

- 1 When a piece of solid carbon dioxide is placed in a warm room, it undergoes sublimation.

What is meant by the term *sublimation*?

.....
.....

[2]

[Total: 2]

- 2 Use the kinetic particle model to describe the motion **and** separation of the particles in:

liquid mercury

.....
.....

mercury gas.

.....
.....

[4]

[Total: 4]

- 3 Ammonia has a strong smell.

A beaker of aqueous ammonia was placed in front of a class of students.

At first, the students at the back of the class could not smell the ammonia.

After a few minutes they could smell the ammonia.

Explain these observations using the kinetic particle model.

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.....
.....
.....
.....

[3]

[Total: 3]

- 4 Use the kinetic particle model to describe the motion **and** separation of the particles in:

solid carbon dioxide

.....

.....

carbon dioxide gas.

.....

..... [4]

[Total: 4]

- 5 Use the kinetic particle model to describe the arrangement **and** separation of the particles in:

solid sodium

.....

.....

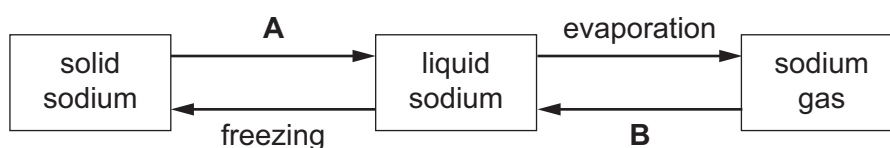
liquid sodium.

.....

..... [4]

[Total: 4]

- 6 Some changes of state of sodium are shown.



State the names of the changes of state represented by **A** and **B**.

A

B [2]

[Total: 2]

- 7 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	electrical conductivity when solid	electrical conductivity when liquid
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D	1610	2230	non-conductor	non-conductor
E	801	1413	non-conductor	good conductor
F	-119	43	non-conductor	non-conductor
G	1535	2750	good conductor	good conductor
H	114	184	non-conductor	non-conductor
I	-210	-196	non-conductor	non-conductor

Choose substances from the table which match the following descriptions. Each substance may be used once, more than once or not at all.

(a) Which substance is a liquid at 25 °C

..... [1]

(b) Which substance is a gas at 25 °C?

..... [1]

(c) Which **three** substances contain simple molecules?

..... [3]

(d) Which substance could be a metal? Give a reason for your answer.

substance

reason

..... [2]

(e) Which substance has a macromolecular structure? Give **two** reasons for your answer.

substance

reason 1

reason 2 [3]

(f) Which substance is an ionic solid? Give **one** reason for your answer.

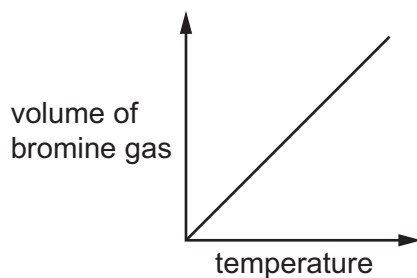
substance

reason

..... [2]

[Total: 12]

- 8 The graph shows how the volume of bromine gas changes with temperature. The pressure is kept constant.



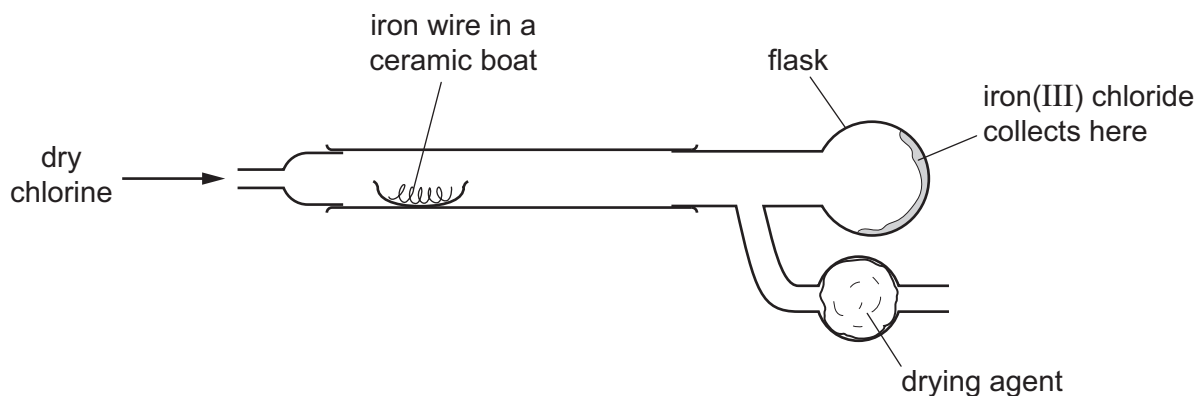
Describe how the volume of the bromine gas changes with temperature.

.....
 [1]

[Total: 1]

- 9 Iron(III) chloride, Fe_2Cl_6 , is produced when iron is heated with chlorine. The diagram shows the apparatus used.

