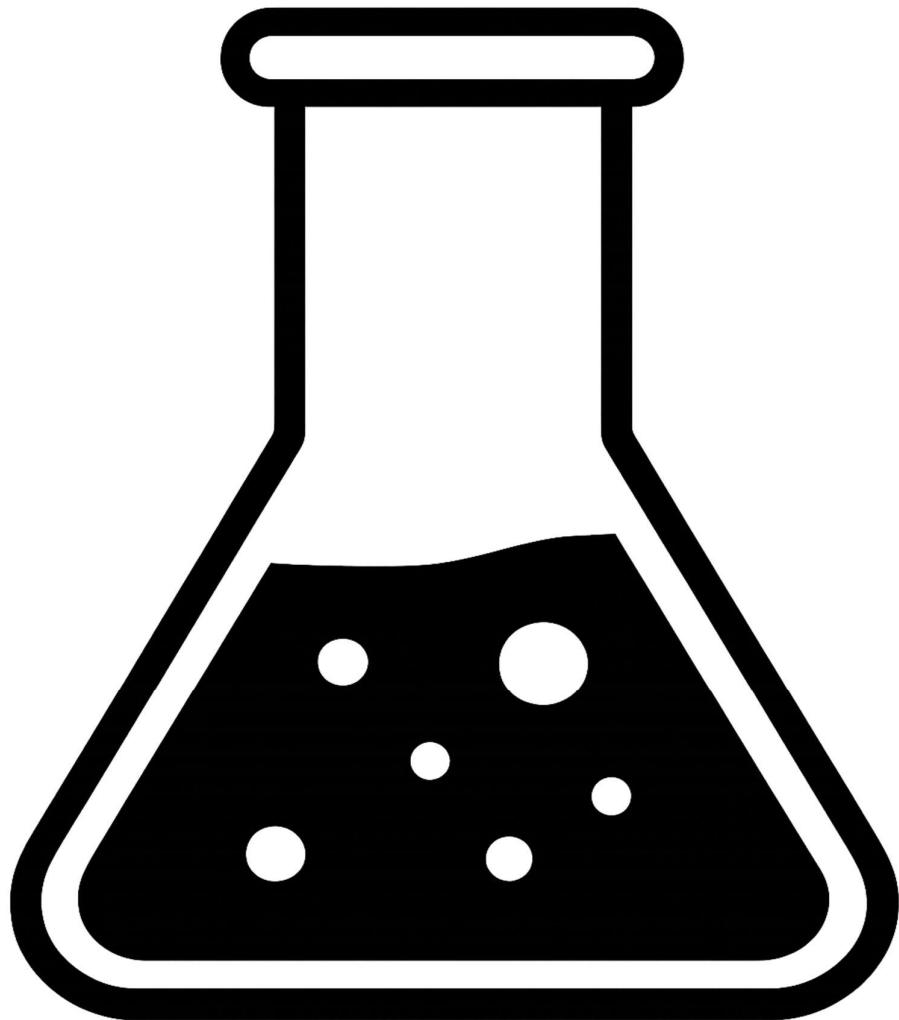


# **0620 IGCSE Chemistry**

## **Mini-Drill and Questions**

### **Assessment Test Prep**



**Prepared by:**  
**The ReviseRoom Educator Team**

## **Multiple Choice Questions**

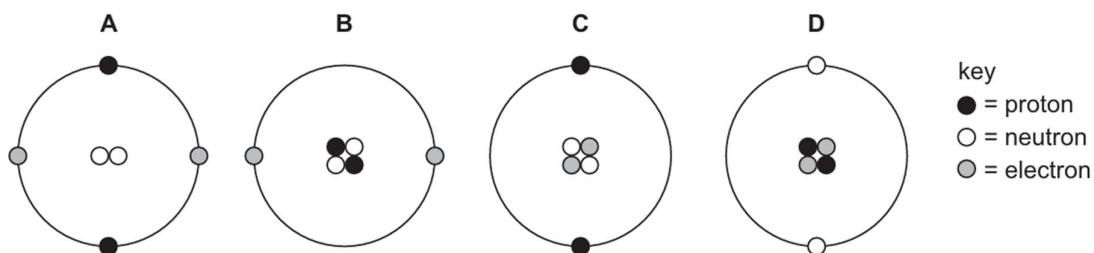
- 1 Which row describes the arrangement and motion of the particles in a liquid?

	arrangement	motion
A	random and particles are touching	moving slowly
B	random with space between all particles	moving slowly
C	an ordered lattice with all particles touching	moving slowly
D	an ordered lattice with space between all particles	moving quickly

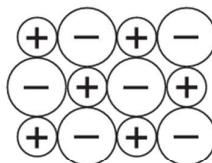
- 2 Which gas has the lowest rate of diffusion at room temperature and pressure?

