

Name:	Target Grade:	Actual Grade:
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KINETIC PARTICLE THEORY MCQ and STRUCTURED QUESTIONS

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Find a quiet, comfortable spot free place from distractions.
2. Spend one minute on each mark.
3. Time yourself for every single question.
4. Every chapter has their own question types. Ensure that you know the different question type for each chapter.
5. Make a conscientious effort to remember your mistakes, especially in terms of answering techniques. E.g Take a picture for the mistakes that you made, keep it in a photo album, and revise it over and over again.
6. Highlight question types that you tend to keep making mistakes and review them nearing exams.
7. Always review the common questions and question type that you tend to make mistakes nearing exams.
8. During exams, classify the question type and recall what you have learnt, how you need to analyse the questions for the different question type, what you need to take note of and answer with the correct answering techniques!

✨ Wishing you all the best for this test!

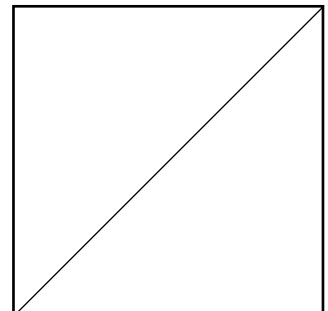
You've got this!

💡 With lots of love,
Bright Culture 🧡

If you are struggling in this paper, means you need to work harder!

If you need any professional guidance and further advice on how to advance, feel free to WhatsApp us at 91870820 or find us at www.bright-culture.com/. We are committed to connect you to your future to reach your goals.

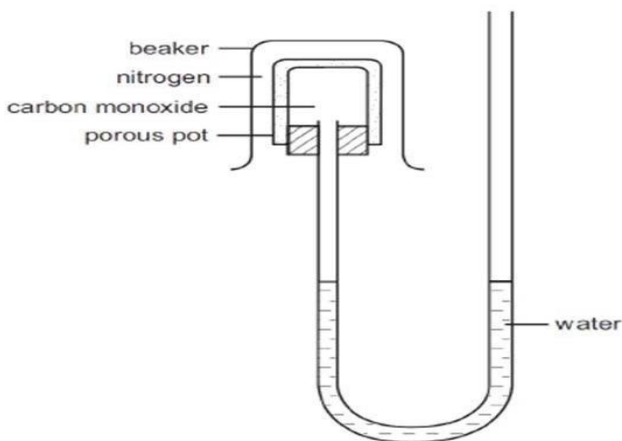
MARKS



KINETIC PARTICLE THEORY MCQ

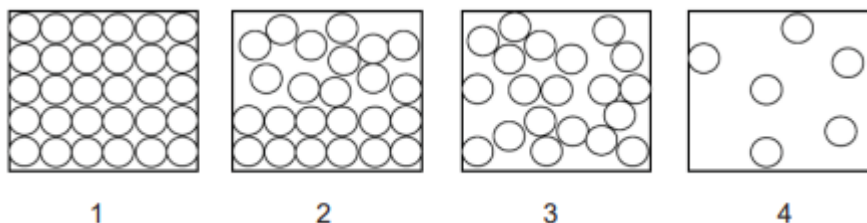
Paper 1

- 1 When iodine crystals were heated in a test tube, the iodine sublimed. How did the movement of the iodine particles change?
- A particles slide over one another → particles move freely
 - B particles slide over one another → particles vibrate about fixed positions
 - C particles vibrate about fixed positions → particles move freely
 - D particles vibrate about fixed positions → particles slide over one another
- 2 A beaker of nitrogen is inverted over a porous pot containing carbon monoxide as shown.



The water level does **not** change. Which statement is correct?

- A Both gases are diatomic.
 - B Nitrogen is an unreactive gas.
 - C The gas particles are too large to pass through the porous pot.
 - D The two gases have the same relative molecular mass.
- 3 Which of the following does not affect the rate at which a gas spreads throughout a room?
- A Boiling point of gas
 - B Temperature of gas
 - C Molecular mass of gas
 - D Density
- 4 The diagram represents different arrangement of atoms.

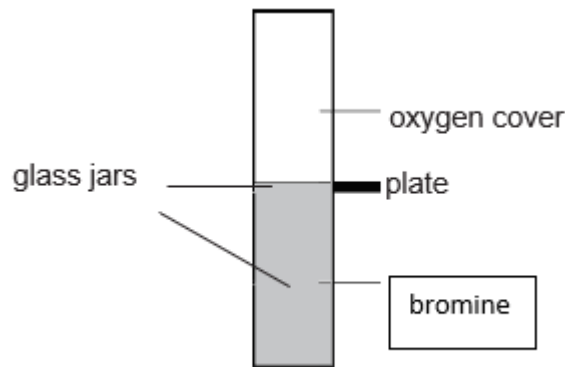


Bromine melts at -7°C and boils at 59°C . A tank filled with bromine at 30°C (room temperature) is cooled to -7°C .

Which row best represents the arrangement of bromine particles at -7°C and at 30°C ?

