

## Chemguide – answers

### EXTRACTION OF METALS: ALUMINIUM

- At ordinary pressures the sodium hydroxide solution would boil at a temperature of a bit more than 100°C (dissolving something in water increases its boiling point a bit). The increased pressure keeps the sodium hydroxide solution liquid at the higher temperature needed.
  - $$\text{Al}_2\text{O}_3 + 2\text{NaOH} + 3\text{H}_2\text{O} \longrightarrow 2\text{NaAl(OH)}_4$$
  - They remain as solids, either because they don't react with the sodium hydroxide solution, or because they form insoluble compounds.
  - It is cooled and seeded with some previously made aluminium hydroxide. This causes new aluminium hydroxide to precipitate out. The precipitate is heated strongly to convert it into aluminium hydroxide.
  - Because of the presence of iron(III) oxide which is red (or reddish-brown).
- A solution of aluminium oxide in molten cryolite.
  - Carbon
  - Carbon (plus the aluminium which is formed during the process)
  - The very high current used during the process
  - Cathode
  - Oxygen is released and reacts with the carbon anodes, burning them away.
  - The important two are the huge amount of electricity needed and the need to keep replacing the anodes as they burn away.
- Any two from the Chemguide page (or alternatives that you know in the same amount of detail).
- The aluminium is made the anode in the electrolysis of dilute sulphuric acid. The oxygen released at the anode reacts with the surface to build up a thicker layer of aluminium oxide.
  - It is more corrosion resistant than untreated aluminium, and during the anodising process the layer is porous enough to take up dyes, which means that you can build a coloured layer into the surface of the aluminium.