

Diffusion, Brownian Motion, Solids/Liquids/Gases

Question Paper 2

Level	IGCSE
Subject	Chemistry (0620/0971)
Exam Board	Cambridge International Examinations (CIE)
Topic	The particulate nature of matter
Sub-Topic	Diffusion, Brownian Motion, Solids/Liquids/ Gases
Booklet	Question Paper 2

Time Allowed: 18 minutes

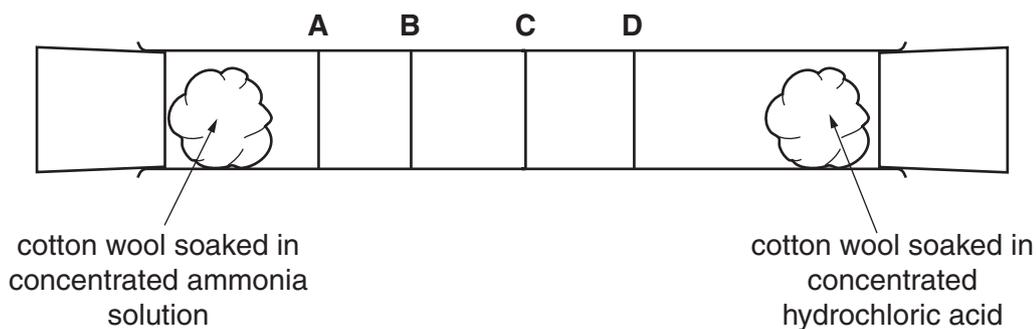
Score: /15

Percentage: /100

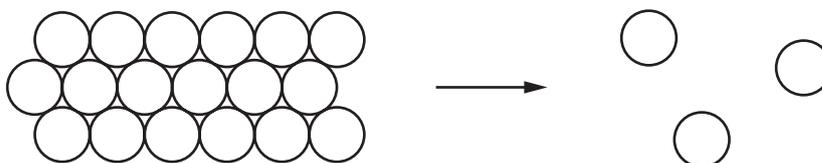
Grade Boundaries:

9	8	7	6	5	4	3	2	1
>85%	75%	68%	60%	53%	48%	40%	33%	<25%

- 1 The diagram shows the diffusion of hydrogen chloride and ammonia in a glass tube. The gases are given off by the solutions at each end of the tube. When hydrogen chloride and ammonia mix they produce a white solid, ammonium chloride. Which line shows where the white solid is formed?



- 2 The diagram shows how the arrangement of particles changes when a substance changes state.



Which change of state is shown?

- A boiling
- B condensation
- C evaporation
- D sublimation

3 Propanone, C_3H_6O , is a liquid at room temperature.

What is the boiling point of pure propanone?

- A $-61\text{ }^\circ\text{C}$ to $-51\text{ }^\circ\text{C}$
- B $-56\text{ }^\circ\text{C}$
- C $51\text{ }^\circ\text{C}$ to $61\text{ }^\circ\text{C}$
- D $56\text{ }^\circ\text{C}$

4 The melting points and boiling points of four elements are shown.

element	melting point/ $^\circ\text{C}$	boiling point/ $^\circ\text{C}$
W	-7	60
X	-101	-34
Y	114	184
Z	39	688

In which elements do the particles vibrate about fixed positions at $0\text{ }^\circ\text{C}$?

- A W and X
- B W and Z
- C X and Y
- D Y and Z

5 Substance Q boils at 445 °C and is a yellow solid at room temperature.

Which temperature could be the melting point of pure Q?

- A** -9 °C
- B** 72 °C to 78 °C
- C** 116 °C
- D** 116 °C to 126 °C

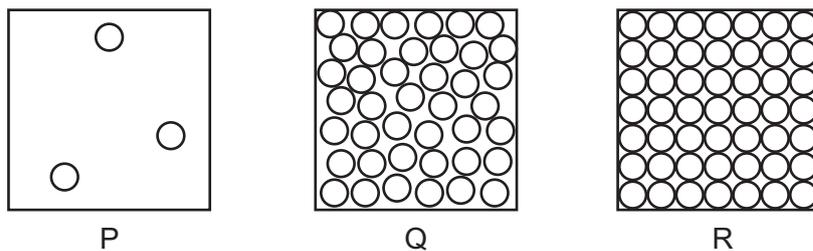
6 Which statement about liquids and gases is correct?

- A** 1 cm³ of gas contains more particles than 1 cm³ of liquid.
- B** A given mass of liquid has a fixed volume at room temperature.
- C** Particles in a liquid can easily be forced closer together.
- D** Particles in a liquid have fixed positions.

