

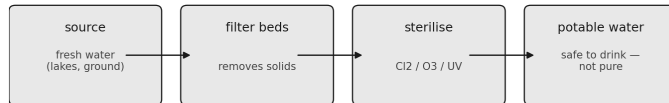
Exercise walk-through

10.2

Life cycle assessment and recycling (4.10.2.1–4.10.2.2)

AQA · GCSE · Chemistry

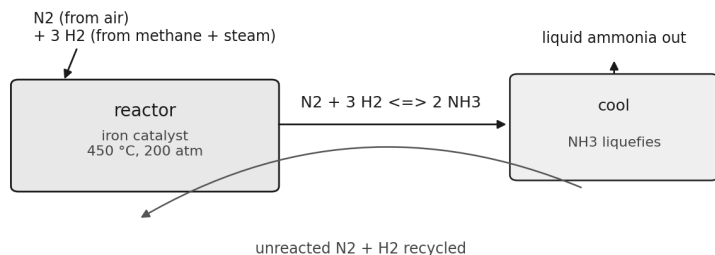
Potable water



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 List the four stages of a life cycle assessment. [4]

2.2 Why are LCA results for pollutant effects less objective than energy figures? [1]

2.3 Give one example of reuse (not recycling). [1]

Exercises 2.1·2.3

2.1 List the four stages of a life cycle assessment. [4]

2.1 Raw material extraction and processing; manufacturing and packaging; use and operation; disposal at end of life.

2.2 Why are LCA results for pollutant effects less objective than energy figures? [1]

2.2 Allocating numbers to pollutant effects requires value judgements.

2.3 Give one example of reuse (not recycling). [1]

2.3 Refilling/returning glass bottles for the same use.

Exercises 3.1-3.3

3.1 Explain why recycling aluminium is worthwhile even though collecting it costs energy. [4]

3.2 A manufacturer claims its bags are green, citing an LCA of the disposal stage only. Evaluate the claim. [3]

3.3 Compare reuse and recycling for glass bottles, giving one benefit of each. [4]

Exercises 3.1·3.3

3.1 Explain why recycling aluminium is worthwhile even though collecting it costs energy. [4]

3.1 Aluminium extraction from ore is extremely energy-intensive – electrolysis of molten alumina; recycling needs only remelting, a fraction of that energy; so overall energy and CO₂ fall despite collection and transport; and less bauxite quarrying – less environmental damage.

3.2 A manufacturer claims its bags are green, citing an LCA of the disposal stage only. Evaluate the claim. [3]

3.2 A single-stage LCA is selective/abbreviated; it omits manufacture, raw materials and use, where the burdens may differ greatly; selective LCAs can be misused to support pre-determined advertising conclusions, so the claim is unjustified as stated.

3.3 Compare reuse and recycling for glass bottles, giving one benefit of each. [4]

3.3 Reuse – washing and refilling bottles avoids the energy of remelting and keeps the original product whole; recycling – crushed glass (cullet) melts at a lower temperature than raw materials, saving energy, and copes with bottles that break or are not returnable.