Properties of metals

Key words

ore a type of rock that contains minerals and metals

properties qualities or characteristics of matter and materials

malleable able to be beaten or hammered into shapes

ductile able to be drawn into wires

rust the reddish-brown layer formed when iron combines with air and water

conducts carries heat or electricity

alloy two or more metals mixed together, or a metal mixed with a non-metal

plated a metal coated by another metal

Many things we use in everyday life are made from metal. We use metals to make things because they have certain useful **properties**. The property of a material refers to the qualities of matter and material. Some of the useful properties of metals are listed below.

1. Metals are strong. If we drop them they will not break, although they might bend.
2. Most metals are very hard, but a few, like pure gold, are much softer.
3. Metals are shiny. Sometimes you cannot see the shine until you rub or scratch them.
4. Metals can be hammered or beaten into useful shapes. We say that metals are **malleable**. They can also be rolled into thin sheets, like kitchen foil.
5. Metals can be drawn into thin wires. We say they are **ductile**. Most electric wires are made of copper.
6. Metals melt at high temperature. This means we can use metal pots for boiling water without damaging the pot.

Some common metals and their special properties

Iron is a metal that has been used by humans in Africa for a very long time. It is used to make objects such as tools, nails, fence posts, wire fencing and weapons because it is strong and hard. A problem with iron is that it **rusts**.

Gold is a valuable metal. It is very malleable so it is easily worked into jewellery. It always shines and never goes dull, so it makes pretty jewellery. The people of Mapungubwe used gold sheets to make precious objects very long ago.

Silver is another valuable metal which has been used for about 8 000 years. It shines brightly and is also popular for making jewellery.

Copper is another metal that has been used since about 6 000 BC to make ornaments and weapons. It **conducts** electricity very well and is used for electric wires.

Aluminium is a very light, but strong, metal. It is used in aircraft construction. There is more aluminium in the earth than any other metal.

Zinc is a metal that is used to cover iron, so that the iron does not rust. Many water buckets are made of iron, but coated with zinc.

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Other properties of metals

Key words

magnetic attracted to a magnet

attracted pulled towards

tarnish a metal changing and going dull

corrode a metal breaking down

Metals are useful

Metals are very useful in everyday life. Metal objects are used for many different jobs. You learnt in Topic 6 that metals have special properties and that people use metals because of these properties. Here are some examples of the properties of metals.

Metals conduct heat

If you put one end of a metal rod into a fire, it won't be long before you can feel the rod becoming hot in your hand. This is because the heat passes along the rod. We say the metal rod conducts the heat. Metals are good conductors of heat.

If a pot has a metal handle, it may be too hot to pick it up when it has been on the stove. This is why most pots have wooden or plastic handles. We make pots and pans from metal because the metal conducts heat.

Magnetism and metals

Some metals are **magnetic**. When you bring certain metals close to a magnet, the metals are **attracted** to the magnet. This means they 'stick' to the magnet.

Metals that are attracted to magnets are magnetic. This does not mean they are magnets themselves. If a piece of metal is not magnetic, it will not be attracted to the magnet. Iron and steel are the most important magnetic metals. Nickel and cobalt are the only two other metals that are magnetic. All the other metals and all the non-metals are not magnetic.

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Metals rust or tarnish

Nearly all metals are affected by the air and water. The air makes the metals change. All metals start off bright and shiny, but in the air they go dull after a few weeks. For many metals, like copper, aluminium and zinc, this dull layer is fairly thin. We say the metals **tarnish** or **corrode**. Gold stays shiny because it does not corrode. Silver gets a blackish layer, which needs to be cleaned off.

Iron corrodes very easily. When iron corrodes, we say it rusts. Iron is the only metal that rusts. The iron turns reddish-brown and breaks down into small bits. Iron objects that rust are badly damaged and weakened. Metal alloys that contain lots of iron, like steel, also rust.

How to stop iron and steel from rusting

To stop iron objects from rusting, we have to protect them from the air and water. We can stop iron objects from rusting by:

- coating them in plastic
- painting them
- coating them with another metal that doesn't rust
- coating them with oil or grease.

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