- A the gas produced when ammonium chloride is heated with aqueous sodium hydroxide
- B the gas which makes up approximately 78% of clean, dry air
- C the gas produced when sodium carbonate is added to dilute hydrochloric acid
- D the gas produced when zinc is added to dilute sulfuric acid

- 3 Which diagram represents one helium atom?



- 4 The diagram shows part of an ionic lattice structure.



Which compound does the diagram represent?

- A potassium bromide
- B sodium oxide
- C magnesium chloride
- D carbon monoxide

**5** What is the formula of iron(III) oxide?

- A** FeO      **B** Fe<sub>3</sub>O<sub>4</sub>      **C** FeO<sub>2</sub>      **D** Fe<sub>2</sub>O<sub>3</sub>

**6** Oxygen melts at –219 °C and boils at –183 °C.

At which temperature is oxygen a liquid?

- A** –225 °C      **B** –189 °C      **C** –175 °C      **D** 25 °C

**7** Which pair of elements react to form a compound with a strong attraction between oppositely charged ions?

- A** carbon and bromine  
**B** carbon and nitrogen  
**C** sodium and oxygen  
**D** sodium and potassium

**8** Four substances, P, Q, R and S, are described.

- P is diatomic.
- Q is a good conductor of electricity when solid and when molten.
- R is a silver solid with a very high melting point.
- S reacts with oxygen to form a brown gas.

Which substances are metals?

- A** P and Q      **B** P and S      **C** Q and R      **D** R and S

**9** Which diagram shows the covalent bonding in a molecule of carbon dioxide?

- A** O–C–O      **B** O=C–O      **C** O=C=O      **D** O≡C≡O

**10** The bonding, structure and melting point of sodium chloride and sulfur dichloride are shown.

compound	bonding	structure	melting point/°C
sodium chloride	ionic	giant lattice	801
sulfur dichloride	covalent	simple molecular	–121

Why does sulfur dichloride have a lower melting point than sodium chloride?

- A** The covalent bonds in sulfur dichloride are weaker than the attractive forces between molecules in sodium chloride.
- B** The covalent bonds in sulfur dichloride are weaker than the ionic bonds in sodium chloride.
- C** The attractive forces between molecules in sulfur dichloride are weaker than the attractive forces between molecules in sodium chloride.
- D** The attractive forces between molecules in sulfur dichloride are weaker than the ionic bonds in sodium chloride.

- 11** Diamond and graphite have giant covalent structures of carbon atoms.

Which statement describes graphite?

- A It has a strong, rigid three-dimensional structure.
- B It has four strong covalent bonds between each carbon atom.
- C It has layers, which can slide over each other.
- D It has no delocalised electrons so does **not** conduct electricity.

- 12** Which row explains the malleability and electrical conductivity of a solid metal?

	malleability	electrical conductivity
A	Delocalised electrons can move freely through the structure.	Delocalised electrons can move freely through the structure.
B	Delocalised electrons can move freely through the structure.	Positive ions can move freely through the structure.
C	Rows of positive ions can slide over each other.	Delocalised electrons can move freely through the structure.
D	Rows of positive ions can slide over each other.	Positive ions can move freely through the structure.

- 13** A sample of ethanol is left in an open beaker at room temperature.

After 24 hours, no ethanol remains in the beaker.

What has happened to the ethanol?

- A It has boiled.
- B It has condensed.
- C It has evaporated.
- D It has frozen.

- 14** A gas is in a sealed container with a fixed volume.

Which statements describe what happens to the molecules in the gas when the temperature is increased?

- 1 They move more slowly.
- 2 They collide with the walls of the container more frequently.
- 3 They collide with the walls of the container with less force.
- 4 They have greater kinetic energy.

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

**15** What happens when sodium atoms combine with chlorine atoms to form sodium chloride?

- A Sodium atoms each gain one electron, and chlorine atoms each lose one electron.
- B Sodium atoms each lose one electron, and chlorine atoms each gain one electron.
- C Sodium atoms and chlorine atoms share one electron with each other.
- D Sodium atoms and chlorine atoms share two electrons with each other.

