after two days and is caused by over sensitivity.

Zinc can be a danger to unborn and newborn children. When their mothers have absorbed large concentrations of zinc the children may be exposed to it through blood or milk of their mothers.