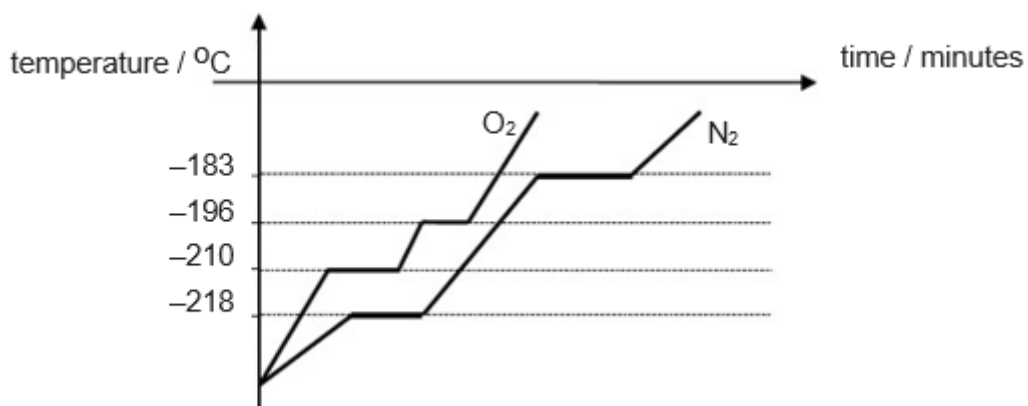
	-7°C	30°C
A	1	4
B	2	3
C	1	2
D	2	4

- 5 The diagram shows the cover plate removed from the gas jars containing oxygen and bromine respectively. After several days, the colour of the gas is the same in both jars.



Which statement explains this change?

- A** Equal volumes of oxygen and bromine contain equal numbers of molecules.
 - B** Oxygen and bromine gases have equal densities.
 - C** Oxygen and bromine molecules are in random motion.
 - D** Oxygen and bromine molecules diffuse at the same rate.
- 6 The graphs (not drawn to scale) show the heating curves of oxygen and nitrogen over a period of time

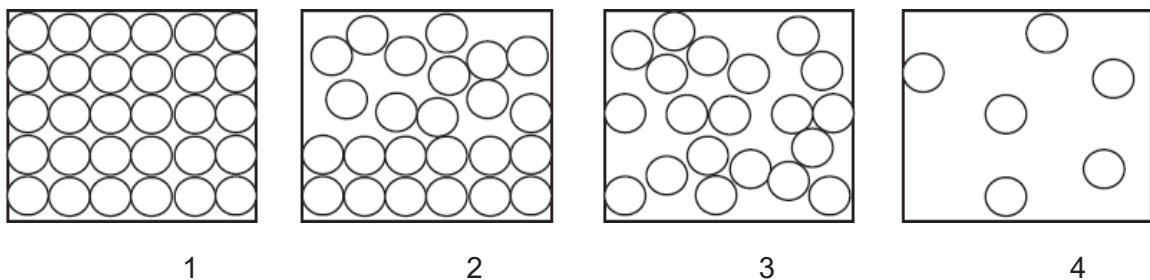


At what temperature will there be two different phases (states) of matter co-existing at the same time, in a mixture of oxygen and nitrogen under room conditions?

- A -180 °C
- B -195 °C
- C -200 °C
- D -210 °C

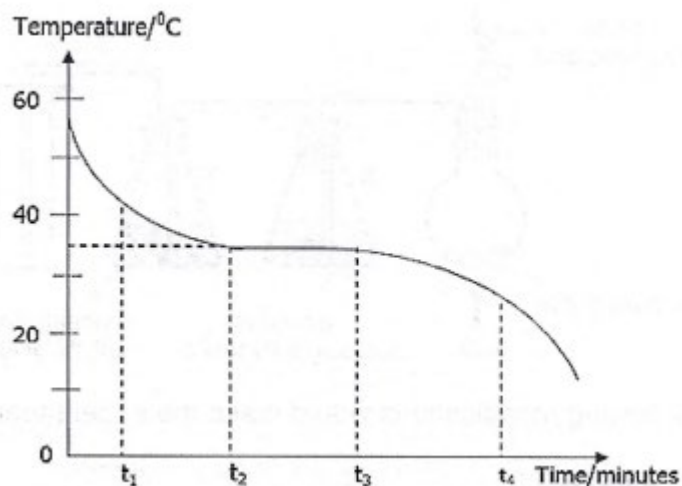
7 Bromine melts at -7°C and boils at 59°C. A tank filled with bromine at 30°C is cooled to -7°C.

Which diagram below best represents the arrangement of bromine particles at -7°C and at 30°C?



	-7°C	30°C
A	2	4
B	1	3
C	2	3
D	1	2

8 A beaker containing liquid X is placed on a table in a room. The temperature of the beaker and its contents changes as shown in the diagram below.



Which of the following statements is correct?

