

Diffusion, Brownian Motion, Solids/Liquids/Gases

Question Paper 1

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 1

Time Allowed: 33 minutes

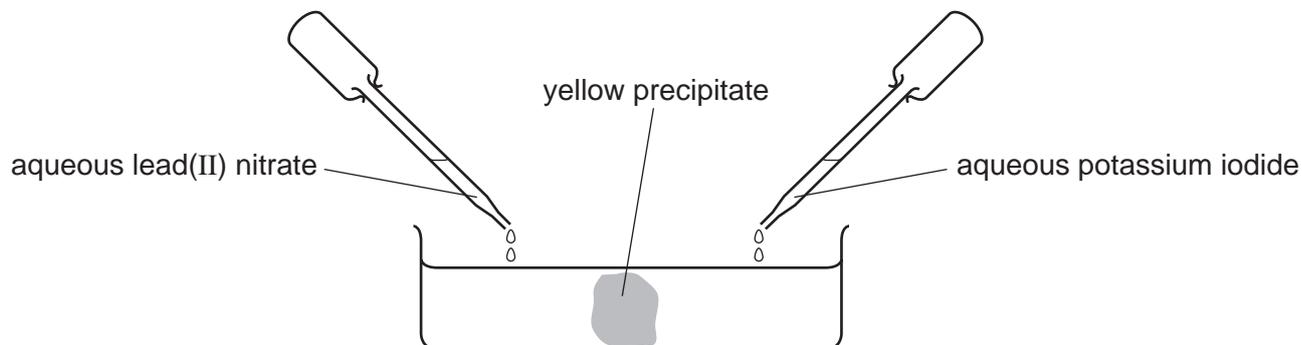
Score: /27

Percentage: /100

Grade Boundaries:

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

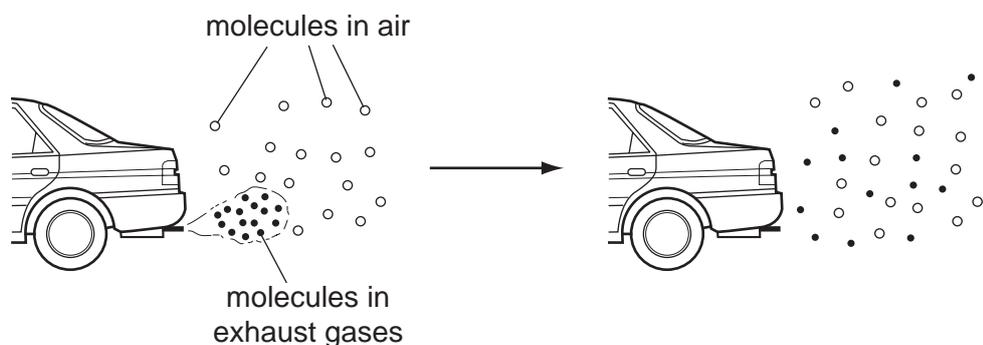
1. Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.



A yellow precipitate forms after a few minutes.

Which process occurs before the precipitate forms?

- A diffusion
 - B distillation
 - C fermentation
 - D filtration
- 2 The diagram shows how the molecules in the exhaust gases diffuse into the air.



Which statement describes what happens to these molecules next?

- A The molecules fall to the ground because they are heavier than air molecules.
- B The molecules go back together as they cool.
- C The molecules spread further into the air.
- D The molecules stay where they are.

3 In which changes do the particles move further apart?



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

4 The diagram shows a cup of tea.



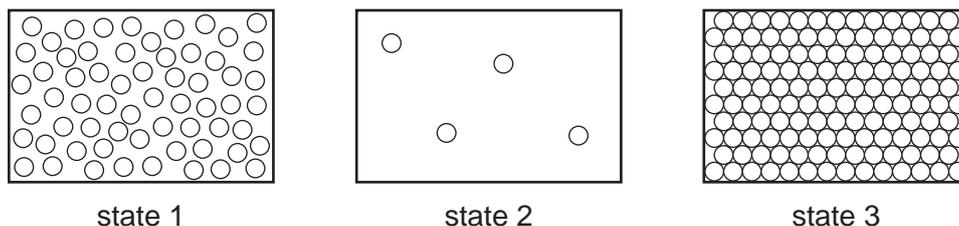
Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	moving faster	closer together
A	✓	✓
B	✓	x
C	x	✓
D	x	x

5 In which substance are the particles close together and slowly moving past each other?

- A** air
B ice
C steam
D water

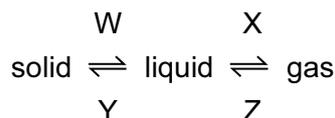
6 The diagrams show the arrangement of particles in three different physical states of substance X.