7 Which process causes the greatest increase in the distance between particles?

- A** condensation
- B** freezing
- C** melting
- D** sublimation

8 The diagram shows the arrangement of particles in the three states of matter.



Solid carbon dioxide (dry ice) sublimates to gaseous carbon dioxide.

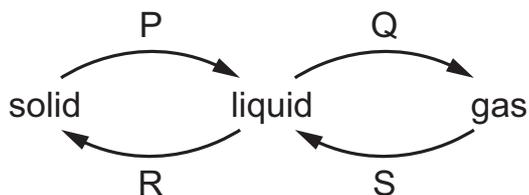
Which row describes the initial and final states?

	initial state	final state
A	P	R
B	Q	P
C	R	P
D	R	Q

9 Which statement describes sublimation?

- A** Particles moving slowly past each other speed up and move further apart.
- B** Particles vibrating next to each other become mobile and move slowly past each other.
- C** Particles vibrating next to each other start to move rapidly and move further apart.
- D** Rapidly moving particles slow down and move closer together.

10 The diagram shows some changes of state.



Which words describe the changes of state, P, Q, R and S?

	P	Q	R	S
A	freezing	boiling	melting	evaporation
B	melting	evaporation	freezing	condensation
C	melting	sublimation	freezing	evaporation
D	sublimation	evaporation	melting	condensation

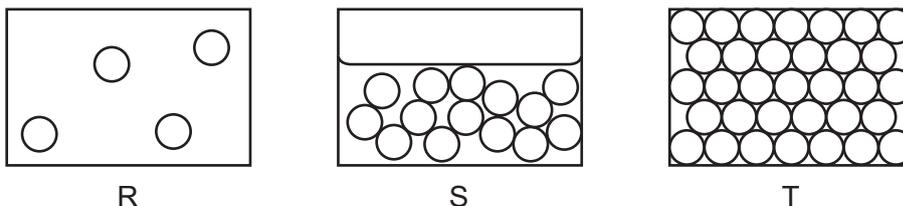
11 Four statements about the arrangement of particles are given.

- 1 Particles are packed in a regular arrangement.
- 2 Particles are randomly arranged.
- 3 Particles move over each other.
- 4 Particles vibrate about fixed points.

Which statements describe the particles in a solid?

- A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

12 Diagrams R, S and T represent the three states of matter.

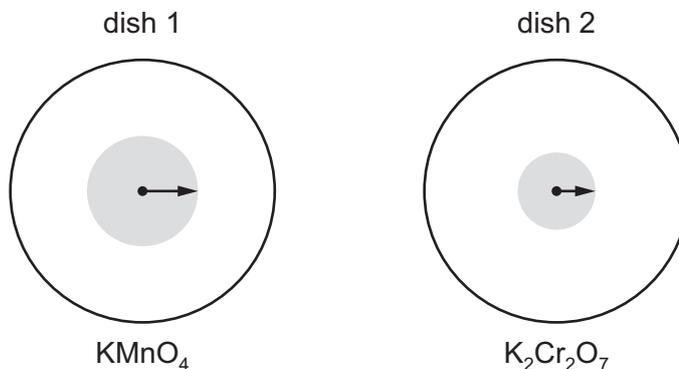


Which change occurs during freezing?

- A** R → S **B** S → T **C** T → R **D** T → S

- 13 Small crystals of purple KMnO_4 ($M_r = 158$) and orange $\text{K}_2\text{Cr}_2\text{O}_7$ ($M_r = 294$) were placed at the centres of separate petri dishes filled with agar jelly. They were left to stand under the same physical conditions.

After some time, the colour of each substance had spread out as shown.



The lengths of the arrows indicate the relative distances travelled by particles of each substance.

Which statement is correct?

- A Diffusion is faster in dish 1 because the mass of the particles is greater.
 - B Diffusion is faster in dish 2 because the mass of the particles is greater.
 - C Diffusion is slower in dish 1 because the mass of the particles is smaller.
 - D Diffusion is slower in dish 2 because the mass of the particles is greater.
- 14 A bottle of aqueous ammonia is placed on a table in a corner of the laboratory.

The stopper is removed and after a few minutes all the students in the room can smell the ammonia.

Which process occurs?

- A Brownian motion
- B diffusion
- C dissolving
- D distillation

15 A gas is released at point Q in the apparatus shown.



Which gas changes the colour of the damp Universal Indicator paper most quickly?

	gas	relative molecular mass
A	ammonia	17
B	carbon dioxide	44
C	chlorine	71
D	hydrogen	2