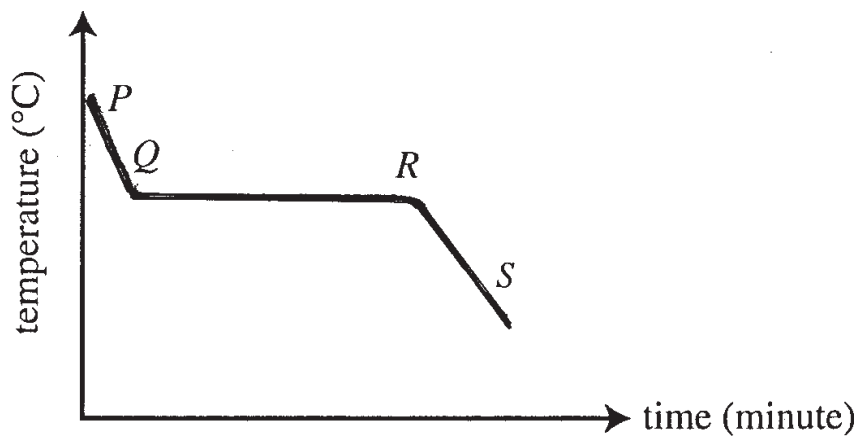
- A Boiling of X takes place at 35 °C.
- B There is no more liquid X after t₃.
- C X starts to melt from t₂.
- D X gains energy between t₂ and t₃

9 Solid carbon dioxide sublimates at room temperature.

Which changes occur during this process?

	movement of particles	arrangement of particles	attraction between particles
A	faster	closer together	increases
B	faster	further apart	decreases
C	slower	closer together	increases
D	slower	further apart	decreases

10 A sample of solid X is heated until it is completely melted. The graph shows how its temperature varies with time as molten X is cooled.



Which of the following statements are true about the particles in X?

- I They are closer to each other at stage RS than at stage PQ.
- II The forces of attraction are stronger at stage P than at stage S.
- III The arrangement is more orderly at stage RS than at stage PQ.
- IV Their total energy content at stage QR is lower than at stage RS.

- A** I and II are correct
- B** I and III are correct
- C** II and III are correct
- D** II and IV are correct

KINETIC PARTICLE THEORY STRUCTURED QUESTIONS

Paper 2 Section A

- 1 Fig 1.1 shows the set-up of an experiment. After some time, a ring of yellow powder is seen in the tube. A, B or C are possible positions at which this ring may be formed.

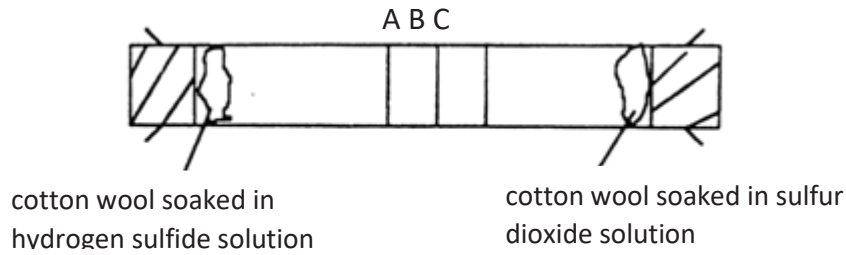
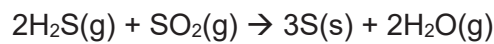


Fig 1.1

It is known that hydrogen sulfide gas reacts with sulfur dioxide gas as follows:



- (a) Name the yellow powder formed in the tube.
[1]

- (b) (i) At which position, A, B or C is the ring of yellow powder most likely to be formed?
[1]

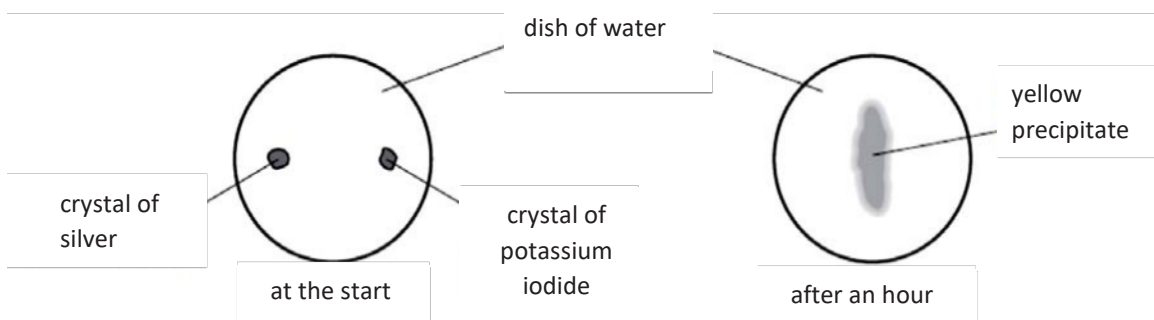
- (ii) Explain your answer to (b)(i).

[2]

[Total: 4]

- 2 A student placed a crystal of silver nitrate and a crystal of potassium iodide in a dish of water.

After an hour she observed that the crystals had disappeared and a yellow precipitate had appeared near the middle of the dish.



Use your knowledge of the kinetic particle theory and reactions between ions to explain these observations.

