PEARSON EDEXCEL GCSE COMBINED SCIENCE (HIGHER) · 1SC0

CHEMISTRY



EXAM QUESTION PACK

TOPIC 2: STATES OF MATTER AND MIXTURES: STATES OF MATTER (PAPER 1)

SCORE	PERCENTAGE
/68	%

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Q1.

Nitrogen, N_2 , oxygen, O_2 and fluorine F_2 are all gases.

Fluorine has a boiling point of −188 °C.

(i) Explain why fluorine has a low boiling point.

(3)

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Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

(ii) A mixture of nitrogen and oxygen becomes a liquid when cooled to −200 °C.

Which row shows the changes in energy and movement of the molecules as they are cooled from room temperature to −200 °C?

(1)

		movement of molecules	energy of molecules
☒	**A**	less	more
☒	**B**	more	less
☒	**C**	less	less
☒	**D**	more	more

(iii) The mixture of liquid nitrogen and liquid oxygen can be separated.

Which process could be used to separate a mixture of liquid nitrogen and liquid oxygen?

(1)

☒ **A** paper chromatography

☒ **B** fractional distillation

☒ **C** filtration

☒ **D** crystallisation

(Total for question = 5 marks)

(**QU03b 1SC0/1CH, June 2025**)

Q2.

An ink is a mixture of coloured substances dissolved in water.

The apparatus shown in Figure 9 can be used to separate water from ink.

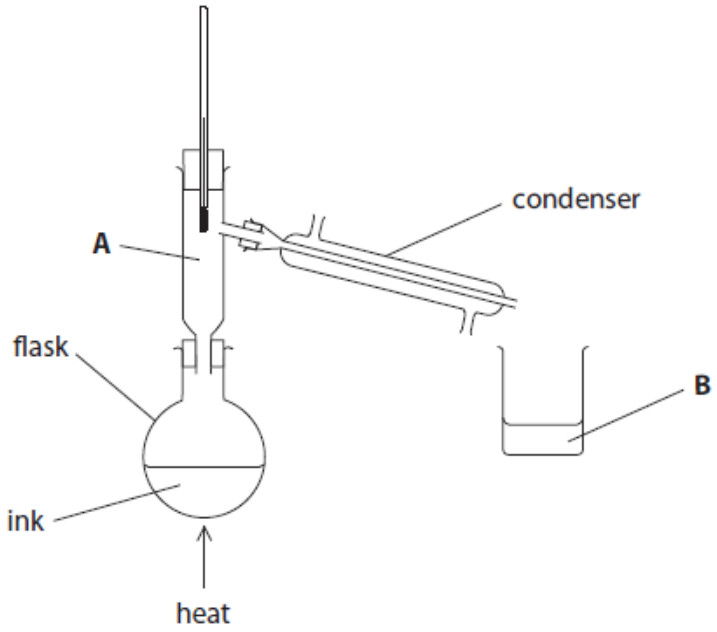


Figure 9

An ink is a mixture of coloured substances dissolved in water.

The particles in the ink in the flask can be shown as in Figure 10.

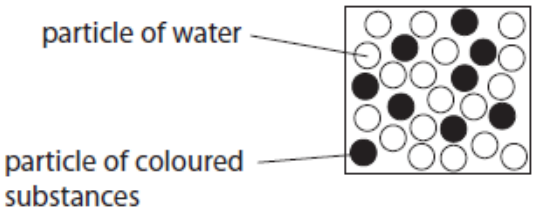


Figure 10

In the boxes below, draw the arrangement of particles that would be expected at **A** and **B** shown in Figure 9.

(2)

particles at **A**	particles at **B**

(Total for question = 2 marks)

(**Q16 1SC0/1CF, June 2018**)

Q3.

Bonding and separation techniques

(a) The diagram shows the structure of diamond.



(i) Describe what each ● represents.

(2)

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.....

(ii) State the type of bonding in the diamond structure.

(1)

.....

(b) Give the name of the process used to obtain oxygen from liquid air.

(2)

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(c) A colouring in some sweets was analysed using paper chromatography.

One of the dyes in the colouring moved 2 cm up the paper while the solvent moved 8 cm.

What is the R_f value of this dye?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** 0.25

☒ **B** 2

☒ **C** 4

☒ **D** 6

*(d) Here is some information about magnesium, oxygen and magnesium oxide.

The electronic configuration of magnesium atoms is 2.8.2
The electronic configuration of oxygen atoms is 2.6
Magnesium oxide is an ionic compound.