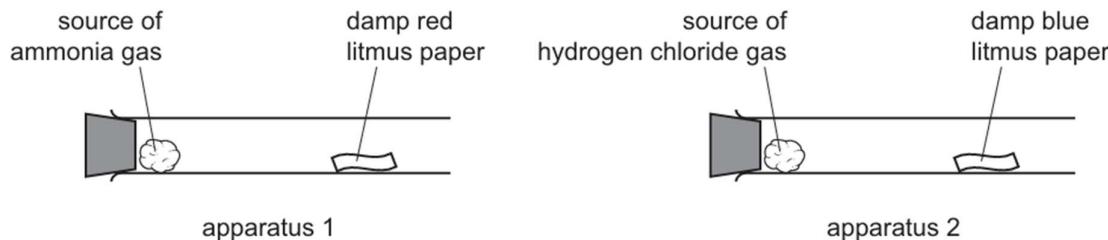
**16** The table shows some properties of four substances.

substance	melting point	electrical conductivity when solid	electrical conductivity when molten
1	high	poor	poor
2	high	poor	good
3	low	poor	poor
4	high	good	good

Which substances are ionic?

- A 1, 3 and 4
  - B 1 and 3 only
  - C 2 and 4
  - D 2 only
- 17** A student investigated the diffusion of ammonia gas,  $\text{NH}_3$ , and hydrogen chloride gas,  $\text{HCl}$ .

Two sets of apparatus were set up as shown at room temperature and pressure.



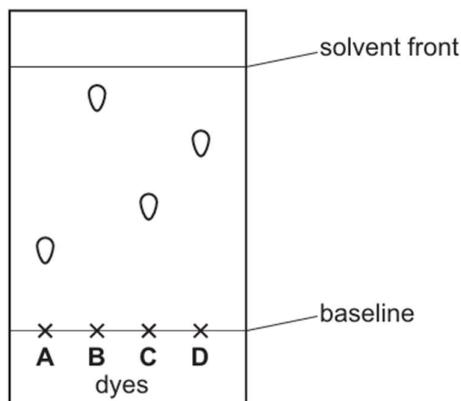
The damp red litmus paper in apparatus 1 changed colour after 30 seconds.

How long does it take for the damp blue litmus paper to change colour in apparatus 2?

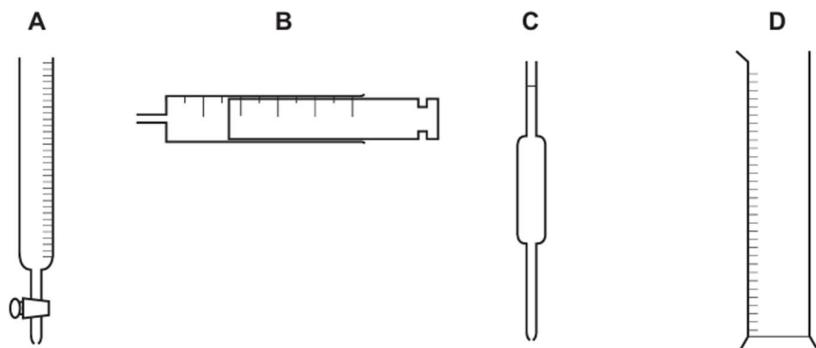
- A 64 seconds
- B 30 seconds
- C 21 seconds
- D The blue litmus paper would not change colour.

- 18** Chromatography is a technique used to separate coloured dyes.

Which dye has an  $R_f$  value of 0.7?



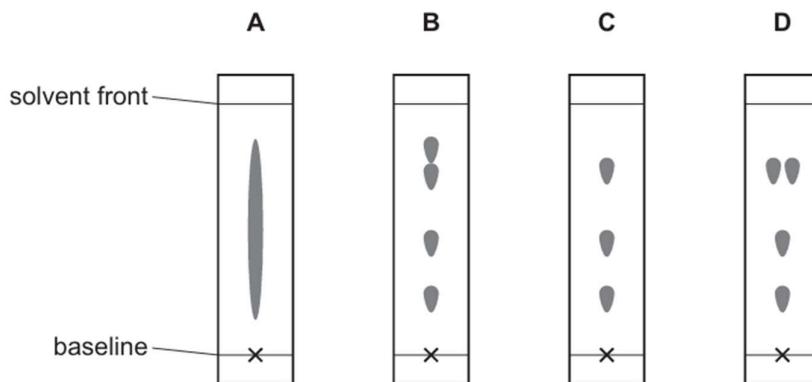
- 19** Which piece of apparatus is used to measure exactly  $26.3 \text{ cm}^3$  of a liquid?