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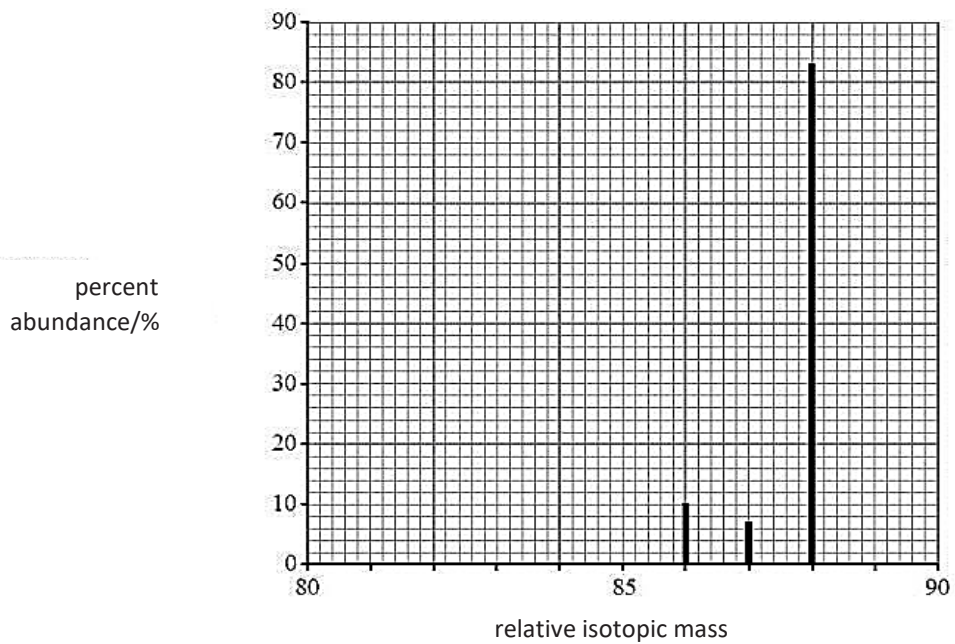
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.....

[3]

The graph below shows the percent abundance (%) and relative masses of three naturally occurring isotopes of element **Z**.



(a) Define the term 'isotopes'.

.....
..... [1]

(b) Using the graph, calculate the relative atomic mass of element **Z**.

[2]

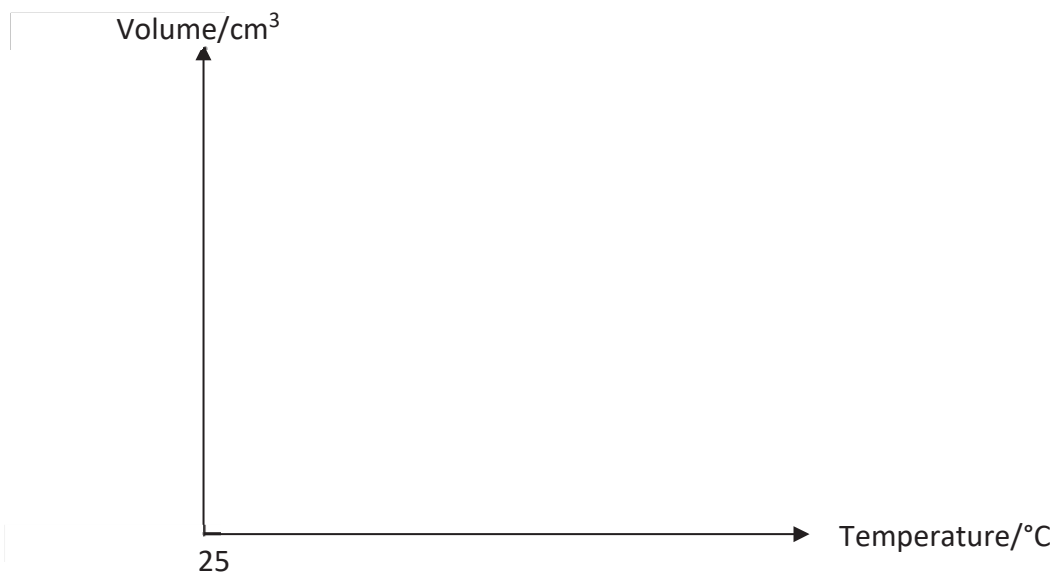
(c) (i) **Z** has a melting point of 777°C and a boiling point of 1382°C .

A solid sample of **Z** was heated from room temperature to 1500°C . There was a larger increase in volume at the boiling point than at the melting point.

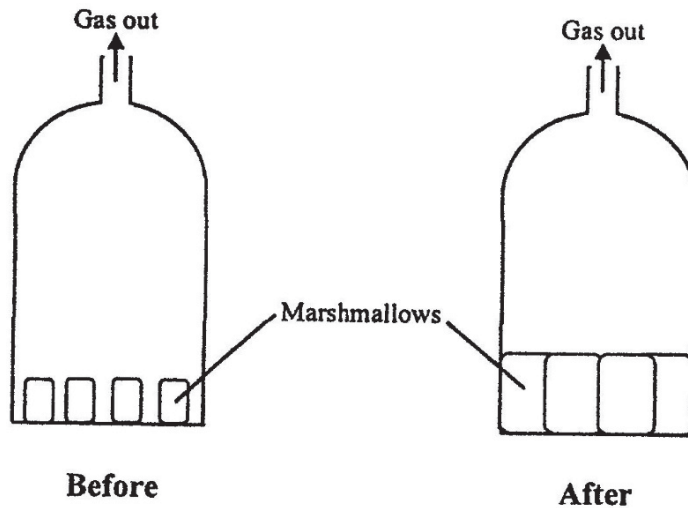
Explain, in terms of arrangement and movement of the particle, why there was a larger increase in volume at the boiling point.