When magnesium ribbon is heated, it reacts with oxygen from the air to form magnesium oxide, MgO.

Describe how the reaction can be carried out, including an explanation of what happens to the magnesium and oxygen atoms when they form magnesium oxide.

(6)

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(Total for question = 12 marks)

(**Q05 1SC0/1CF, June 2014**)

Q4.

A substance is heated at a constant rate and its temperature is taken every minute.
During the heating, the substance undergoes one change of state.

The results are shown on the graph in Figure 5.

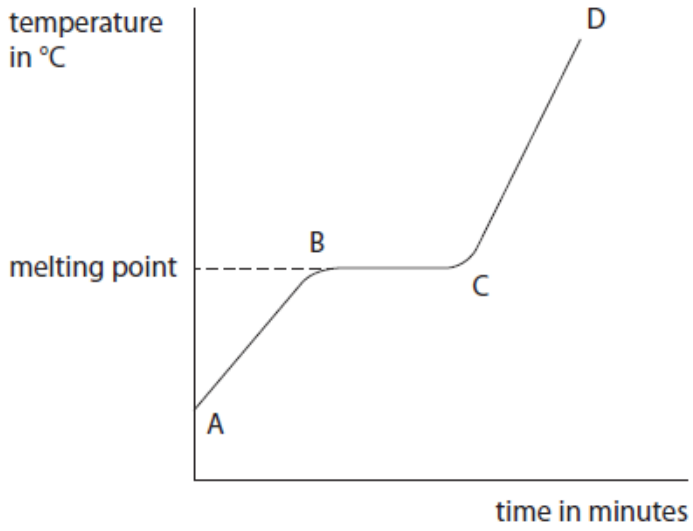


Figure 5

Explain the shape of the graph in terms of the changes in the movement and arrangement of the particles as the substance is heated.

(4)

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(Total for question = 4 marks)

(**Q10 1SC0/1CH, June 2018**)

Q5.

An ink is a mixture of coloured substances dissolved in water.

The apparatus shown in Figure 9 can be used to separate water from ink.

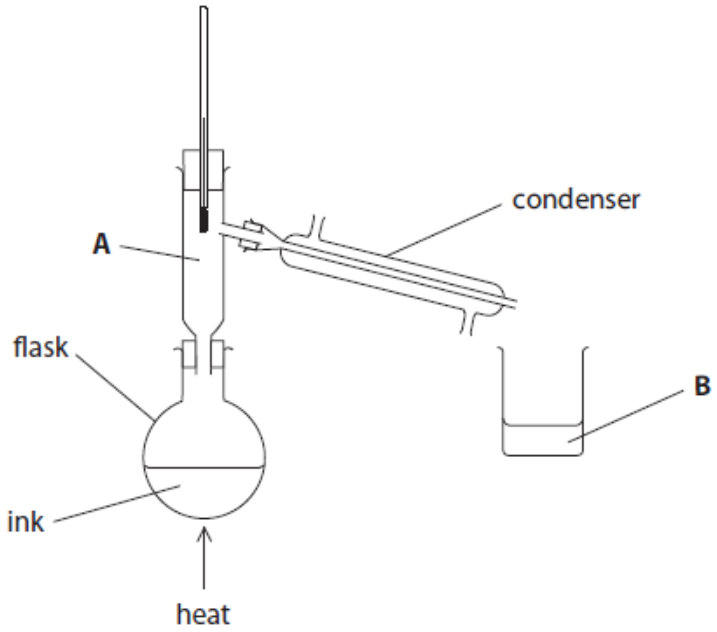


Figure 9

Changes of state between the three states of matter are shown in Figure 11.

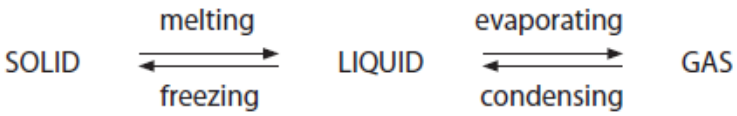


Figure 11

The changes shown are physical changes.

Explain why these changes are called physical changes rather than chemical changes.

(2)

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(Total for question = 2 marks)

(**Q17 1SC0/1CF, June 2018**)

Q6.

Crystals of copper sulfate are prepared by reacting copper oxide, a base, with dilute sulfuric acid.

When some water is removed from the aqueous solution of copper sulfate, crystals of copper sulfate are made.