Which statement about the physical states of substance X is correct?

- A Particles in state 1 vibrate about fixed positions.
- B State 1 changes to state 2 by diffusion.
- C State 2 changes directly to state 3 by condensation.
- D The substance in stage 3 has a fixed volume.

7 What are the processes W, X, Y and Z in the following diagram?



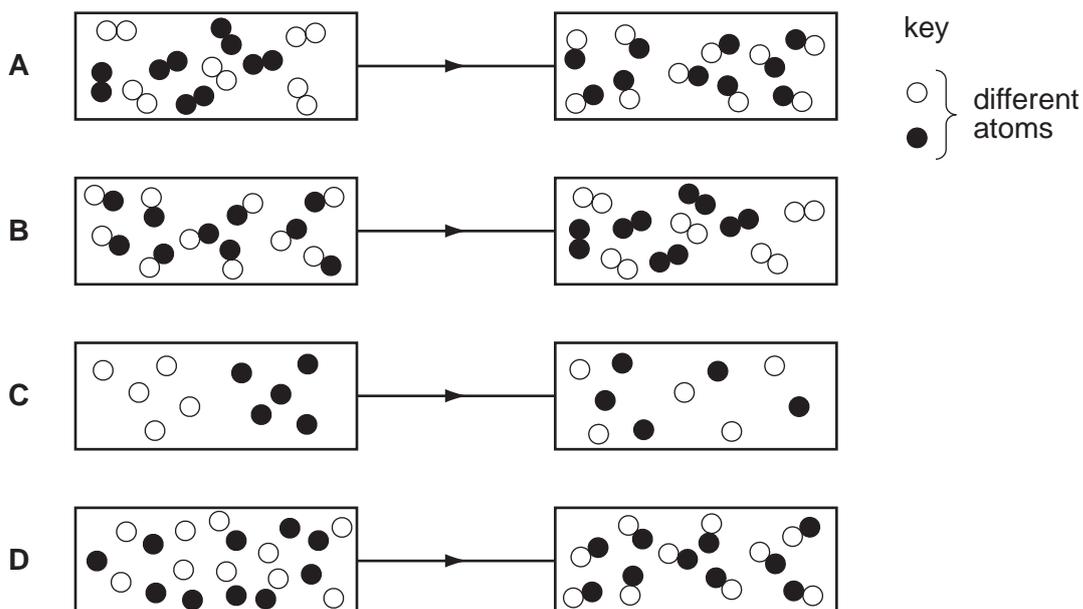
	W	X	Y	Z
A	condensing	boiling	freezing	melting
B	condensing	freezing	melting	boiling
C	melting	boiling	freezing	condensing
D	melting	freezing	condensing	boiling

8 'Particles moving **very slowly** from an area of high concentration to an area of low concentration.'

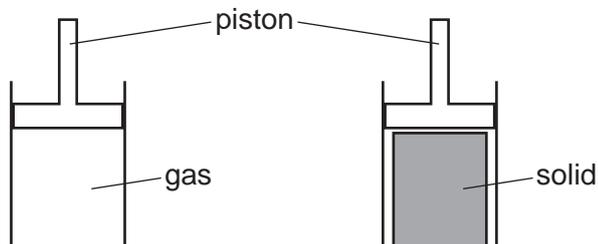
Which process is being described above?