.....
.....
..... [2]

(ii) Complete the graph below to show changes in volume of solid sample **Z** against temperature. Label all temperatures clearly. [1]

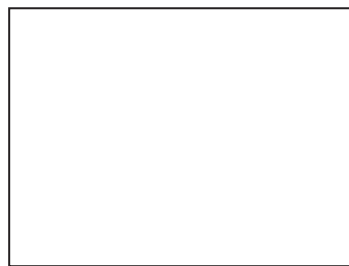


- 3 A student carried out an experiment where she removed some gas from a gas chamber containing marshmallows.

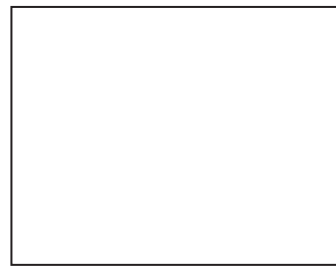


The marshmallows were observed to have increased in size after some gas was removed from the sealed gas chamber.

- (a) In the boxes below, draw the diagram for the gas in the chamber before and after some gas was removed from the chamber. [1]



Before



After

- (b) Using the kinetic particle theory, provide an explanation for why the marshmallows increased in size.

.....

[2]

- (c) When heat was applied to the gas chamber before gas was removed, the student theorized immediately that the space between the gas particles will be increased. Do you agree? Explain your answer.

.....

 [2]

[Total: 5]

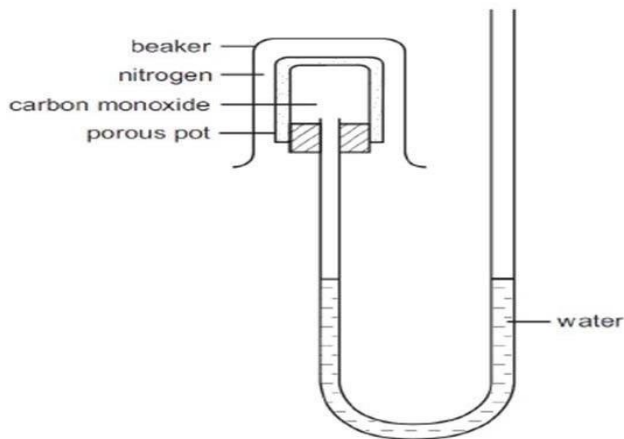
ANSWERS FOR KINETIC PARTICLE THEORY MCQ

Paper 1

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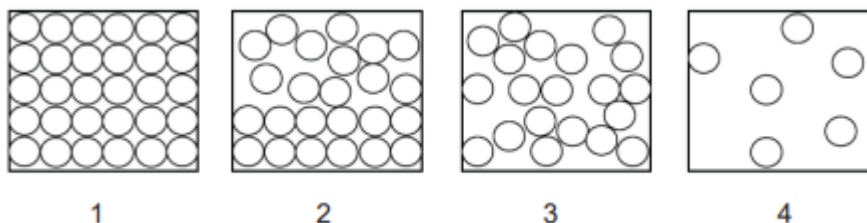
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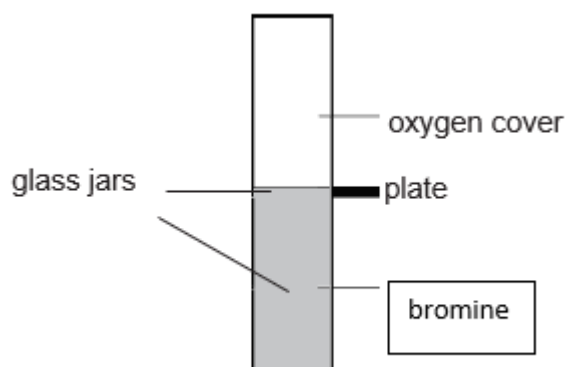