- 20** A chromatography experiment was done to separate a mixture of four substances.

The  $R_f$  values measured for these substances were 0.3, 0.5, 0.8 and 0.8.

Which diagram shows the chromatogram obtained?



- 21 Which piece of apparatus **cannot** be used to collect and measure the volume of gas produced in an experiment?
- A burette  
B gas syringe  
C measuring cylinder  
D pipette
- 22 Paper chromatography is done in the same way with three different mixtures of dyes. Each mixture contains at least one of the dyes W, X, Y and Z.

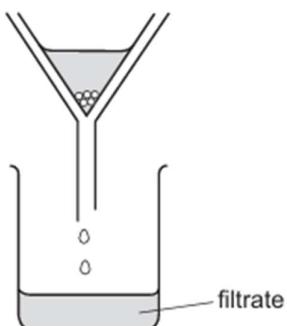
The  $R_f$  values of the dyes in the three mixtures are shown.

dye	$R_f$ values from mixture 1	$R_f$ values from mixture 2	$R_f$ values from mixture 3
W	0.15	0.15	0.15
X	0.00	0.00	0.00
Y	0.50	0.50	0.50
Z	0.00	0.91	0.91

Which conclusion is correct?

- A Dye W is nearest the solvent front and is present only in mixture 1 and mixture 3.  
B Dye X has travelled furthest up the chromatography paper.  
C Dye Y is the only dye present in all three mixtures.  
D Dye Z is nearest the solvent front and is found in only two of the mixtures.
- 23 Which statement describes the structure of an ionic compound?
- A It is a giant lattice of oppositely charged ions.  
B It is a giant lattice of positive ions in a 'sea' of electrons.  
C It is a giant molecule of oppositely charged ions.  
D It is a simple molecule of oppositely charged ions.

- 24 A student separates sugar from pieces of broken glass by dissolving the sugar in water and filtering off the broken glass.



What is the filtrate?

- A broken glass only
- B broken glass and sugar solution
- C pure water
- D sugar solution

# Theory/Written Questions

- 1 This question is about the structures of atoms and ions.

- (a) Define the term *proton number*.

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

- (b) (i) Complete the table to show the number of protons, neutrons and electrons present in atoms of  $^{24}_{12}\text{Mg}$  and  $^{26}_{12}\text{Mg}$ .

	number of protons	number of neutrons	number of electrons
$^{24}_{12}\text{Mg}$			
$^{26}_{12}\text{Mg}$			

[2]

- (ii) What term is used to describe atoms of the same element, such as  $^{24}_{12}\text{Mg}$  and  $^{26}_{12}\text{Mg}$ ?

..... [1]

- (iii) Explain why the chemical properties of  $^{24}_{12}\text{Mg}$  and  $^{26}_{12}\text{Mg}$  are the same.

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

- (c) Complete the table to identify the atoms and ions which have the following numbers of protons, neutrons and electrons.

	number of protons	number of neutrons	number of electrons
$^{23}_{11}\text{Na}^+$	11	12	10
	4	5	4
	17	20	18

[4]

- (d) State the electronic structure of the following atom and ion.

Al .....