Describe how the arrangement and movement of the particles change as crystals are formed from a solution.

(3)

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(Total for question = 3 marks)

(**QU05d 1SC0/1CH, June 2023**)

Q7.

Figure 13 shows a model of how particles are arranged in a solid.

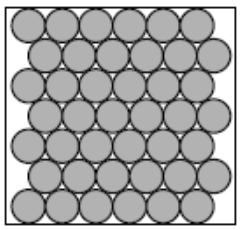


Figure 13

State **two** ways in which this model fails to accurately represent a crystal of sodium chloride.

(2)

1 .....

.....

2 .....

.....

(Total for question = 2 marks)

(**Q05ai 1SC0/1CH, SAM 2016**)

Q8.

Figure 1 shows a metal spoon and two test tubes being heated in a water bath.

One test tube contains a piece of chocolate, the other some liquid egg white.

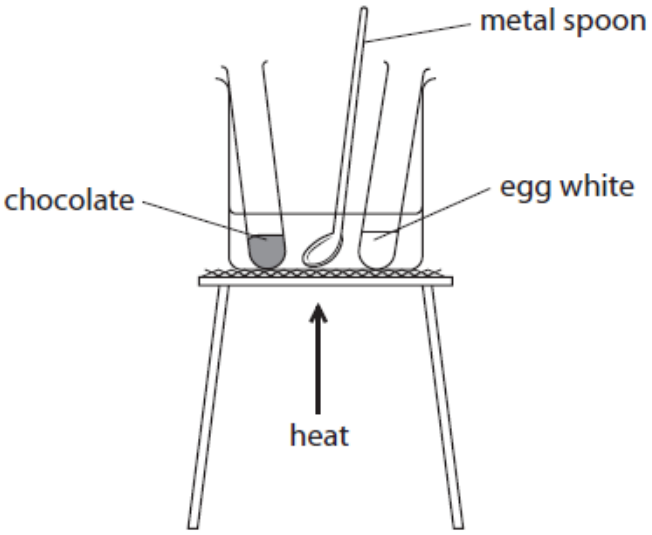


Figure 1

After heating, the spoon, the chocolate and the egg white are allowed to cool to room temperature.

Figure 2 shows the state of the three different substances before heating, when hot and after cooling.

substance	before heating	when hot	after cooling
metal spoon	solid	solid	solid
chocolate	solid	liquid	solid
egg white	liquid	solid	solid

Figure 2

Describe the differences in the arrangement and movement of the particles in a solid and in a liquid.

(2)

difference in arrangement of particles

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.....

difference in movement of particles

.....

.....

.....

(Total for question = 2 marks)

(**Q01a 1SC0/1CF, June 2022**)

Q9.

The freezing point of water is 0°C.

Describe how the movement and arrangement of water particles changes when water is cooled from 10°C to –10°C.

(2)

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(Total for question = 2 marks)

(**Q01ci 1SC0/1CF, SAM 2016**)

Q10.

Figure 5 shows the changes of state for gallium and the arrangement of particles in liquid gallium.

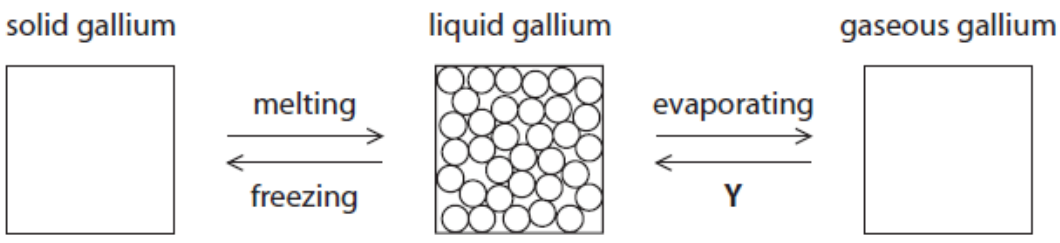


Figure 5

(i) Complete the boxes for solid gallium and gaseous gallium by drawing the arrangement of the particles in each of these physical states.

(2)

(ii) Give the name of the change of state labelled **Y** in Figure 5.

(1)

.....

(Total for question = 3 marks)

(**Q03d 1SC0/1CF, Nov 2020**)

Q11.

Figure 1 shows a test tube being heated in a beaker of water.