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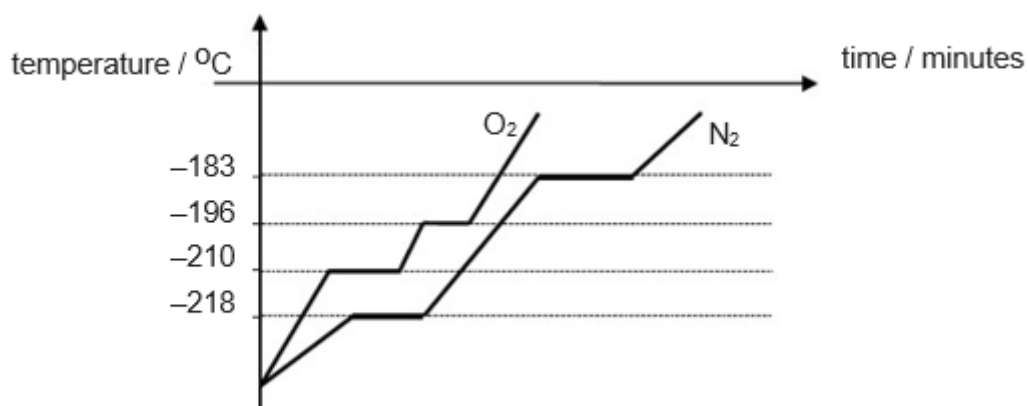
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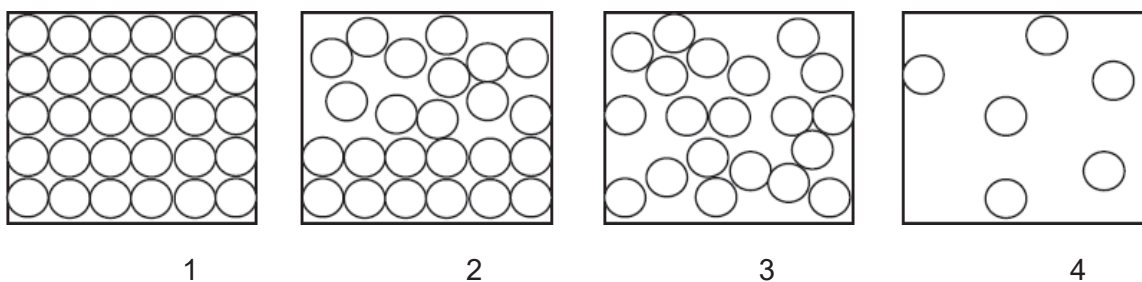


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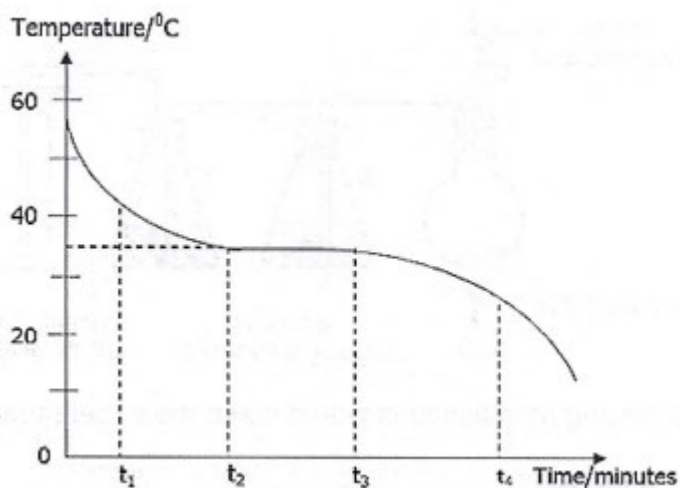
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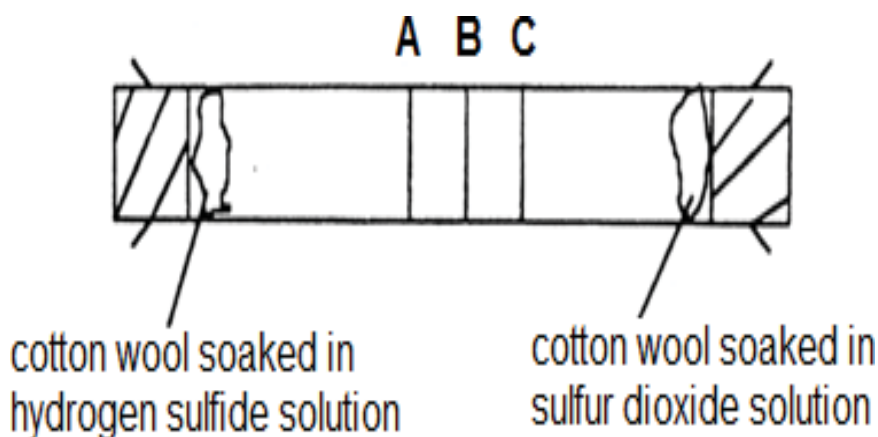
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- B I and III are correct
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ANSWERS FOR KINETIC PARTICLE THEORY STRUCTURED QUESTIONS

Paper 2 Section A

- 1 Fig 1.1 shows the set-up of an experiment. After some time, a ring of yellow powder is seen in the tube. A, B or C are possible positions at which this ring may be formed.

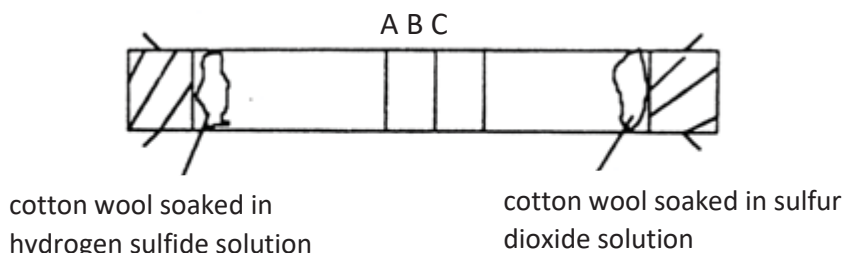
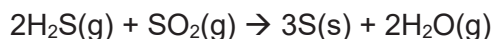


Fig 1.1

It is known that hydrogen sulfide gas reacts with sulfur dioxide gas as follows:



- (a) Name the yellow powder formed in the tube.