- A a liquid being frozen
- B a solid melting
- C a substance diffusing through a liquid
- D a substance diffusing through the air

9 Which diagram shows the process of diffusion?



10 An attempt was made to compress a gas and a solid using the apparatus shown.

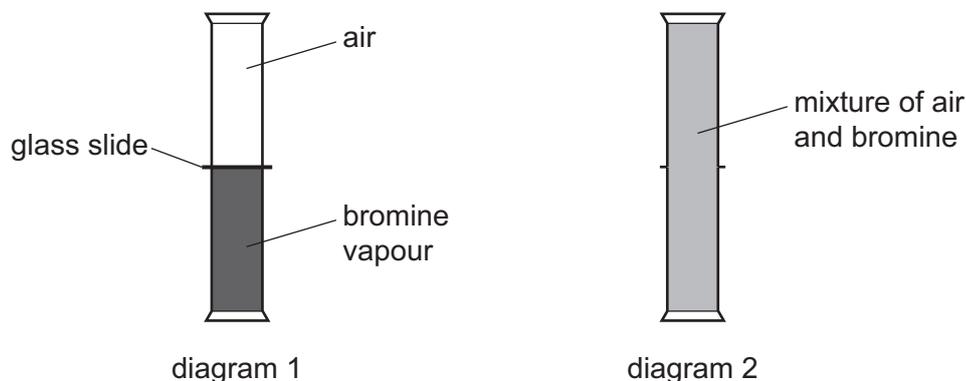


Which substance would be compressed and what is the reason for this?

	substance	reason
A	gas	the gas particles are close together
B	gas	the gas particles are far apart
C	solid	the solid particles are close together
D	solid	the solid particles are far apart

- 11 A gas jar of bromine vapour and a gas jar of air are set up as shown in diagram 1.

The glass slide is removed. Diagram 2 shows the appearance of the gas jars after one hour.



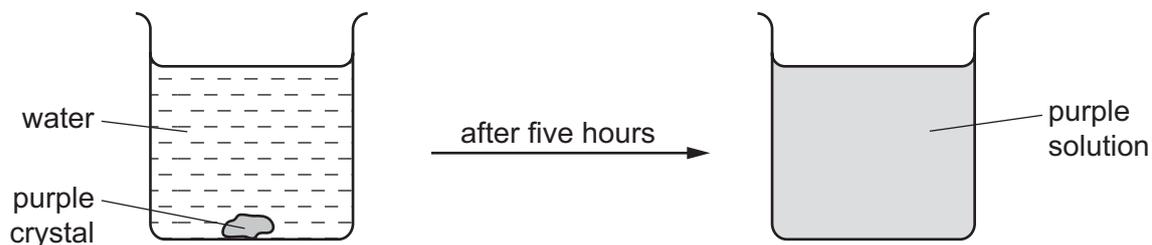
Which statement explains why the bromine and air mix together?

- A Bromine is denser than air.
 - B Bromine is lighter than air.
 - C Bromine molecules moved upwards and molecules in air moved downwards.
 - D Molecules in bromine and air moved randomly.
- 12 Which statement is an example of diffusion?
- A A kitchen towel soaks up some spilt milk.
 - B Ice cream melts in a warm room.
 - C Pollen from flowers is blown by the wind.
 - D The smell of cooking spreads through a house.
- 13 A few drops of perfume were spilt on the floor. A few minutes later the perfume could be smelt a few metres away.

Which two processes had taken place?

- A distillation and condensation
- B distillation and diffusion
- C evaporation and condensation
- D evaporation and diffusion

14 The diagram shows the result of dropping a purple crystal into water.

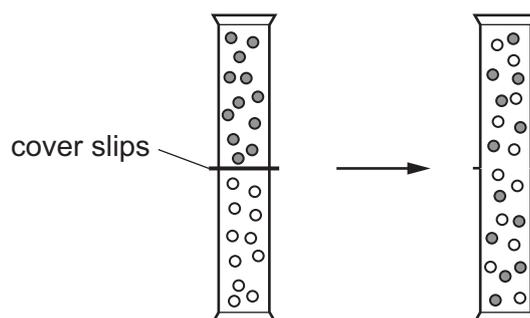


Which processes take place in this experiment?

	chemical reaction	diffusing	dissolving
A	✓	✓	✓
B	✓	x	✓
C	x	x	✓
D	x	✓	✓

15 Two gas jars each contain a different gas. The gas jars are connected and the cover slips are removed.

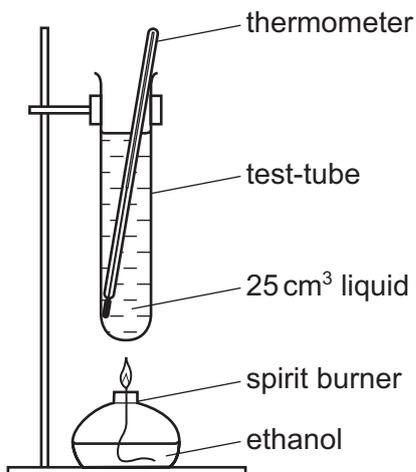
The diagram shows what happens to the particles of the gases.