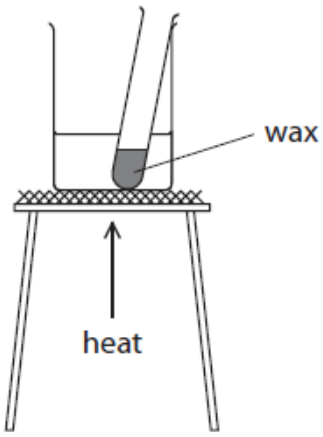


Figure 1

The test tube contains solid wax.

As the test tube was heated, the solid wax changed to liquid wax.

After heating, the wax was allowed to cool to room temperature.

Figure 2 shows the arrangement of particles in liquid wax.

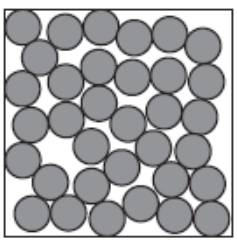


Figure 2

Draw the arrangement of particles in solid wax in the box in Figure 3.

(1)

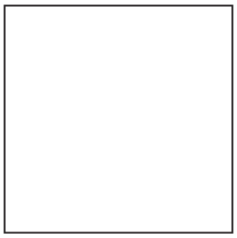


Figure 3

(Total for question = 1 mark)

(**Q01a 1SC0/1CF, June 2024**)

Q12.

Figure 1 shows a metal spoon and two test tubes being heated in a water bath.

One test tube contains a piece of chocolate, the other some liquid egg white.

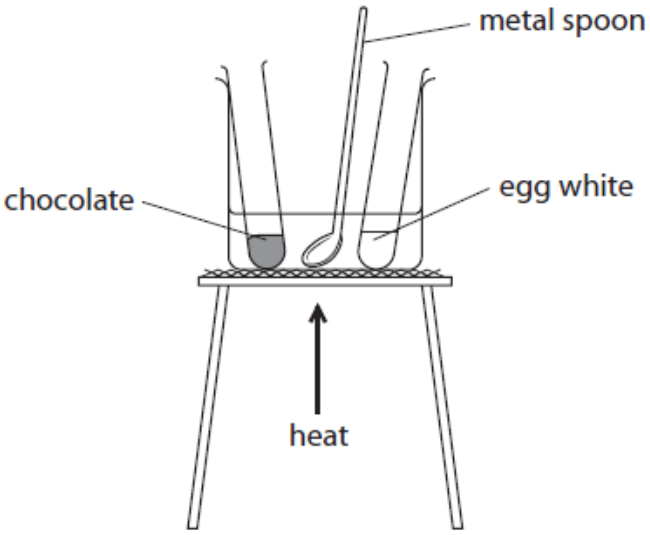


Figure 1

After heating, the spoon, the chocolate and the egg white are allowed to cool to room temperature.

Figure 2 shows the state of the three different substances before heating, when hot and after cooling.

substance	before heating	when hot	after cooling
metal spoon	solid	solid	solid
chocolate	solid	liquid	solid
egg white	liquid	solid	solid

Figure 2

Explain how we know the change to the egg white is a chemical change rather than a physical change.

(2)

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.....

.....

(Total for question = 2 marks)

(**Q01d 1SC0/1CF, June 2022**)

Q13.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Figure 1 shows a test tube being heated in a beaker of water.

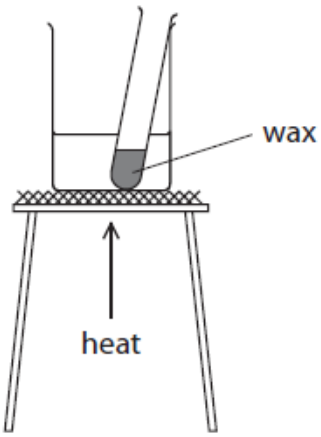


Figure 1

The test tube contains solid wax.

As the test tube was heated, the solid wax changed to liquid wax.

After heating, the wax was allowed to cool to room temperature.

Another physical change is when a liquid changes into a gas.

(i) Which row shows the movement and arrangement of the particles in a gas?

(1)

	movement of particles	arrangement of particles
☐ **A**	slow	regular
☐ **B**	slow	random
☐ **C**	fast	regular
☐ **D**	fast	random

(ii) Suggest why the wax did **not** change into a gas when the test tube was heated in the beaker of water.

(1)

.....

.....

(Total for question = 2 marks)

(**Q01c 1SC0/1CF, June 2024**)

Q14.

There are three states of matter, solid, liquid and gas.