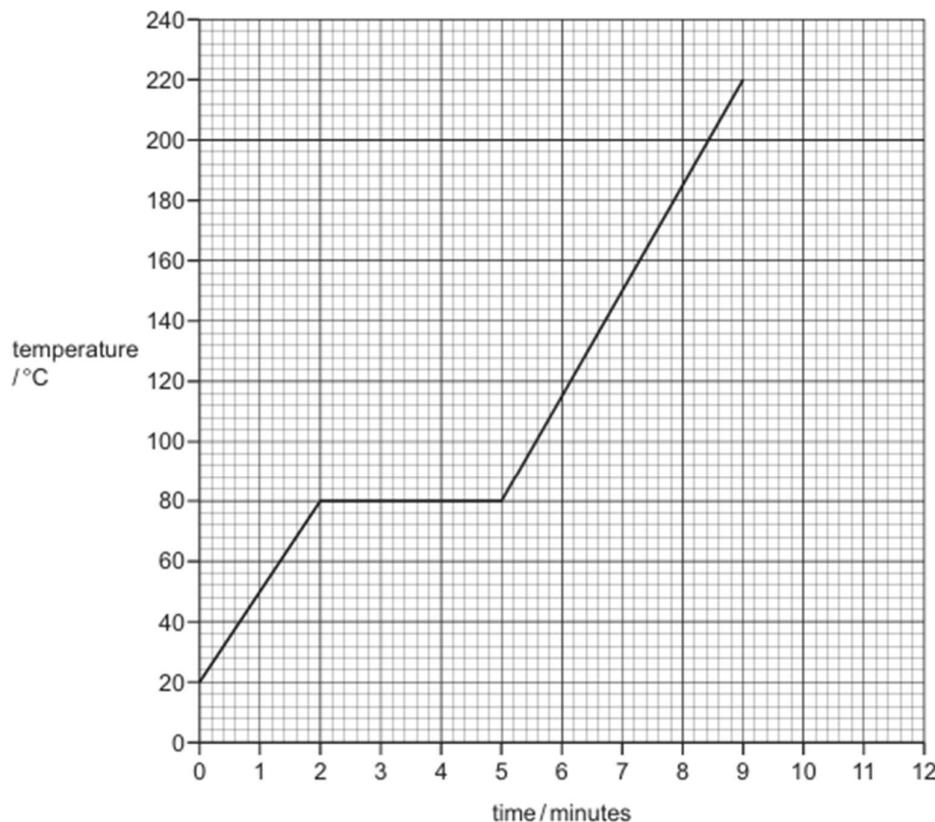
S<sup>2-</sup> .....

[2]

[Total: 13]

- 2 Z is a covalent substance. In an experiment, a sample of pure solid Z was continually heated for 11 minutes.

The graph shows how the temperature of the sample of pure Z changed during the first 9 minutes.



- (a) What is the melting point of pure Z?

..... °C [1]

- (b) The sample of pure Z began to boil at 9 minutes. It was boiled for 2 minutes.

Use this information to sketch on the grid how the temperature of the sample of pure Z changed between 9 minutes and 11 minutes. [1]

- (c) The sample of pure Z was continually heated between 2 minutes and 5 minutes.

Explain, in terms of attractive forces, why there was no increase in the temperature of the sample of pure Z between 2 minutes and 5 minutes.

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

- (d) Describe how the motion of particles of pure Z changed from 0 minutes to 2 minutes.

.....  
.....

[2]

- (e) The experiment was repeated using a solid sample of **impure Z**.

Suggest the differences, if any, in the melting point and boiling point of the sample of impure Z compared to the sample of pure Z.

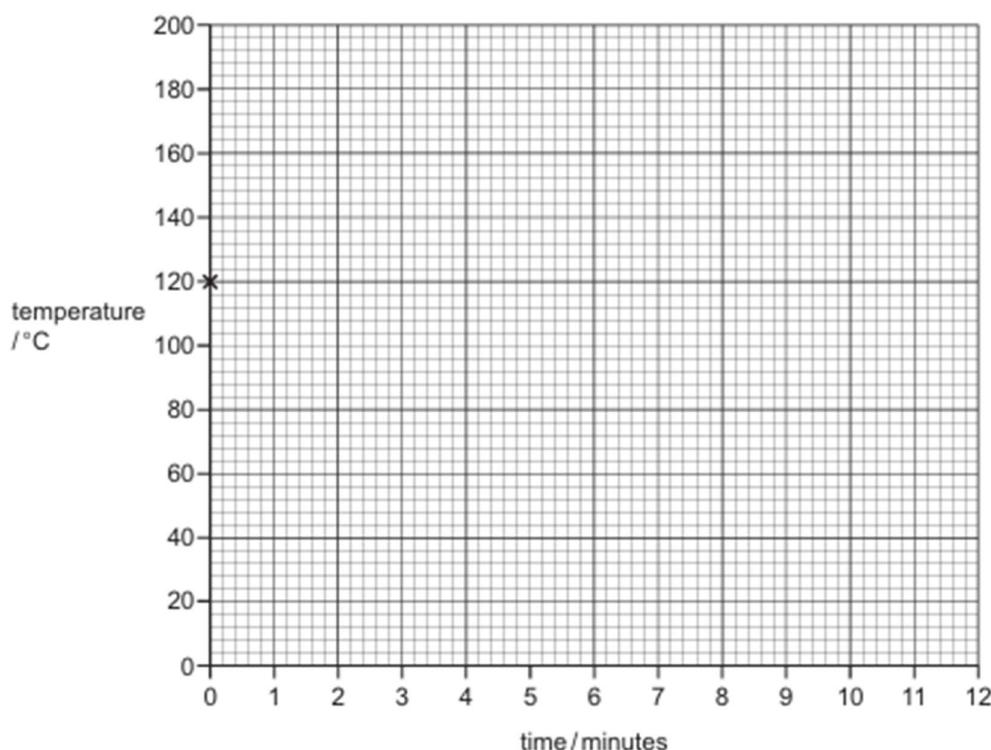
melting point .....

