Your notes

KS3 Science: revision notes

C3.3 Using resources

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The reactivity series

- From most to least reactive: potassium, sodium, calcium, magnesium, aluminium, (carbon), zinc, iron, (hydrogen), copper, silver, gold.
- Reactive metals react with water to make a metal hydroxide and hydrogen. Metal + acid → salt + hydrogen.
- A more reactive metal displaces a less reactive metal from its compound: magnesium + copper sulfate → magnesium sulfate + copper.

Extracting metals

- Gold is so unreactive that it is found as the metal itself.
- Metals less reactive than carbon (such as zinc, iron and copper) are extracted by heating their oxides with carbon. This is **reduction**: iron oxide + carbon → iron + carbon dioxide.
- Metals more reactive than carbon (such as aluminium) are extracted by **electrolysis**, which uses a lot of electricity and is expensive.

Water

- **Potable water** is safe to drink. It isn't pure, because it contains dissolved salts.
- Fresh water is treated by filtering it (through filter beds) and sterilising it (with chlorine, ozone or ultraviolet light) to kill microbes.
- **Desalination** makes sea water drinkable by distillation or reverse osmosis, but it needs a lot of energy.
- Testing water: check its pH, and evaporate a sample to see if solids are left behind. Pure water boils at exactly 100 °C.

Materials and sustainability

- **Alloys**, such as steel (iron and carbon) and brass (copper and zinc), are harder than pure metals, because different-sized atoms stop the layers sliding over each other.
- **Ceramics** (pottery, glass) are hard but brittle; **polymers** (plastics) are light and flexible insulators; **composites** combine two materials, such as reinforced concrete or carbon fibre.
- A **life cycle assessment** (LCA) looks at a product's environmental impact at every stage: getting the raw materials, making and packaging it, using it, and disposing of it. Some of the values are estimates, so LCAs can be biased.
- Reducing, reusing and **recycling** saves raw materials and energy and cuts waste. **Recycling** aluminium uses far less energy than extracting it.
- To judge a source of information, check who wrote it, whether it could be biased, whether it is based on evidence, and how recent it is.

Key terms

Reactivity series	A list of metals in order of how reactive they are.
Displacement reaction	A more reactive metal taking the place of a less reactive metal in a compound.
Ore	A rock that contains enough metal to be worth extracting.
Reduction	Removing oxygen from a compound.
Electrolysis	Using electricity to break down a compound.
Potable water	Water that is safe to drink.
Desalination	Removing salt from sea water.
Alloy	A mixture of a metal with other elements, such as steel.
Polymer	A long-chain molecule; plastics are polymers.
Ceramic	A hard, brittle material such as pottery or glass.
Composite	A material made from two or more materials combined.
Life cycle assessment	An assessment of a product's environmental impact from start to finish.
Recycling	Processing used materials so they can be used again.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which of these metals is the most reactive?
2. What gas is made when a metal reacts with an acid?
3. What happens when magnesium is added to copper sulfate solution?
4. Why is gold found as the metal itself in the ground?

Your notes

5. How is iron extracted from iron oxide?
6. Why is aluminium extracted by electrolysis rather than with carbon?
7. What is potable water?
8. Why is chlorine added to drinking water?

Answers

1. Potassium
2. Hydrogen
3. Magnesium displaces the copper
4. It is very unreactive
5. By heating it with carbon (reduction)
6. It is more reactive than carbon
7. Water that is safe to drink
8. To kill microbes

What to do next

Practise 15 questions on this topic

Try 4 exam questions, with mark schemes

Read the lesson, one step at a time

Free revision for GCSE and KS3 at lycolearn.co.uk. Some notes are for one exam board only, and say so in brackets.

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