A student is given some solid wax.

Use words from the box to name **two** pieces of equipment that the student should use to convert the solid wax into a liquid.

Bunsen burner	test tube	filter funnel
burette	pipette	

(2)

1 .....

2 .....

(Total for question = 2 marks)

(**Q01aii 1SC0/1CF, SAM 2016**)

Q15.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Figure 1 shows a test tube being heated in a beaker of water.

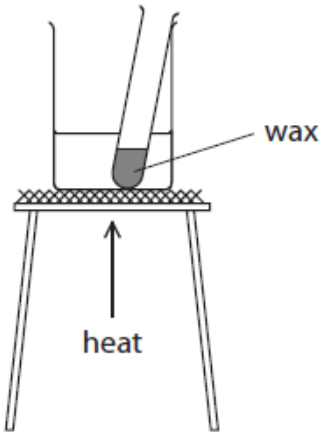


Figure 1

The test tube contains solid wax.

As the test tube was heated, the solid wax changed to liquid wax.

After heating, the wax was allowed to cool to room temperature.

When the wax cools, it changes from a liquid back to a solid.

This change is a **physical change**.

(i) What name is given to the change of a liquid to a solid?

(1)

☒ **A** condensing

☒ **B** evaporating

☒ **C** freezing

☒ **D** melting

(ii) Explain why the change from a liquid to a solid is a physical change rather than a chemical change.

(2)

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.....

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.....

(Total for question = 3 marks)

(**Q01b 1SC0/1CF, June 2024**)

Q16.

Some liquid is left in a warm room.

After a few days no liquid can be seen.

Give the name of the process that has occurred.

(1)

.....

(Total for question = 1 mark)

(**Q01b 1SC0/1CF, SAM 2016**)

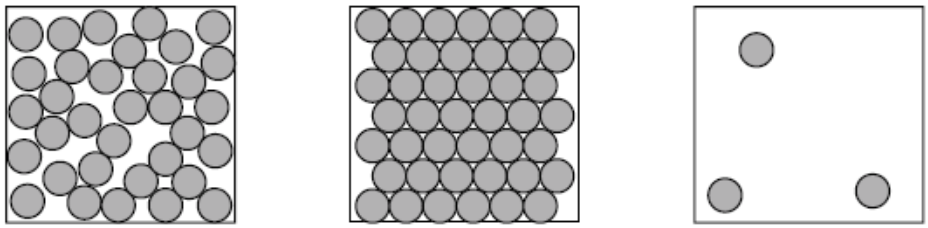
Q17.

There are three states of matter, solid, liquid and gas.

The three boxes in Figure 1 show the arrangement of particles in different states.

Under each box write the name of the state of matter shown.

(2)



....

Figure 1

(Total for question = 2 marks)

(**Q01ai 1SC0/1CF, SAM 2016**)

Q18.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

The three states of matter are solid, liquid and gas.

What is the name of the change of state when a liquid changes into a solid?

(1)

☒ **A** condensation

☒ **B** evaporation

☒ **C** freezing

☒ **D** melting

(Total for question = 1 mark)

(**Q01a 1SC0/1CF, June 2019**)

Q19.

Answer the question with a cross in the box you think is correct (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

Figure 3 shows the changes of state between ice, water and steam.

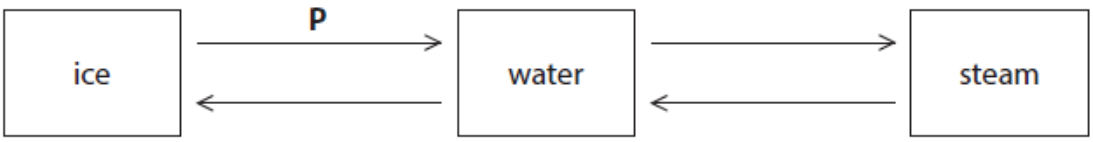


Figure 3

(i) What is the name of the change of state labelled **P** in Figure 3?

(1)

☒ **A** evaporating

☒ **B** freezing

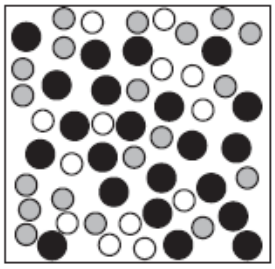
☒ **C** melting

☒ **D** subliming

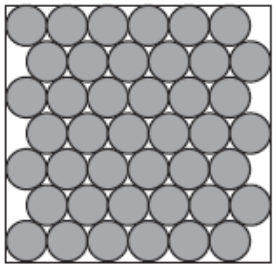
(ii) Which of the following shows the arrangement of particles in ice?

