



Copper cooking and storage pots

Every time you switch on a light, use an appliance in your home, or turn on a tap, it is copper that is delivering the electricity or water to you. Copper is therefore a very important metal to humans. It combines more useful properties than probably any other metal!

In fact, copper was the first metal used by our ancestors, discovered by Neolithic Man about 9000 years ago and used in place of stone, as it was far easier to shape! Early coppersmiths in Iran found that heating copper softened it and hammering copper made it harder. In this way, they could shape copper into various useful items such as containers and utensils, a big leap forward for the human race. Because of its beautiful colour, copper was also made into jewellery and ornaments. Around 4000 BC bronze, an even harder alloy, was discovered by mixing copper with a small amount of tin. It was used to make not only decorations but also weapons, armour and tools - thus began the Copper-Bronze Age.

PROPERTIES

- Copper is deep pink-brown and is the only metal other than gold, to have a distinctive colour.
- Copper is an excellent conductor of heat and electricity (second only to silver).
- Copper is soft but tough.
- Copper is quite rare.
- Copper is malleable and ductile (can be beaten and drawn into a wire).
- Copper has the symbol Cu (from the Roman word Cuprum - their word for the island of Cyprus, famous for its copper mines).
- Copper can be alloyed (mixed) with many other metals.

USES

USE	DESCRIPTION
Electricity and communication	As copper is ductile and a great conductor, its main use is in electric generators, household/car electrical wiring, and the wires in appliances, computers, lights, motors, telephone cables, radios and TV sets.
Coins	The alloy 'cupronickel', a mixture of 75% copper and 25% nickel, is used for making 'silver' coins such as our 5, 10, 20 and 50 cent pieces. Our \$1 and \$2 coins are 92% copper, mixed with aluminium and nickel.
Pipes	As copper does not rust easily, and can be easily joined, it is useful for making water pipes (and hydraulic systems). The use of copper in water pipes dates back to the ancient Egyptians and of course the Romans!
Heat conducting	Copper's ability to conduct heat means it is used for car radiators, air conditioners, home heating systems, and boilers to produce steam. It is also ideal for the base of cooking pots.
Fungicides and insecticides	Copper sulphate is used to kill algal blooms in water reservoirs, to protect timber, to stop plant roots from blocking rains and sewerage systems, and to kill insects.
Health	Copper is an important trace mineral for the healthy functioning of the body. Some people find that wearing a copper bracelet helps relieve arthritis.
Fertilisers	Copper production was boosted in the 1950s and 1960s by the need for copper-based fertilisers to aid crop growth in previously unproductive land.
Bronze	Bronze (90% copper, 10% tin) is used for statues, and bearings in car engines and heavy machinery.
Brass	Brass (70% copper, 30% zinc) is particularly corrosion-resistant and so is used to make the hulls of sailing boats and other marine hardware. Many musical instruments are made from brass. Also decorative pieces, from light fittings to taps, and instruments for astronomy, surveying, navigation and other scientific purposes.



Mine machinery loading copper ore into a truck (Roche)



Copper rod

SOURCE

Although it can be found in its pure form, copper is generally locked together with other minerals such as gold, lead, zinc and silver. A mixture of copper, iron and sulphur is called chalcopyrite or 'fool's gold', and tricked many an old-time prospector! In Australia, the search for copper began soon after European settlement. By the 1860s, South Australia was known as the 'Copper Kingdom' because it had some of the largest copper mines in the world.

Australia is the world's fifth largest producer of copper. We have several copper mines which are of world significance, including Mt Isa in Queensland (our largest copper producer) and Olympic Dam in South Australia which is mining out one of the largest copper-bearing ores in the world.



Major Copper Mines in Australia

Here, copper-bearing rock (ore) is blasted underground, scooped up by front-end loaders, taken in large trucks to underground crushers, then hoisted to the surface in skips up one of the shafts. At the surface, the ore is crushed further, mixed with water and other special chemicals to remove the waste rock and float the copper ore so it can be skimmed off, then heated and treated in other ways to purify the copper and separate it from any other metals.

AMAZING FACTS

- A copper pendant dated at 8700 BC was discovered in what is now northern Iraq.
- A piece of copper tubing from 5000 years ago was unearthed by archaeologists from the Pyramid of Cheops in Egypt.
- The sixth wonder of the world was the Colossus of Rhodes, a huge statue of Helios the sun-god, made of bronze reinforced with iron and weighted with stones.
- Another famous bronze artefact is the 15th century pair of baptistry doors in Florence, Italy, hand-sculptured by Ghiberti.
- In the past, copper's ability to be beaten into sheets and its resistance to rusting made it popular for roofing on important buildings.
- In 1837 Charles Wheatstone and William Cooke patented the first electric telegraph, using copper wire.
- The first major discovery of copper in Australia was at Kapunda in South Australia in 1842 when Francis Dutton found copper ore whilst searching for lost sheep!
- In 1876 Alexander Graham Bell was the first to use copper telephone wire. In 1878 Thomas Edison invented the first electric light, relying on copper to carry the current to it. Within a few years, the mass use of these two inventions caused an incredible increase in the mining and production of copper.
- Copper and brass are easily recycled - perhaps 70% of the copper now in use has been recycled at least once.
- In the future, copper will be used in powder form in super-conductors, and as a coating for coaxial fibre optic cables. It is also bound to be used more and more in maintaining our health and those of our crops and livestock.
- An average family home contains more than 90 kilograms of copper: 40 kg of electrical wire, 30 kg of plumbing, 15 kg of builders hardware, 9 kg inside electrical appliances, and 5 kg of brass goods.
- A Boeing 747-200 jet plane contains about 1.8 tonnes of copper.
- The Statue of Liberty in New York contains more than 37,000 tonnes of copper.

FOR FURTHER INFORMATION

- Fact Sheet: Copper, Minerals Council of Australia and Australian Geological Survey Organization, 1999
- ITAM Copper, Minerals Council of Australia, 1996
- www.agso.gov.au/education/factsheet/
- www.nswmin.com.au for a Virtual Tour of Cadia Hill Gold and Copper Mine.