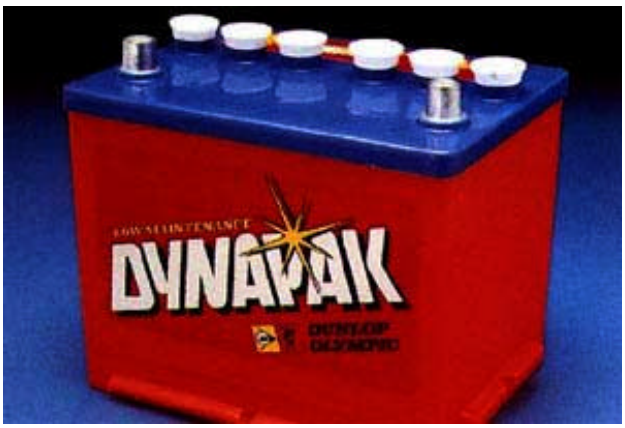
ROCK FILES

Lead



Car batteries contain electrodes made from lead

Humans used lead as long ago as 5000 BC, as it was able to be shaped it into all sorts of things, from water pipes to coins. It has been in use ever since, in a wide range of applications.

Have you ever seen the beautiful stained-glass windows of churches, where the glass is held together by lead?

Did you know that car engines rely on a lead-acid battery to start up?

Perhaps you are aware that when you watch TV or use a computer, it is lead that screens you from harmful radiation. Lead is certainly an important metal.

PROPERTIES

- Lead is a bluish-white, shiny metal.
- Lead is very resistant to corrosion.
- Lead is very dense.
- Lead is very soft.
- Lead is toxic if too much is absorbed into the body.
- Lead rarely occurs on its own in nature.
- Lead is the most abundant of the heavy metals.
- Lead has a low melting point (328°C).
- Lead is malleable and ductile (can be beaten and drawn into a wire).
- Lead is a good electrical conductor.
- Lead has the symbol Pb (from the Roman word 'plumbum' meaning water conductor or spout).

USES

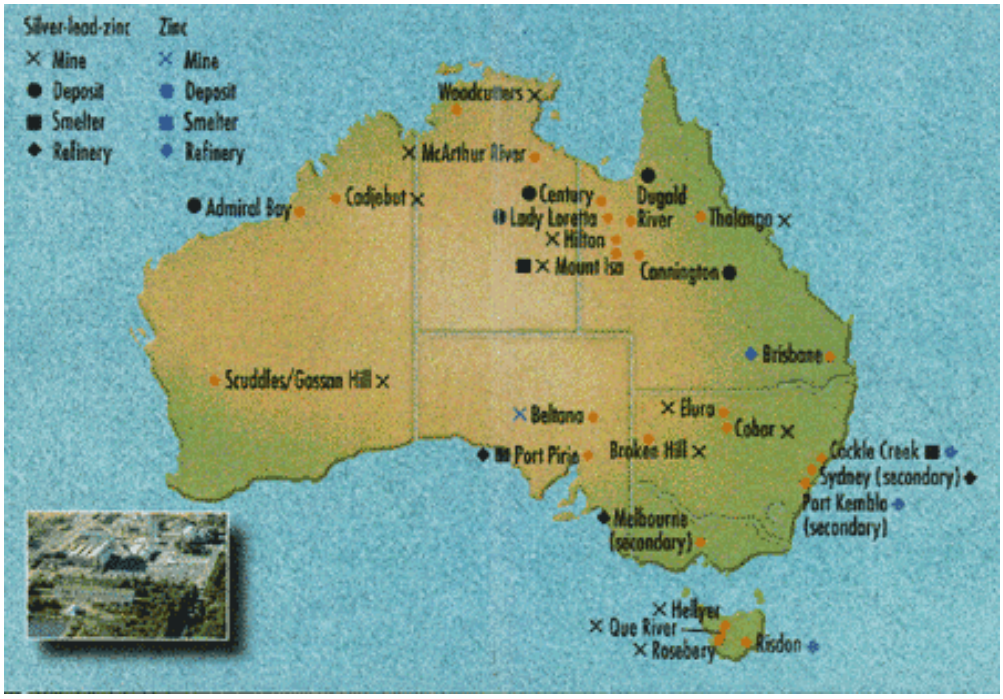
USE	DESCRIPTION
Batteries	Lead has good electrical conductivity and resistance to corrosion. The major use is in lead-acid batteries to store power in cars, wheelchairs, lift trucks, baggage loaders, even golf carts and submarines! Batteries are important in hospitals and communication centres needing a back-up supply in case of power failures, and in solar and wind power systems (to store the energy).
Health	As lead is very dense and highly absorbent, it is used as a radiation shield around X-ray, radiotherapy treatment, and nuclear equipment. Also in computer screens and TV tubes to absorb radiation.
Sound and vibration insulation	Lead's density and softness also makes it an excellent absorber of sound, so thin lead sheets are laminated onto building materials such as plywood, aluminium or steel to provide sound insulation. Even whole buildings can be mounted on lead to reduce vibration problems.
Cables	Lead's ductility and resistance to corrosion makes it an excellent sheath around electrical cables, especially under sea.
Chemical industry	Lead's corrosion resistance makes it ideal to line containers and pipes for storing and carrying corrosive chemicals.
Housing	Lead flashings (where roofs meet walls or chimneys) stop leaks, resist wind lift and do not corrode.
Weights	Lead's density makes it useful as a weight, such as for curtains, SCUBA divers and yacht keels (fishing sinkers tend not to be made from lead these days).
Solders	Lead's low melting point makes it an excellent solder, often alloyed with tin.
Lead oxide	In producing high-quality crystal glassware, stained-glass window 'frames', colour lenses, pottery glazes and as a 'red lead' undercoat on bridges and other exposed steel structures.
Other	Ammunition, ceramics, UV barrier in PVC products, and to minimise sulphur gas emissions by industry.