(1)

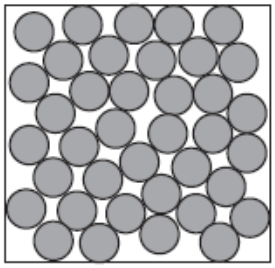
☒ A



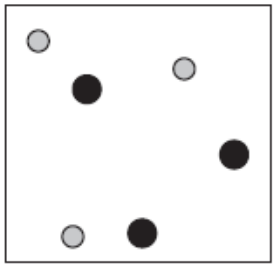
☒ B



☒ C



☒ D



(Total for question = 2 marks)

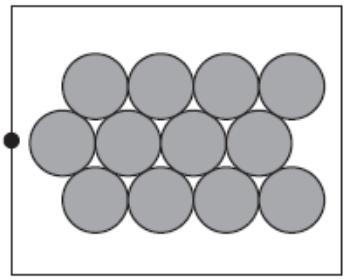
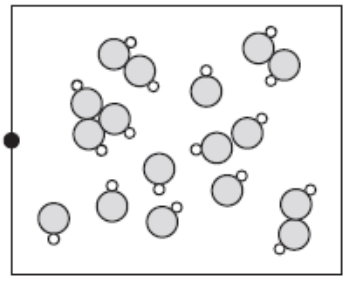
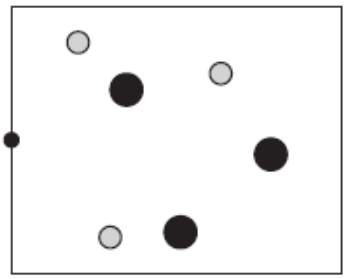
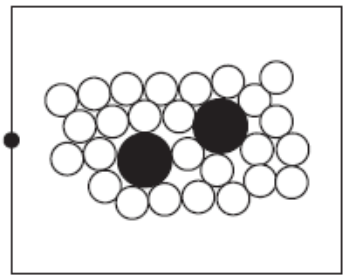
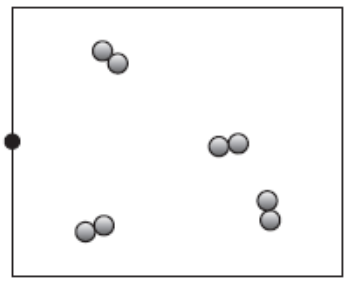
(**QU02a 1SC0/1CF, June 2025**)

Q20.

The diagrams below show particles in five different structures.
The different circles show different particles.

Draw one straight line from each substance to its structure.

(2)

substance	particles in structures
solid zinc metal, Zn(s)	
	
	
hydrogen gas, H_2(g)	
	

(Total for question = 2 marks)

(Q01d 1SC0/1CF, June 2019)

Q21.

Which of the following substances will be a solid at 20 °C and will melt when placed in a beaker of hot water at 80 °C?

(1)

	melting point in °C	boiling point in °C
☒ **A**	122	249
☒ **B**	−7	59
☒ **C**	30	2403
☒ **D**	−32	27

(Total for question = 1 mark)

(**Q08 1SC0/1CH, June 2018**)

Q22.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

If liquid water is cooled below 0 °C it turns into the solid, ice.

(i) Give the name for the change of state from liquid to solid.

(1)

.....

(ii) Here are five statements about ice and water.

Place ticks in boxes by the **two** statements that are correct.

(2)

the molecules move faster in water than in ice	
the molecules are more randomly arranged in ice than in water	
the molecules start moving when water becomes ice	
the molecules are arranged regularly in ice but not in water	
the molecules have more energy in ice than in water	

(Total for question = 3 marks)

