Solutions

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

2.1

- oxidising power decreases down the group; the larger atoms attract an extra electron less strongly

2.2

- $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

2.3

- colourless to **brown** (iodine is formed)

2.4

- **purple** fumes (of iodine vapour) appear

3.1 A

- Chlorine is the strongest oxidising agent

3.2 C

- HI is the least thermally stable (weakest H–X bond)

3.3

(a)

- no; bromine is a weaker oxidising agent than chlorine, so it cannot displace chloride

(b)

- the H–I bond is longer and weaker than H–Cl, so HI decomposes more easily on heating

3.4

- down the group the atoms get larger with more shielding, so they attract an extra electron less strongly – weaker oxidising agents

3.5

(a)

- the reaction becomes less vigorous: explosive with fluorine, slow and reversible with iodine even when heated

(b)

- $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$
- the H–I bond is weak, so HI decomposes back into hydrogen and iodine, and an equilibrium forms

3.6

- $Br_2 + 2I^- \rightarrow 2Br^- + I_2$
- bromine, Br_2, is the oxidising agent