The famous winged keel on Americas Cup winner Australia 11 contained lead as ballast

SOURCE

Lead was the first metal mined in Australia, at Glen Osmond in South Australia in 1841, after the wheel of a cart being pulled up a rough track accidentally exposed some lead-zinc ore! The ores of lead (mainly galena, which is lead sulphide) usually occur together with other ores. The discovery of a large lead-zinc-silver orebody at Broken Hill in 1883 (a mine is still in operation today) was a significant event in Australia's history as it greatly boosted our economy. Previously we had relied only on wool and wheat for the nation's wealth.

Today, Australia is the world's leading producer and exporter of lead, with large mines at Broken Hill, Mt Isa and Hilton in Queensland, and McArthur River in the Northern Territory. However, more than half of the lead we use comes from recycling, mostly from old car batteries.



Major Silver-Lead-Zinc Mines in Australia

Most lead mines are underground operations. The lead ore is blasted, scooped up by front-end loaders, taken in large trucks to underground crushers, then hoisted to the surface up one of the shafts. At the surface, the ore is crushed further and subjected to the froth flotation method, then heated and treated in other ways to purify the lead and separate it from any other metals. Our lead refinery is at Port Pirie in South Australia.

AMAZING FACTS

- Lead pipes, water tanks, coins and weights for fishing nets were used in ancient Egypt, and the Hanging Gardens of Babylon were floored with soldered sheets of lead.
- The Romans had an elaborate water distribution system of lead aqueducts; and Roman baths in Bath, England, were lined with lead and fed by lead pipes from hot mineral springs. The Romans gladiators even used lead knuckle dusters!
- During the Middle Ages, lead was among the main exports of England, bartered for spices from the East.
- Many 15th and 16th century buildings had lead roofs (including Westminster Abbey and St Paul's Cathedral which still stand today) and during the Great Fire of London in 1666, the gutters were running with molten lead!
- Before batteries were invented, cars were started by turning a 'crank handle' at the front of the car – very tiring!
- Unleaded petrol has mostly replaced the old leaded petrol, to reduce the amount of lead from car exhausts.
- Prior to the 1970s, most house paint contained lead, so people renovating old houses are advised to wear face-masks when sanding or scraping the old paint off walls. Modern paints contain titanium dioxide instead, a safe mineral sands product.
- So-called 'lead pencils' don't actually contain lead, but are made from carbon (graphite).
- The Leaning Tower of Pisa leaned so much that, for a while, lead was used as a temporary counterweight before the problem was fixed more permanently.
- Non-nuclear submarines rely on a bank of lead-acid batteries for extra power, and for ballast to keep them upright. These batteries provide as much power in five hours as the average home uses in a year!
- It is hoped that future transport will be non-polluting, quiet, cheap-to-run electric cars which will be powered by lead-based batteries.

FOR FURTHER INFORMATION

- Fact Sheet: Lead, Minerals Council of Australia and Australian Geological Survey Organization, 1999
- ITAM Lead/Zinc, Minerals Council of Australia, 1996
- Copper, Lead and Zinc, Minerals of Western Australia Series #10, The Chamber of Minerals and Energy of WA Inc.