(a) Draw an arrow on the diagram to show where the apparatus is heated.



[1]

(b) Iron(III) chloride undergoes sublimation.

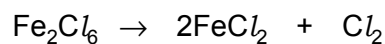
What is meant by the term *sublimation*?

.....
 [1]

(c) Suggest why the iron(III) chloride is collected in the flask and **not** in the ceramic boat.

.....
 [2]

(d) At higher temperatures, iron(III) chloride decomposes.



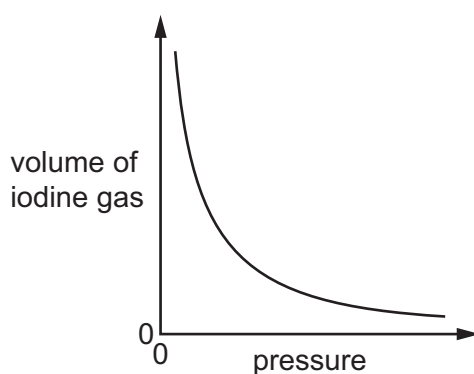
Explain why this is a decomposition reaction.

.....

..... [1]

[Total: 5]

- 10 The graph shows how the volume of iodine gas changes with pressure. The temperature is kept constant.



Describe how the volume of iodine gas changes with pressure.

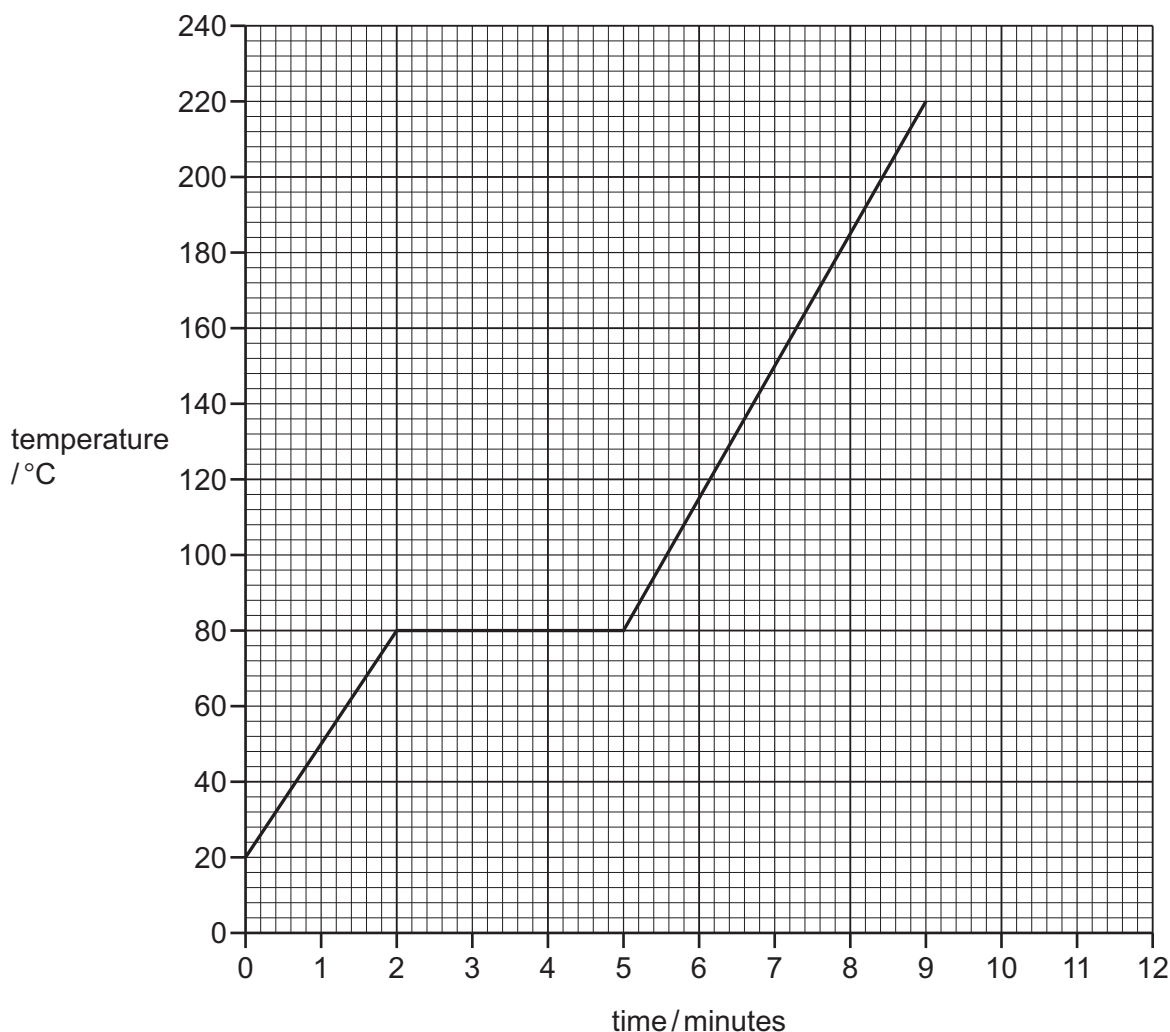
.....

