

1.2 Diffusion

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS diffusion 扩散 • relative molecular mass 相对分子质量 • rate 速率 • particles 粒子
• mass 质量

Objective

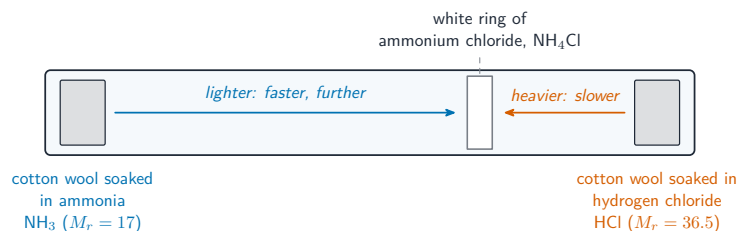
Build the skills to answer exam questions on **diffusion** 扩散 — what it is, why it happens, and how the **rate** depends on **relative molecular mass** 相对分子质量.

You must be able to:

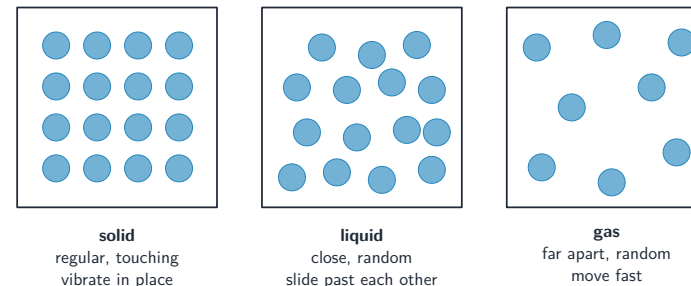
- describe diffusion as spreading from high to low concentration
- explain diffusion using the random motion of particles
- explain why lighter molecules diffuse faster (the NH_3/HCl experiment)

1 Worked examples

■ The NH_3/HCl experiment



Ammonia ($M_r = 17$) is lighter, so it diffuses faster and further; the ring forms nearer HCl



Diffusion is the random movement of particles

- diffusion:** particles spread from high to low concentration because they move randomly.
- happens in gases and liquids, **not** solids (particles can't move from place to place).
- lighter molecules (smaller M_r) diffuse **faster**.

2 Practice

2.1 Define diffusion. [1]

2.2 State why diffusion does not occur in solids. [1]

3 Exam-style questions

3.1 Two gases diffuse along a tube. The one that travels faster has the: [1]

- A larger relative molecular mass
- B smaller relative molecular mass
- C higher density
- D larger molecules

3.2 In the experiment, ammonia ($M_r = 17$) and hydrogen chloride ($M_r = 36.5$) diffuse from opposite ends of a tube and form a white ring.

(a) State, with a reason, at which end the white ring forms nearer. [2]

(b) Name the white solid formed. [1]

3.3 Explain, in terms of particles, why you can smell perfume from across a room. [2]

Solutions

2.1 the spreading of particles from a region of high concentration to a region of low concentration.

2.2 the particles in a solid cannot move from place to place (only vibrate).

3.1 B. The gas with the smaller relative molecular mass diffuses faster.

3.2 (a) nearer the hydrogen chloride end; because ammonia is lighter, so it diffuses faster and travels further.

(b) ammonium chloride (NH_4Cl).

3.3 the perfume particles move randomly in all directions; they diffuse and mix with the air until they reach your nose.