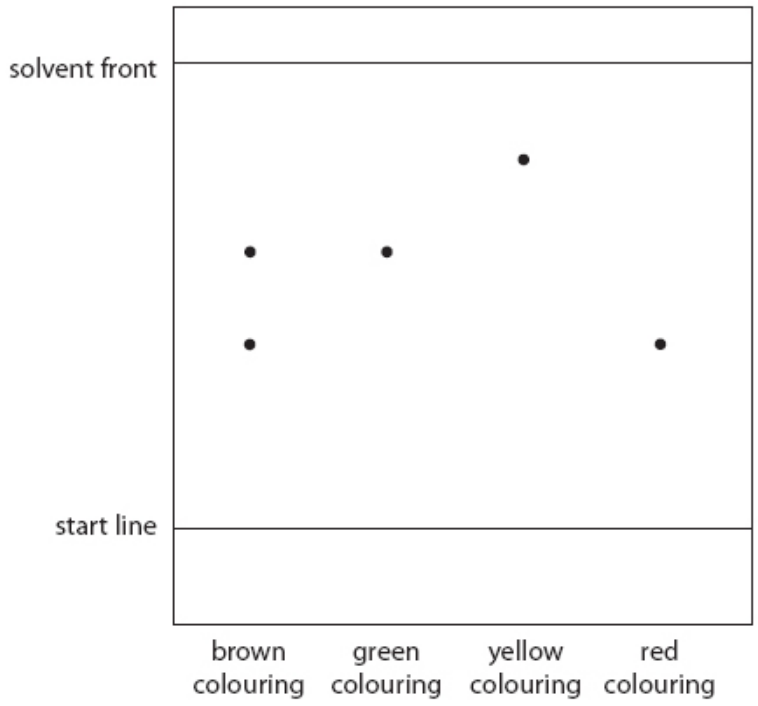
(**Q01a 1SC0/1CF, Nov 2021**)

Q23.

Paper chromatography can be used to separate coloured substances.

A student carried out a chromatography experiment on four food colourings.
The four food colourings were brown, green, yellow and red.

The diagram shows the results.



Use the results of the chromatography experiment to describe the colours present in the brown food colouring.

(2)

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(**Q14 1SC0/1CF, June 2013**)

Q24.

A gas was left to cool to form a liquid.

Figure 1 shows how the temperature of the substance changed with time.

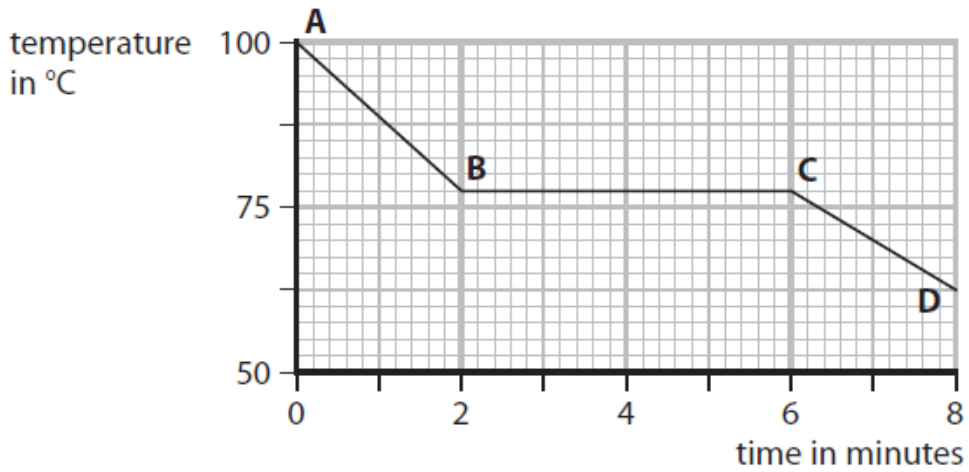


Figure 1

From **A** to **B** the substance is a gas.

From **C** to **D** the substance is a liquid.

(i) State the time when the gas first started to form a liquid.

(1)

..... minutes

(ii) Calculate the number of minutes it took from the gas first starting to form a liquid until the substance was completely liquid.

(1)

.....

..... minutes

(Total for question = 2 marks)

(**Q01b 1SC0/1CF, June 2019**)

Q25.

In an experiment, paper chromatography was used to separate the coloured dyes in four different inks, **W**, **X**, **Y** and **Z**.

The substance used as the solvent in the chromatography was heated for 8 minutes.

Figure 2 shows how the temperature of the substance changed with time.