Sulfur [1]

- (b) (i) At which position, A, B or C is the ring of yellow powder most likely to be formed?

Position C [1]

- (ii) Explain your answer to (b)(i).

Hydrogen sulfide (Mr = 34) has a smaller molecular mass compared to sulfur dioxide Mr = 64).

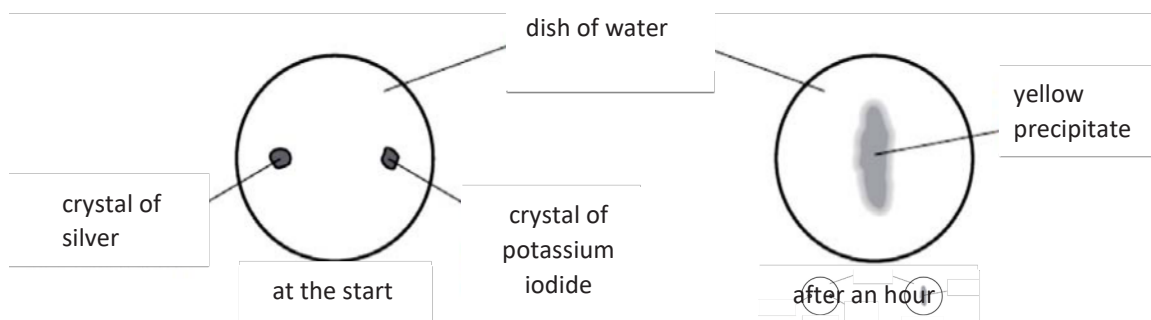
Hence, hydrogen sulfide diffuses faster than sulfur dioxide and travel further to react with sulfur dioxide at point C. [2]

[2]

[Total: 4]

- 2 A student placed a crystal of silver nitrate and a crystal of potassium iodide in a dish of water.

After an hour she observed that the crystals had disappeared and a yellow precipitate had appeared near the middle of the dish.

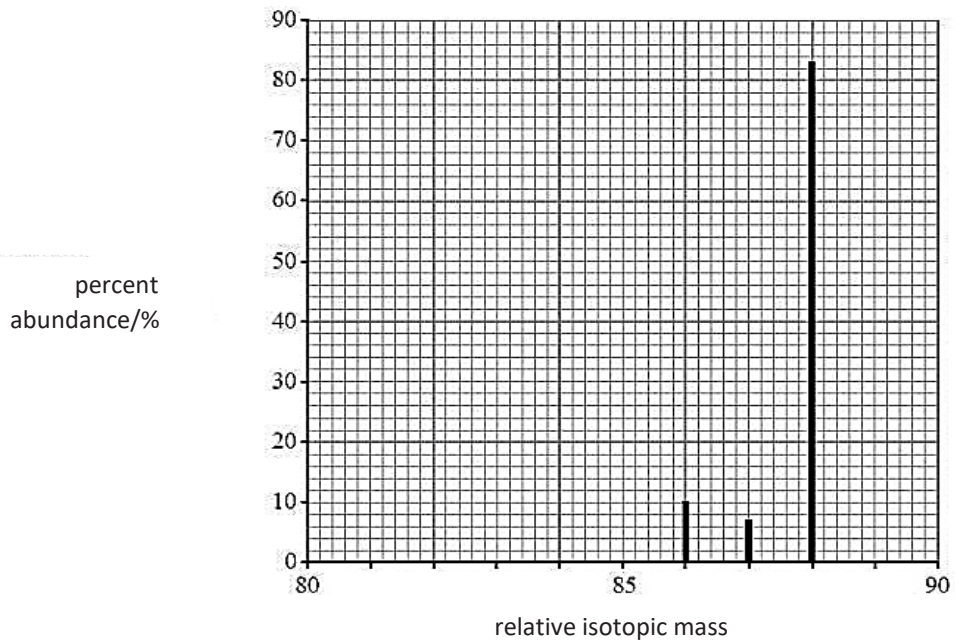


Use your knowledge of the kinetic particle theory and reactions between ions to explain these observations.

Crystal of silver nitrate and potassium iodide dissolve in the dish of water [1] and form ions which diffuse from a region of higher concentration at the 2 spots to a region of lower concentration at the middle of the dish [1].

Silver ions and iodide ions react to form insoluble silver iodide [1] which is yellow in color [3]

The graph below shows the percent abundance (%) and relative masses of three naturally occurring isotopes of element Z.



(a) Define the term 'isotopes'.

Isotopes are atoms of the same element with same number of protons but [1] different number of neutrons.

