AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.3.3.1

Particle motion in gases

Past-paper questions

Tier	**Foundation**
Question groups	**2**
Available paper years	**2019–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

6.3.3.1 Particle motion in gases

Question 01

June 2019 | 8464/P/1F | Original Q7

0 7 A scientist cooled the air inside a container.

0 7 . 1 The temperature of the air changed from 20 °C to 0 °C

The volume of the container of air stayed the same.

Explain how the motion of the air molecules caused the pressure in the container to change as the temperature decreased.

[3 marks]

0 7 . 2 The air contained water that froze at 0 °C

The change in internal energy of the water as it froze was 0.70 kJ

The specific latent heat of fusion of water is 330 kJ/kg

Calculate the mass of ice produced.

Use the Physics Equations Sheet.

[3 marks]

Mass of ice = _____ kg

6.3.3.1 Particle motion in gases

Question 01 · continued

June 2019 | 8464/P/1F | Original Q7

0 7 . 3 The air also contained oxygen, nitrogen and carbon dioxide.

Oxygen boils at –183 °C and freezes at –218 °C
Nitrogen boils at –195 °C and freezes at –210 °C
Carbon dioxide sublimates at –78 °C

The scientist continued to cool the air to a temperature of –190 °C

What is the state of each substance at –190 °C?

[2 marks]

Tick (✓) **one** box for **each** row of the table.

Substance	Solid	Liquid	Gas
Oxygen			
Nitrogen			
Carbon dioxide			

Question 7 continues on the next page

6.3.3.1 Particle motion in gases

Question 01 · continued

0 7 . 4 The air also contained a small amount of argon.

As the temperature of the air decreased from 20 °C to –190 °C the argon changed from a gas to a liquid to a solid.

Explain the changes in the arrangement and movement of the particles of the argon as the temperature of the air decreased.

[6 marks]

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6.3.3.1 Particle motion in gases

Question 02

June 2024 | 8464/P/1F | Original Q5

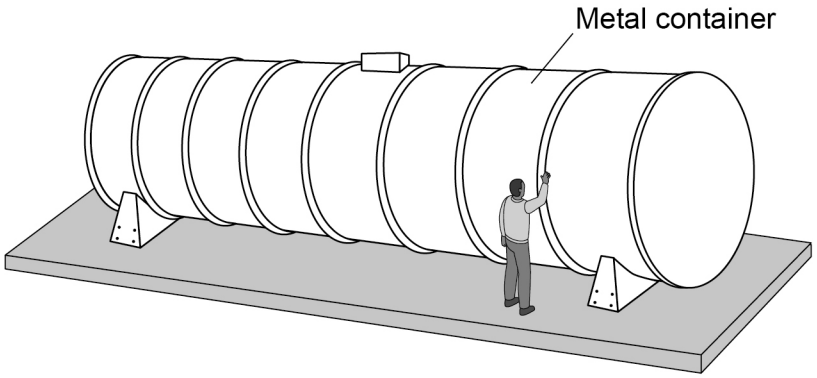
0 5 Data-storage computers get very hot.

Scientists investigated using the sea to cool data-storage computers.

The computers were set up inside a large metal container.

Figure 8 shows the metal container before it was lowered into the sea.

Figure 8



0 5 . 1 Why is the container made of metal?

[1 mark]

Tick (✓) **one** box.

Metal has a high thermal conductivity. ☐

Metal is a good thermal insulator. ☐

Metal is a poor conductor of thermal energy. ☐

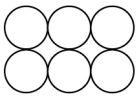
6.3.3.1 Particle motion in gases

Question 02 · continued

0 5 . 2 The walls of the container are solid.

Figure 9 shows an arrangement of six particles in a solid.

Figure 9



The air inside the container is a gas.

Draw an arrangement of six particles in a gas in the box below.

[1 mark]

0 5 . 3 How does the air in the container exert pressure on the container?

[1 mark]

Tick (✓) **one** box.

Air particles absorb energy from the container. ☐

Air particles collide with the walls of the container. ☐

Air particles expand to fill the container. ☐

Question 5 continues on the next page

6.3.3.1 Particle motion in gases

Question 02 · continued

0 5 . 4 As the container is lowered into the sea, the temperature of the air in the container decreases.

Complete the sentence.

Choose the answer from the box.

[1 mark]

decreases	**stays the same**	**increases**

When the temperature of the air in the container decreases, the average speed of the air particles _____.

0 5 . 5 After the temperature of the air in the container had decreased, the computers were switched on.

The computers caused the temperature of the air to then increase.

Describe how the air pressure in the container changed as the temperature decreased and then increased.

[2 marks]

6.3.3.1 Particle motion in gases

Question 02 · continued

0 5 . 6 The container has a length of 12 m.

The container has a cross-sectional area of 7.5 m^2.

Calculate the volume of the container.

Use the equation:

volume = length × cross-sectional area

[1 mark]

Volume = _____ m^3

Use the Physics Equations Sheet to answer questions **05.7** and **05.8**.

0 5 . 7 Write down the equation that links density (ρ), mass (m) and volume (V).

[1 mark]

0 5 . 8 The average density of the container and its contents is 1100 kg/m^3.

Calculate the mass of the container and its contents.

Use your answer to Question **05.6**

[3 marks]

Mass = _____ kg

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