Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

- **decomposition** of an ionic compound
- when **molten or in aqueous solution**, by passing an **electric current**

2.2

- cathode (−): **zinc**
- anode (+): **chlorine**

2.3

- **hydrogen** at the cathode and **oxygen** at the anode
- volume ratio hydrogen : oxygen = 2 : 1

2.4

- $Al^{3+} + 3e^- \rightarrow Al$

2.5

- the spoon is the **cathode** (−)
- **silver nitrate** solution (contains Ag^+ ions)

3.1

C

- copper is deposited on the cathode; the anode dissolves, so Cu^{2+} is replaced and the colour stays

3.2

B

- sodium is more reactive than hydrogen, so hydrogen forms; the chloride is concentrated, so chlorine forms

3.3

(a) **electrolysis**

(b)

- $2Br^- \rightarrow Br_2 + 2e^-$

(c)

- negative electrode: **hydrogen**; **bubbles**
- positive electrode: **oxygen** (the bromide is dilute); **bubbles**

3.4

(a)

- **copper**
- a **pink-brown solid** coats the cathode

(b)

- **oxygen**
- $4OH^- \rightarrow O_2 + 2H_2O + 4e^-$

(c)

- the blue colour **fades**
- Cu^{2+} ions are removed from the solution as copper

(d)

- the anode **dissolves** (gets smaller): $Cu \rightarrow Cu^{2+} + 2e^-$
- the blue colour **stays the same**, because Cu^{2+} ions are replaced as fast as they are removed

(e) only **copper** moves from the impure anode to the cathode; impurities fall away, so pure copper builds up