

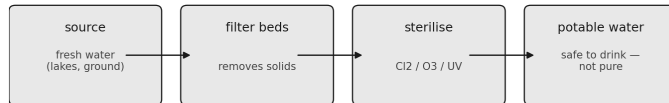
Exercise walk-through

10.3

Using materials – corrosion and alloys, chemistry only (4.10.3.1–4.10.3.2)

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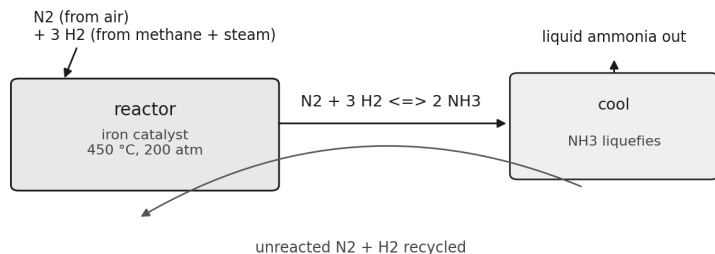
Potable water



desalination alternative: distillation or reverse osmosis — high energy cost

- Potable — safe to drink, but not pure.
- UK — source, filter beds, sterilise with chlorine, ozone or UV.
- Desalination where fresh water runs short — at an energy price.

The Haber process



- N₂ from air + H₂ from methane and steam — over iron, 450 °C, 200 atm.
- Ammonia liquefies out; unreacted gases recycle.
- (HT) every condition is a compromise of rate, yield and cost.

Exercises 2.1·2.3

2.1 What two substances does iron need to rust? [2]

2.2 Give the composition of brass. [1]

2.3 What two components make a composite? [2]

Exercises 2.1·2.3

2.1 What two substances does iron need to rust? [2]

2.1 Oxygen (or air) and water.

2.2 Give the composition of brass. [1]

2.2 Copper and zinc.

2.3 What two components make a composite? [2]

2.3 A matrix/binder surrounding a reinforcement of fibres or fragments.

Exercises 3.1·3.3

3.1 Explain why stainless steel is chosen for cutlery, using its composition. [3]

3.2 An 18-carat gold ring weighs 12 g. Calculate the mass of gold present. [2]

3.3 Explain the difference between thermosoftening and thermosetting polymers in structure and behaviour. [4]

Exercises 3.1·3.3

3.1 Explain why stainless steel is chosen for cutlery, using its composition. [3]

3.1 Stainless steel contains iron with chromium and nickel; the alloying elements make it hard and resistant to corrosion – it survives washing and contact with food acids.

3.2 An 18-carat gold ring weighs 12 g. Calculate the mass of gold present. [2]

3.2 $18 \text{ carat} = 75 \% \text{ gold}$; $0.75 \times 12 = 9 \text{ g}$.

3.3 Explain the difference between thermosoftening and thermosetting polymers in structure and behaviour. [4]

3.3 Thermosoftening polymers have separate chains with no cross-links; on heating the intermolecular forces weaken and the polymer melts – it can be remoulded and recycled. Thermosetting polymers have strong covalent cross-links between chains; these do not break on heating, so the polymer chars rather than melts.