Solutions

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

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

2.1

- **gain of oxygen**
- **loss of electrons**

2.2

- **CO is oxidised**: it gains oxygen
- **Fe_2O_3 is reduced**: it loses oxygen

2.3

- S in SO_2: $x + 2(-2) = 0$, so $+4$
- Fe in $FeCl_3$: $x + 3(-1) = 0$, so $+3$

2.4

- potassium manganate(VII): **purple to colourless**
- potassium iodide: **colourless to brown** (iodine forms)

3.1

A

- Mg loses two electrons to become Mg^{2+}; sulfate is a spectator

3.2

A

- chlorine gains electrons ($0 \to -1$), so it is reduced and is the oxidising agent

3.3

(a)

- $Mg(s) + 2Ag^+(aq) \to Mg^{2+}(aq) + 2Ag(s)$

(b)

- $Mg \to Mg^{2+} + 2e^-$
- $Ag^+ + e^- \to Ag$

(c)

- **Ag^+** is reduced
- each ion **gains an electron**

(d) **magnesium**

3.4

(a) iron has an **oxidation number of** $+2$ (Fe^{2+} ions)

(b)

- the **purple** colour
- turns **colourless** as it reacts

(c)

- $Fe^{2+} \to Fe^{3+} + e^-$
- **oxidised**: it loses an electron

(d) it is the **oxidising agent**

(e)

- formulae $FeCl_2$, Cl_2, $FeCl_3$
- $2FeCl_2 + Cl_2 \to 2FeCl_3$

(f)

- chlorine in Cl_2 is 0; in $FeCl_3$ it is -1
- the oxidation number **decreases**, so chlorine is reduced