Which process has occurred?

- A** chemical reaction
- B** condensation
- C** diffusion
- D** evaporation

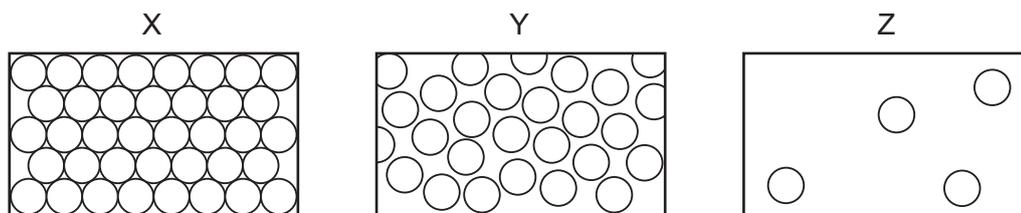
16 A liquid is heated until it boils.



Which result shows that the liquid in the test-tube is pure water?

- A Condensation forms at the top of the test-tube.
- B Steam is produced.
- C The thermometer reads 100°C .
- D There is nothing left behind in the test-tube.

17 Diagrams X, Y and Z represent the three states of matter.

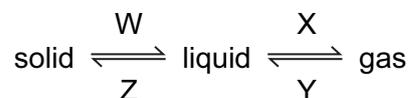


Which change occurs during boiling?

- A X to Y
- B Y to Z
- C Z to X
- D Z to Y

- 18 Which change of state takes place during evaporation?
- A gas to liquid
 - B liquid to gas
 - C liquid to solid
 - D solid to gas
- 19 In which process do particles move closer together but remain in motion?
- A condensation
 - B diffusion
 - C evaporation
 - D freezing

20 The changes that occur when a substance changes state are shown below.

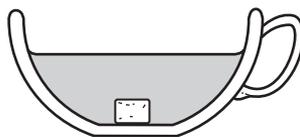


Which process, W, X, Y or Z, is occurring in the following four situations?

- 1 Butter melts on a warm day.
- 2 Water condenses on a cold surface.
- 3 The volume of liquid ethanol in an open beaker reduces.
- 4 Ice forms inside a freezer.

	1	2	3	4
A	W	X	Y	Z
B	W	Y	X	Z
C	X	Y	Z	W
D	X	Z	Y	W

- 21 The diagram shows a sugar lump in a cup of tea.



Which two processes must happen to spread the sugar evenly in the tea?

	first process	second process
A	diffusion	dissolving
B	dissolving	diffusion
C	dissolving	melting
D	melting	diffusion

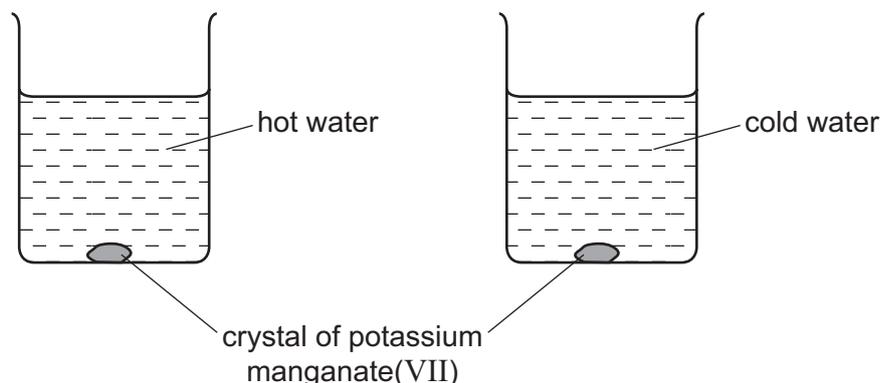
- 22 A sugar cube is dropped into a hot cup of tea.

The tea is not stirred.

Which statement explains why the tea becomes sweet?

- A** The heated water molecules penetrate the sugar cube.
- B** The hot tea causes the sugar to melt.
- C** The sugar cube dissolves and its molecules diffuse.
- D** The sugar molecules get hot and evaporate.

- 23 A crystal of purple potassium manganate(VII) was added to each of the beakers shown in the diagram.