boiling point .....

[2]

- (f) A sample of pure Z was allowed to cool from 120 °C to 20 °C. The total time taken was 8 minutes.

Starting from point X, sketch on the grid how the temperature of the sample of pure Z changed between 0 minutes and 8 minutes.



[2]

[Total: 10]

- 3 Diamond and graphite are different solid forms of carbon. The carbon atoms in diamond and graphite are arranged in different ways.

(a) State the number of covalent bonds each carbon atom has in diamond.

..... [1]

(b) State the term used to describe the structure of diamond.

..... [1]

(c) Name an oxide that has a similar structure to diamond.

..... [1]

(d) Describe the arrangement of atoms in graphite.

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

(e) Explain how graphite conducts electricity.

..... [1]

(f) Buckminsterfullerene is a simple molecular form of carbon.

The relative molecular mass of Buckminsterfullerene is 720.

Determine the number of carbon atoms in one molecule of Buckminsterfullerene.

..... [1]

(g) All forms of carbon burn to produce carbon dioxide.

Name the substance used to test for carbon dioxide.

..... [1]

[Total: 8]

4 Sodium is a reactive metal.

(a) Suggest why sodium is stored under oil.

..... [1]

(b) Sodium burns in air to form sodium oxide,  $\text{Na}_2\text{O}$ .

(i) State the term given to a reaction in which a substance burns.

..... [1]

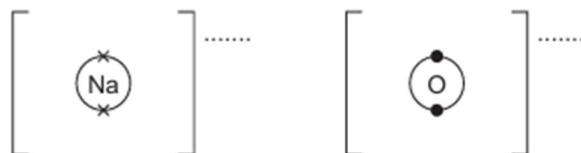
(ii) State the colour of the flame seen when sodium burns.

..... [1]

(iii) Write a chemical equation for the reaction which takes place when sodium burns in air to form sodium oxide.

..... [2]

(iv) Complete the dot-and-cross diagram to show the electron arrangement and charges of the ions in sodium oxide.



[3]

- 5** Atoms and ions are made from small particles called electrons, neutrons and protons.

(a) Complete the table.

particle	relative charge	relative mass
electron	-1	$\frac{1}{1840}$
neutron		
proton		

[2]

- (b) Information about atoms and ions, **A**, **B** and **C**, is shown in the table.

Complete the table.

atom or ion	number of electrons	number of neutrons	number of protons	symbol
<b>A</b>	18		20	$^{42}_{20}\text{Ca}^{2+}$
<b>B</b>		18		$^{35}_{17}\text{Cl}$
<b>C</b>	18	16	16	

[6]

[Total: 8]

- 6** The table shows the melting points, boiling points and electrical conductivities of six substances, **D**, **E**, **F**, **G**, **H** and **I**.

substance	melting point /°C	boiling point /°C	conducts electricity when solid	conducts electricity when liquid
<b>D</b>	1083	2567	yes	yes
<b>E</b>	-117	79	no	no
<b>F</b>	3550	4827	no	no
<b>G</b>	119	445	no	no
<b>H</b>	-210	-196	no	no
<b>I</b>	801	1413	no	yes

- (a) Identify the substance, **D**, **E**, **F**, **G**, **H** or **I**, which is:

- (i) a liquid at 25 °C ..... [1]  
 (ii) a gas at 25 °C ..... [1]  
 (iii) a solid consisting of simple molecules at 25 °C. ..... [1]

- (b) Identify the substance, **D**, **E**, **F**, **G**, **H** or **I**, which is a metal. Give a reason for your choice.

substance .....  
 reason ..... [2]

- (c) Identify the substance, **D**, **E**, **F**, **G**, **H** or **I**, which has a macromolecular structure. Give two reasons for your choice.