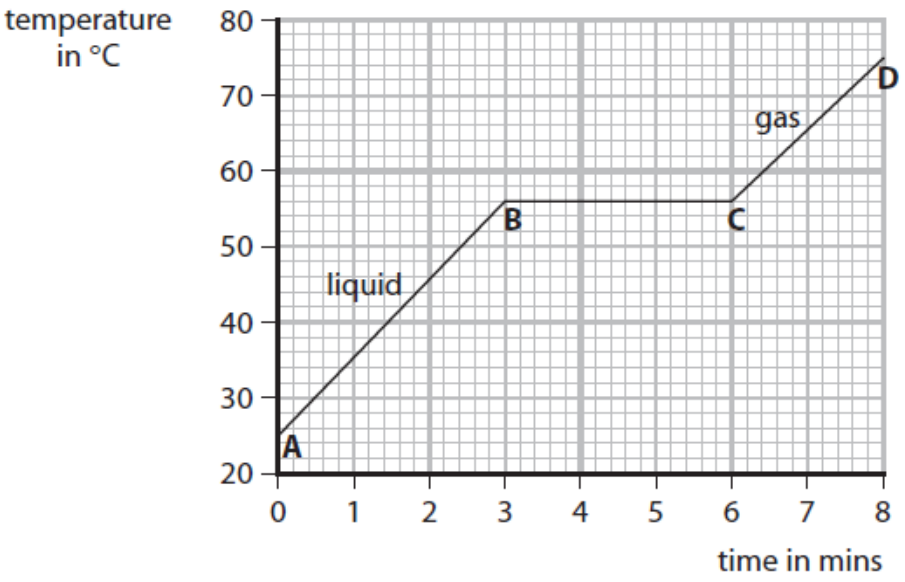


Figure 2

From **A** to **B** the substance was a liquid.

From **C** to **D** the substance was a gas.

(i) Give the name of the change when a liquid becomes a gas.

(1)

.....

(ii) Use Figure 2 to give the temperature of the substance at 4 minutes.

(1)

..... °C

(iii) Use Figure 2 to give the time when the substance has completely changed into a gas.

(1)

..... minutes

(iv) The temperature of the substance at **A** was 25 °C.

Calculate the temperature rise of the substance from **A** to **D**.

(1)

..... °C

(Total for question = 4 marks)

(**Q01b 1SC0/1CF, June 2023**)

Q26.

Figure 2 shows the melting points and boiling points of four substances, **W**, **X**, **Y** and **Z**.

substance	melting point in °C	boiling point in °C
W	−220	−188
X	−101	−34
Y	−7	59
Z	114	184

Figure 2

Using the information in Figure 2

(i) give the letter of the substance that is a solid at 20 °C

(1)

.....

(ii) give the letter of a substance that is a liquid at 50 °C

(1)

.....

(Total for question = 2 marks)

(**Q01c 1SC0/1CF, June 2019**)

Q27.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Figure 1 shows a metal spoon and two test tubes being heated in a water bath.

One test tube contains a piece of chocolate, the other some liquid egg white.

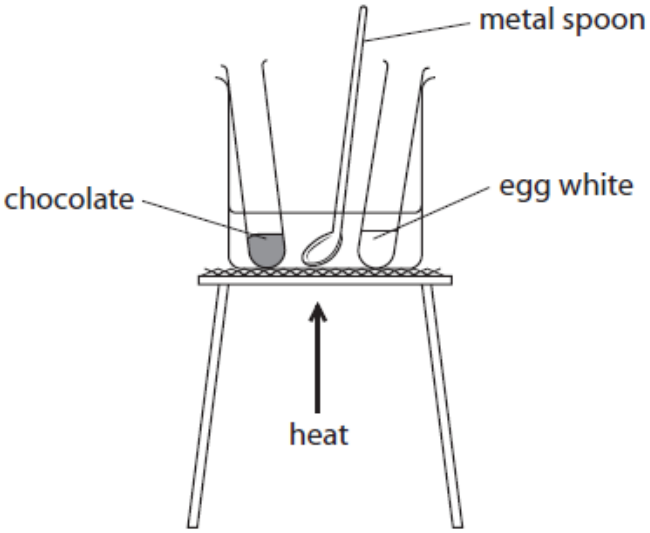


Figure 1

After heating, the spoon, the chocolate and the egg white are allowed to cool to room temperature.

Figure 2 shows the state of the three different substances before heating, when hot and after cooling.

substance	before heating	when hot	after cooling
metal spoon	solid	solid	solid
chocolate	solid	liquid	solid
egg white	liquid	solid	solid

Figure 2

What name is given to the process when the chocolate changes from a solid to a liquid?

(1)

- ☒ **A** condensing
- ☒ **B** evaporating
- ☒ **C** freezing
- ☒ **D** melting

(Total for question = 1 mark)

(**Q01b 1SC0/1CF, June 2022**)