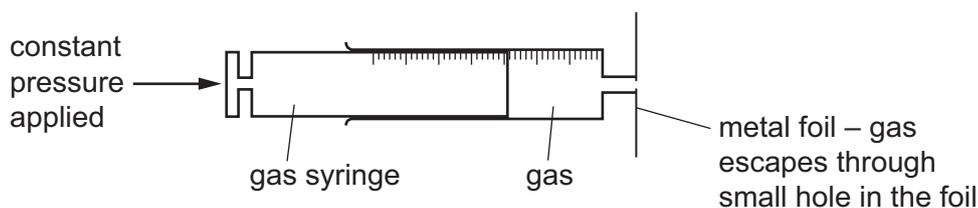
One beaker contained hot water and the other beaker contained cold water.

In both beakers the purple colour of the potassium manganate(VII) spreads out.

Which result and explanation are correct?

	result	explanation
A	colour spreads faster in cold water	particles move faster at a higher temperature
B	colour spreads faster in cold water	particles move slower at a higher temperature
C	colour spreads faster in hot water	particles move faster at a higher temperature
D	colour spreads faster in hot water	particles move slower at a higher temperature

- 24 The rate of diffusion of two gases, methane, CH_4 , and ethene, C_2H_4 , is measured using the apparatus shown.



Which gas diffuses faster and why?

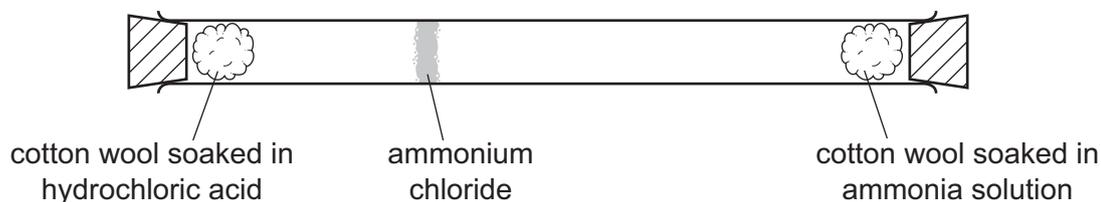
	gas that diffuses faster	reason
A	ethene	Ethene molecules are heavier and so move faster.
B	ethene	Ethene molecules have a double bond which makes them more reactive.
C	methane	Methane molecules are lighter and so move faster.
D	methane	Methane molecules are smaller so they can get out of the small hole more easily.

- 25 The particles of a substance gain energy and change from a regular ordered structure to a disordered structure with large distances between the particles.

Which change of state is described?

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

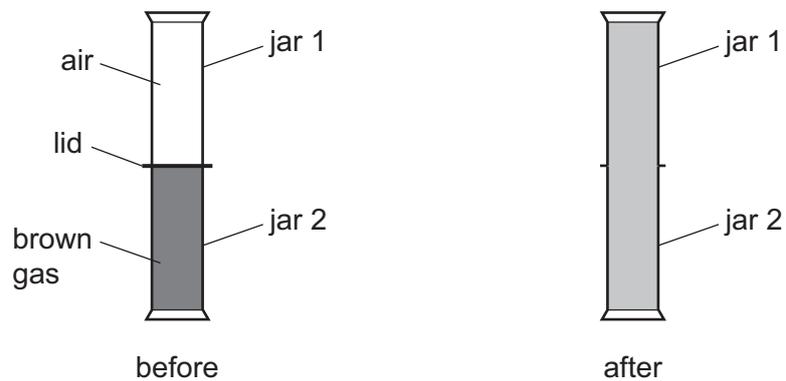
- 26 The diagram shows an experiment to demonstrate diffusion.



Which statement explains why the ring of ammonium chloride appears as shown?

- A Ammonia solution only produces a gas which moves until it meets the hydrochloric acid.
- B Both solutions produce a gas, but ammonia moves quicker than hydrogen chloride because it is lighter.
- C Hydrochloric acid produces hydrogen chloride which stays at one end of the tube until the ammonia reaches it.
- D The two solutions run along the tube until they meet.

27 Two gas jars are set up as shown.



The lid is removed and the gas jars are left to stand. After some time the contents of both gas jars are brown.

Which process causes this to happen?

- A** condensation
- B** diffusion
- C** evaporation
- D** filtration