Solutions

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

2.1

- particles spread because they move randomly
- **spreading from high concentration to low concentration**

2.2

- particles in a solid **cannot move from place to place** (they only vibrate)

2.3

- it **increases**: the particles move faster

2.4

- **oxygen**: it has the lower M_r

3.1 B

- the gas with the **smaller** M_r diffuses faster
- compare relative molecular mass at the same temperature; molecular size alone is not a reliable rule

3.2

(a)

- ammonia is lighter ($M_r = 17$ vs 36.5), so it **diffuses faster and travels further**
- the ring forms **nearer the hydrogen chloride end**

(b)

- the white solid is **ammonium chloride**, NH_4Cl

3.3

- perfume particles move **randomly in all directions**
- they **diffuse** and mix with the air until they reach your nose

3.4

(a)

- **diffusion**

(b)

- the particles of water and of the dissolved crystal move randomly
- so there is a net movement of the purple particles from where they are more concentrated to where they are less concentrated

(c)

- gas particles move faster and have more space between them

3.5

- **hydrogen** travels further
- it has a much lower M_r, so its molecules move faster at the same temperature