

History

Zinc has an unusual history in that it was first used thousands of years ago in ancient China, the Mediterranean and Middle East, to create brass, an alloy of zinc and copper. However, metallic zinc itself was not actually used to create brass at this time as it was not actually known as a metal, rather zinc ores were combined with copper pellets in the smelting process. It was not until the 12th century in India that zinc was first identified as a pure metal and extracted from its oresⁱ. Brass was highly valued for its appearance but did not represent the same level of fundamental technological transformation which bronze, the alloy of copper and tin, did. It was not until the 18th century that zinc production on a large scale began in Europe, followed by the United States. This enabled the discovery of a wide array of uses for zinc which have far superseded the manufacture of brass.

Geology

Ore deposits for zinc are spread throughout the world with over 50 countries currently mining zinc. China, Australia, Peru, Europe and Canada are the biggest zinc mining regions. Zinc is often found in deposits associated with lead as well as copper, gold and silver. There are four major types of zinc deposits: Volcanic hosted massive sulphides; Carbonate hosted; Sediment hosted; and Intrusion related. The most commonly found zinc mineral is sphalerite and this is found in almost all zinc deposits currently being mined. Marmatite is also a common zinc-iron sulphide ore, however as it is very difficult and costly to smelt zinc from marmatite it is rarely exploitedⁱⁱ.

Use

Today the main uses of zinc are: Galvanising – 47 per cent; creation of Brass/Bronze – 19 per cent; other Alloys – 14 per cent; making Chemicals – 9 per cent; Die Casting – 8 per centⁱⁱⁱ.

As noted the most prolific use of Zinc is as a corrosion resistant coating by 'galvanising' steel and iron. The amazing aspect of zinc's use to resist the corrosion of steel and iron is that it is actually more reactive to exposure to the environment than iron or steel. How it works to protect the iron and steel is twofold; the first is that its high reactivity means that it will attract oxidation away from steel or iron that it is located with, and the second is that as the zinc slowly corrodes it forms a layer of zinc oxide and carbonate on the surface of the galvanised steel or iron, which provides an additional layer of protection. Because of this, even if the layer of zinc is penetrated the steel beneath it will still not rust thanks to the layer of oxide and carbonate which zinc creates. This is in stark contrast to using paint and aluminium coatings to protect steel or iron as, any penetration of the coating will see the steel corrode progressively under the paint or aluminium^{iv}.

However, both iron and steel will eventually succumb to rust as the zinc itself and the protective layer it creates degrade, although this occurs at a dramatically reduced rate when compared to un-galvanised steel. Galvanised iron and steel are used in a wide range of applications including, building and construction, automotive, fencing and roofing^v.



Zinc Ore – Sphalerite
Source: Wikimedia Commons



A close up of the surface of steel that has been galvanised with zinc. This crystalline coating is what protects steel from rusting.

Source: Wikimedia Commons

Victoria

In Victoria zinc occurs in most gold–sulphide and lead–silver deposits. However the only major deposits of zinc identified to date have been in the far-east of the state near Wilga near Limestone Creek. This deposit was mined for its copper and silver from 1993 to 1996, but produced 16,894 tonnes of zinc from 956,980 tonnes of ore. A deposit of great potential has also been identified at Currawong, only a few kilometres from Wilga^{vi}. A project which will develop these deposits is currently seeking approval.

ⁱ Habashi, Fathi. Zinc Protects – Discovering the 8th Metal – A history of Zinc. International Zinc Association (IZA).

<http://web.archive.org/web/20090304154217/http://www.iza.com/Documents/Communications/Publications/History.pdf>

ⁱⁱ International Zinc Association (IZA), Zinc – Natural Occurrence http://www.zinc.org/basics/zinc_natural_occurrence

ⁱⁱⁱ London Metal Exchange, Zinc Industry Usage, http://www.lme.com/zinc_industryusage.asp

^{iv} International Zinc Association (IZA), Zinc coatings – Protecting Steel. http://www.zinc.org/general/Zinc_Coatings_-_Protecting_Steel1.pdf

^v GeoScience Australia, Australian Mines Atlas, Zinc http://www.australianminesatlas.gov.au/education/fact_sheets/zinc.html

^{vi} Victorian Government, Department of Primary Industries: Zinc Fact Sheet <http://www.dpi.vic.gov.au/earth-resources/minerals/metals/zinc>