[1]

(b) Using the graph, calculate the relative atomic mass of element Z.

$$A_r \text{ of Z} = \frac{(10 \times 86) + (7 \times 87) + (83 \times 88)}{100} \quad [1]$$

$$= 87.7 \text{ (3sf)} \quad [1]$$

[2]

(c) (i) Z has a melting point of 777°C and a boiling point of 1382°C.

A solid sample of Z was heated from room temperature to 1500°C. There was a larger increase in volume at the boiling point than at the melting point.

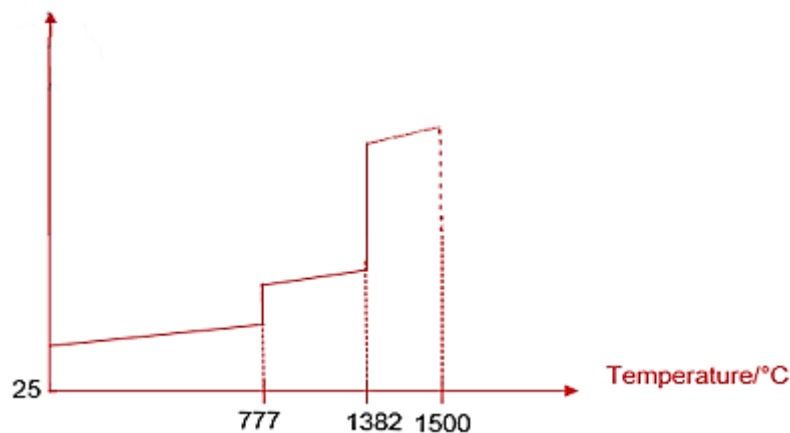
Explain, in terms of arrangement and movement of the particle, why there was a larger increase in volume at the boiling point.

There was a change state from liquid to gas.

The particle moved faster in all directions / randomly [1]

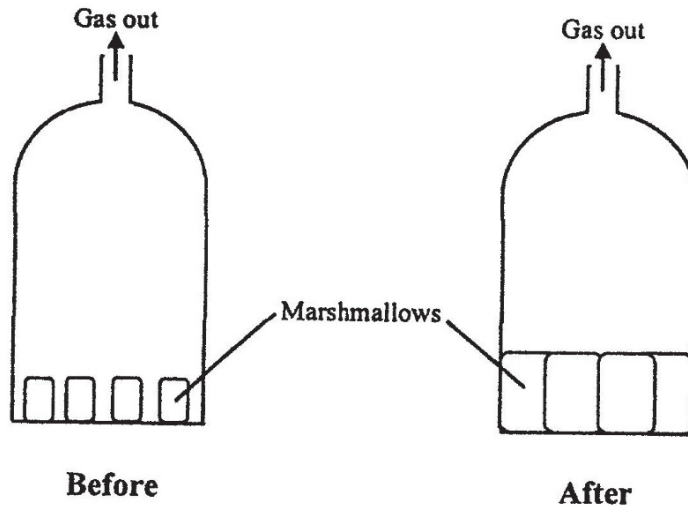
and were spaced further apart / large spaces between particles [1] [2]

(ii) Complete the graph below to show changes in volume of solid sample Z against temperature. Label all temperatures clearly. [1]



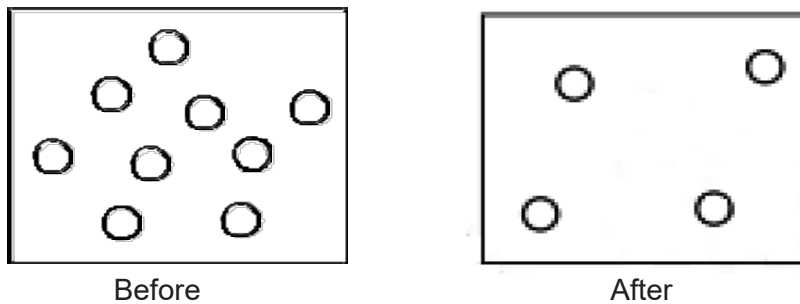
The vertical line at 1382 must be longer than that at 777.
All the 3 values (777, 1382 and 1500) must be indicated clearly

- 3 A student carried out an experiment where she removed some gas from a gas chamber containing marshmallows.



The marshmallows were observed to have increased in size after some gas was removed from the sealed gas chamber.

- (a) In the boxes below, draw the diagram for the gas in the chamber before and after some gas was removed from the chamber. [1]



Answer to clearly illustrate lesser gas particles (1) AND gas particles are further apart (1) when comparing before and after.

- (b) Using the kinetic particle theory, provide an explanation for why the marshmallows increased in size.

When all the air particles are removed, the vacuum created forces the air particles in the marshmallows to spread further apart. This action pushes against the marshmallows and causes it to swell / increase in size [2]

- (c) When heat was applied to the gas chamber before gas was removed, the student theorized immediately that the space between the gas particles will be increased. Do you agree? Explain your answer.

No, heating the chamber will cause the gas particles to increase in kinetic energy, making them vibrate and move faster OR

No, the space in the gas chamber is the *same / fixed, so the particles will not move further apart.

*only award max. of 1 mark for second answer as students failed to link that an increase a temperature (through heating) lead to an increase in kinetic energy.. [2]

[Total: 5]