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What's the **BIG** idea?

100% Sheet Sustainability



Resources

The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.

Making water Safe to drink

- **Stage 1 - sedimentation** where some solid materials sink to the bottom.
- **Stage 2 – filtration** where the water passes through layers of sand and gravel to remove any remaining solid material.
- **Stage 3 – sterilisation** where **chlorine** or **ozone** is added to the water to kill any microbes. Water can also be sterilised by shining ultra-violet light through it.

Potable Water has low levels of dissolved substances in it but is safe to drink

Desalination is the process of removing salt from sea water by distillation through the process of **evaporation** and **condensation**.

Heat is used to boil the water where the steam rises and leaves the salt behind. The steam is cooled through a condenser which turns the gas back to liquid water

HIGHER ONLY - Alternative ways to extract metals from ores

Bioleaching

Use bacteria to feed on low grade copper ores and then extract the copper from them using electrolysis

Phytomining

Grow plants in soil containing low grade copper ore.

Burn the plants, treat with sulfuric acid and extract using electrolysis

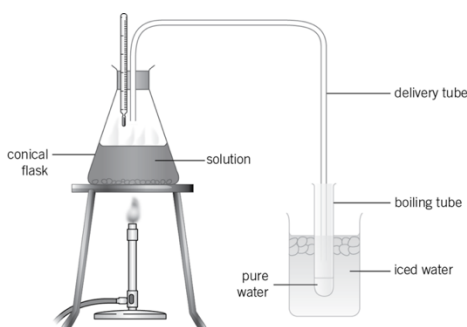
Advantages are both processes allow us to get metals from low grade ores or where other extraction methods are not possible.

Disadvantages are both are low yield and slow.

A life cycle assessment can be used to compare the environmental impact of a product at all stages of its lifecycle and has 5 stages that designers and producers should consider

- Extracting and processing raw materials
- Manufacturing and packaging
- Transport and distribution
- Use and operation during its lifetime
- Disposal at the end of its useful life

REMEMBER to talk about these points in any evaluation of the benefits of recycling metals or plastics.



Use the apparatus to purify water by **distillation**. Each component of the dirty water will **evaporate** at different temperatures. Use the thermometer to check the boiling points. Water will boil at **100°C**. Use this temperature to check for purity. You can also **check its pH** using Universal indicator solution or paper (pH 7 & green). The delivery tube and iced water act as a **condenser** to turn gas back to liquid.

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Supermarkets in the UK have been advised by the Government to stop giving plastic bags to customers. The Government states that this is because plastic bags use up resources that are not renewable and that the manufacture of plastic bags produces carbon dioxide. Most of these plastic bags are made from poly(ethene). The table shows methods to deal with large numbers of used plastic bags.

Method	Description of what happens to the plastic bag
Reused	used again by the customer
Recycled	collected, transported, washed and melted to make new plastic items
Burned	collected, transported and burnt to release heat energy
Dumped	mixed with other household waste, collected, transported and disposed of at a landfill site

Use the information and your knowledge and understanding to briefly give **one advantage and one disadvantage** for each of these methods

The table below shows the carbon dioxide emissions of four fuels used to generate electricity.

Fuel	Direct CO ₂ emissions in kg per MWh	Lifecycle CO ₂ emissions in kg per MWh
Coal	460	540
Natural gas	185	215
Oil	264	313
Wood	2 100	58

Direct CO₂ emissions are the amounts of carbon dioxide released when the fuel is burned.

Lifecycle CO₂ emissions is the total amount of carbon dioxide released during all stages from fuel extraction to when the fuel has been used.

Use the data from the table above AND YOUR KNOWLEDGE to explain why wood is considered to be a low carbon dioxide emitting fuel

Steel is an alloy of iron. Steel is used to make cars. After its useful life a car is taken to a scrapyards for recycling. Suggest **four** benefits of recycling a car body.

Describe how water in the United Kingdom is treated. Explain how this makes it safe to drink