..... [1]

[Total: 1]

- 11 **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.

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.....

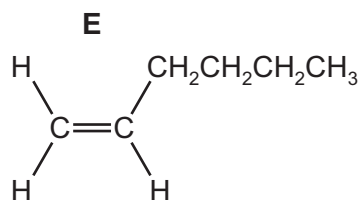
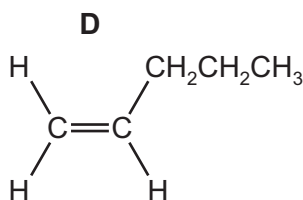
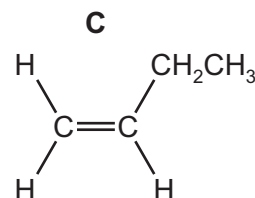
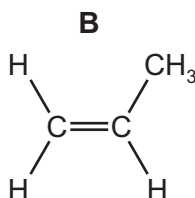
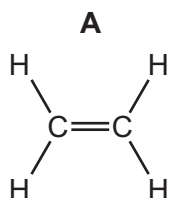
..... [2]

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

.....
 [2]

[Total: 6]

- 12 The structures of five alkenes, **A**, **B**, **C**, **D** and **E**, are shown.



- (a) What is the general formula of alkenes?

..... [1]

- (b) What is the molecular formula of alkene **D**?

..... [1]

- (c) Predict which alkene, **A**, **B**, **C**, **D** or **E**, has the highest boiling point.
 Explain your answer.

alkene

explanation

..... [2]

- (d) Which alkene, **A**, **B**, **C**, **D** or **E**, diffuses most quickly?
 Explain your answer.

alkene

explanation

..... [2]

[Total: 6]

- 13 Solid sulfur is found around the edge of sulfur springs.

When heated, sulfur undergoes sublimation.

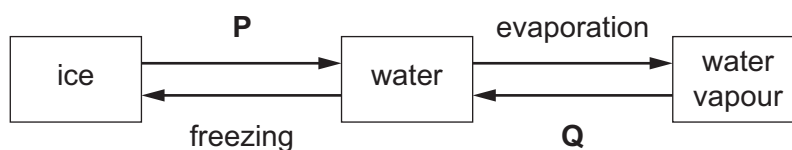
What is meant by the term *sublimation*?

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[1]

[Total: 1]

- 14 Some of the changes of state of water are shown.



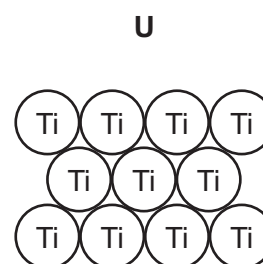
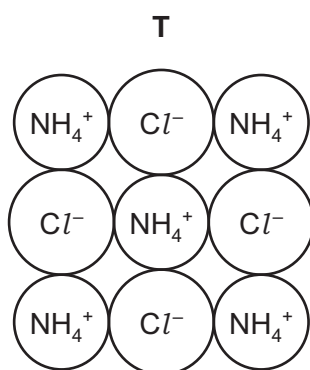
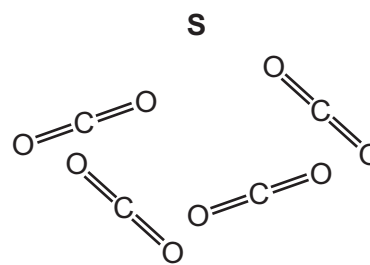
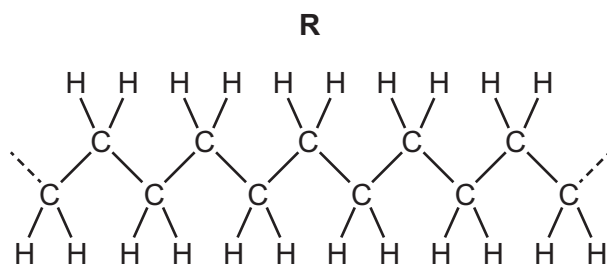
Give the names of the changes of state represented by **P** and **Q**.

P

Q [2]

[Total: 2]

- 15 The diagrams show the structures of four substances, **R**, **S**, **T** and **U**.



State which **one** of these substances, **R**, **S**, **T** or **U**:

- (a) is an element [1]
(b) contains ionic bonds [1]
(c) is a gas at room temperature [1]
(d) is a polymer. [1]

[Total: 4]

16 Limonene is a volatile liquid which smells of oranges.

A teacher placed a beaker of limonene at the front of a classroom.

At first, the students at the back of the classroom could not smell the limonene.

After two minutes, the smell of limonene had spread throughout the classroom.

The air in the classroom was still and calm.

Explain these observations using the kinetic particle model.

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..... [3]

[Total: 3]