Solutions

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

2.1

- red-brown / orange-brown; liquid

2.2

- volatility decreases down the group

2.3

- **purple** (violet)

2.4

- a **solid**

3.1 B

- Iodine has more electrons, so stronger id–id forces between molecules

3.2 B

- Subliming breaks the intermolecular (id–id) forces, not the covalent bond

3.3

- down the group the molecules have more electrons; so the instantaneous dipole–induced dipole forces are stronger; more energy is needed to separate the molecules, so the boiling point rises

3.4

- the I_2 atoms are larger, so the shared bonding electrons are further from the nuclei; the weaker attraction gives a lower bond energy

3.5

(a)

- the halogen atom gets larger down the group, so the bonding pair is further from its nucleus
- with more shielding, so the attraction to the bonding pair is weaker and the bond is weaker

(b)

- the H–I bond is weak enough to be broken by the heat of the wire, but the H–Cl bond is too strong

3.6

- fluorine molecules have fewer electrons than chlorine molecules

- so the instantaneous dipole–induced dipole (London) forces between them are weaker, and less energy is needed to separate them