substance .....  
 reason 1 .....  
 reason 2 ..... [3]

- (d) Identify the substance, **D**, **E**, **F**, **G**, **H** or **I**, which is an ionic solid. Give a reason for your choice.

substance .....  
 reason .....  
 ..... [2]

[Total: 10]

# Answers

## *Multiple Choice Questions*

- |     |   |     |   |
|-----|---|-----|---|
| 1.  | A | 13. | C |
| 2.  | C | 14. | D |
| 3.  | B | 15. | B |
| 4.  | A | 16. | D |
| 5.  | D | 17. | A |
| 6.  | B | 18. | D |
| 7.  | C | 19. | A |
| 8.  | C | 20. | C |
| 9.  | C | 21. | D |
| 10. | D | 22. | D |
| 11. | C | 23. | A |
| 12. | C | 24. | D |

## *Theory/Written Questions*

Question	Answer	Marks
1(a)	number of protons (1) protons in the nucleus (of an atom) (1)	2
1(b)(i)	12p 12n 12e (1) 12p 14n 12e (1)	2
1(b)(ii)	isotope(s)	1
1(b)(iii)	same number of electrons (1) (same number) of electrons in the outer shell (1)	2
1(c)	${}^9_4\text{Be}$ any element symbol with a single negative charge (1) use of Cl (1) use of ${}^{37}_{17}\text{Cl}$ (1)	4
1(d)	2 8 3 (1) 2 8 8 (1)	2
Question	Answer	Marks
2(a)	80( $^{\circ}\text{C}$ ) (1)	1
2(b)	horizontal line from end of graph at minute 9 to minute 11 (1)	1
2(c)	energy is used to break bonds / overcome attraction (1) between molecules (1)	2
Question	Answer	Marks
2(d)	vibrations (1) increase (1)	2
2(e)	melting point decreases (1) boiling point increases (1)	2
2(f)	decrease from 120 $^{\circ}\text{C}$ to 80 $^{\circ}\text{C}$ and horizontal line at 80 $^{\circ}\text{C}$ (1) decrease from horizontal line to finish at 20 $^{\circ}\text{C}$ at 8 mins (1)	2

Question	Answer	Marks						
3 (a)	4	1						
(b)	giant covalent	1						
(c)	silicon dioxide	1						
(d)	M1 layers M2 hexagon(al) (rings of carbon)	2						
(e)	mobile electrons	1						
(f)	60	1						
(g)	limewater	1						
Question	Answer	Marks						
4 (a)(i)	to prevent contact with air / oxygen and / or water	1						
(b)(i)	combustion	1						
(b)(ii)	yellow	1						
(b)(iii)	$4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$ <b>M1</b> species (1) <b>M2</b> balancing (1)	2						
(b)(iv)	<b>M1</b> eight crosses in second shell of both Na (1) <b>M2</b> six dots and two crosses in second shell of O (1) <b>M3</b> '+' charge on each Na ion on correct answer line <b>and</b> '2-' charge on O ion on correct answer line (1)	3						
Question	Answer	Marks						
5(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th><b>M1</b> relative charge</th><th><b>M2</b> relative mass</th></tr> <tr> <td>0</td><td>1</td></tr> <tr> <td>+1</td><td>1</td></tr> </table> <p>1 mark for each correct column</p>	<b>M1</b> relative charge	<b>M2</b> relative mass	0	1	+1	1	2
<b>M1</b> relative charge	<b>M2</b> relative mass							
0	1							
+1	1							
(b)	<b>M1</b> 22 (1) <b>M2</b> 17 (1) <b>M3</b> 17 (1) <b>M4</b> 32 and 16 (1) <b>M5</b> S (1) <b>M6</b> $2^- / ^-2 / ^{..} (1)$	6						
Question	Answer	Marks						
6(a)(i)	E	1						
(a)(ii)	H	1						
(a)(iii)	G	1						
(b)	<b>M1</b> D (1) <b>M2</b> conducts electricity <b>when solid</b> (1)	2						
Question	Answer	Marks						
(c)	<b>M1</b> F (1) <b>M2</b> high melting point (1) <b>M3</b> non-conductor of electricity <b>when solid and liquid</b> (1)	3						
(d)	<b>M1</b> I (1) <b>M2</b> conducts electricity <b>when liquid but not when solid / ONLY</b> conducts when liquid (1)	2						



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