

Section 1: Key Terms

Finite resource	A non-renewable resource used by humans that has a limited supply e.g. coal.
Renewable resources	A resource used by humans that can be replenished e.g. trees. If not managed correctly, the resource may decrease.
Potable water	Water that is safe to drink . Has low levels of dissolved salts and microbes .
Fresh water	Water that has low levels of dissolved salts . Rain water is an example of fresh water but sea water is not.
Pure water	Only contains water molecules , nothing else.
Desalination	A process that removes salt from sea water to create potable water. Expensive as it requires a lot of energy .
Sewage	Waste water produced by people . Contains potentially dangerous chemicals and large numbers of bacteria .
Reverse osmosis	Uses membranes to separate dissolved salts from salty water .
Natural resource	Natural resources have formed without human input , includes anything that comes from the earth, sea or air (e.g. cotton).
Synthetic resource	Synthetic resources are man made .

Section 2: Natural products that are supplemented or replaced by agricultural and synthetic products

Natural resources	Use	Alternative synthetic product
Wool	Clothing, carpets	Acrylic fibre, polypropene
Cotton	Clothing, textiles	Polyester
Silk	Clothing	Nylon
Wood	Construction	PVC, composites.

Section 3: Finite and renewable resources

Finite resources	Renewable resources
Metal ores	Trees
Crude oil	Fresh water
Limestone	Food

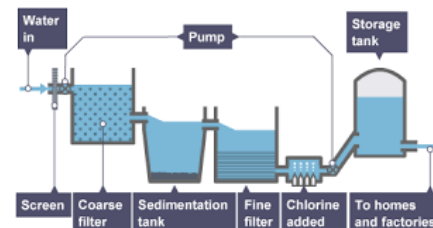
Section 4: Water safe to drink

Section 4a: Potable water

Providing people with potable water (fresh water) is a major issue around the world. The way that potable water is **produced** depends on **where you are**.

Obtaining potable water in countries with plentiful fresh water e.g. the UK

- Find a suitable source of fresh water (e.g. **lakes, reservoirs, rivers or groundwater aquifers**).
- Filtration**: Pass through **filter beds to remove large particles** (leaves, twigs etc).
- Sterilise** to kill microbes (bacteria) e.g. by using **chlorine, ozone** or **ultraviolet light**.



Obtaining potable water in countries with limited fresh water

In **dry countries** (e.g. Spain, Kuwait) there's **not enough surface or ground water**, so **seawater** must be treated by **desalination**. Two processes can be used, **distillation** or **reverse osmosis**. Both processes **needs lots of energy** so are **very expensive**.

Distillation:

- Water is heated to **100°C**.
- It **evaporates**, leaving the salt behind.
- A **condenser cools** the water to return it to the liquid state.

Reverse osmosis:

- Pressure** is applied to the water.
- The **water molecules** move through the **partially-permeable membrane**.
- Other particles are too large** and are not able to move through.



Section 4b: Sewage Treatment

Sewage treatment requires more processes than **desalination** but **uses less energy** so could be used as an alternative in areas with little fresh water.

Screening	Removes rags, paper, plastics and grit that may block pipes.
Sedimentation	Allowed to stand in a sedimentation tank so that suspended particles settle out of the water and fall to the bottom of a sedimentation tank to form the sewage sludge . Lighter effluent floats on top.
Aerobic digestion of effluent	Effluent separated and air pumped through encouraging aerobic bacteria to break down any organic matter including other microbes.
Anaerobic digestion of sewage sludge	Bacteria digest the sludge in the absence of oxygen . This breaks it down. Methane and carbon dioxide are produced by the bacteria.
Sterilisation	If the river is a sensitive ecosystem, then the water is filtered one more time and sterilised by UV light or by chlorine .

Section 5: More Key Terms

Aerobic	With oxygen
Anaerobic	Without oxygen
Sustainable development	Using resources to meet the needs of people today without preventing people in the future from meeting theirs.
Life cycle assessment	A life cycle assessment looks at every stage of a product's life to assess the impact it would have on the environment.
Subjective judgement	Judgement based on a person's opinion and/or values.
Phytomining	Plants are used to absorb metal compounds from the soil as part of the metal's extraction.
Bioleaching	Use of bacterial to convert metal compounds in ores into soluble metal compounds which can then be extracted.
Leachate	A solution produced from bioleaching.

Section 6: Alternative Methods of Metal Extraction (HT)

The Earth's resources of metal ores are limited. Copper ores are becoming scarce and new ways of **extracting copper** from **low-grade ores** include **phytomining**, and **bioleaching**. These methods avoid traditional mining methods of digging, moving and disposing of large amounts of rock.

Bioleaching	Phytomining
Bacteria grow on low-grade copper ores . They produce a leachate (liquid) that contains soluble copper compounds .	Plants are grown on low-grade copper ores . The plants absorb the copper and are then burned . The ash contains soluble copper compounds .

The **soluble copper compounds** produced in both methods above can then be extracted by **electrolysis** or **displacement using scrap iron** (as Iron is more reactive than copper).

Section 7: Life Cycle Assessments LCA

Life Cycle Assessment	Life cycle assessments assess the environmental impact of products . A LCA assesses the use of water, resources, energy sources and production of some wastes during the following stages: <ul style="list-style-type: none"> • extracting and processing raw materials • manufacturing and packaging • use and operation during its lifetime • disposal at the end of its useful life (recycling, landfill or incineration) including transport & distribution at each stage. However assigning numerical values to the relative effects of pollutants involves subjective judgements and LCA can be biased as they can be written to give them deliberate positive advertising.
Reuse	The environmental impact of products can be reduced by reusing the product. E.g. glass bottles can be crushed and melted to produce different glass products.
Recycling	Some materials can be recycled e.g. metals. Metals can be recycled by melting and recasting or reforming into different products . Recycling uses less energy than mining and extracting.