

GCSE Combined Science: Trilogy

Worksheet: Group 0

TIME 30 min	TOTAL 27 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Group 0

NAME _____

CLASS _____

DATE _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Group 0 is the last group in the periodic table.

0 1 . 1

What name is given to the elements in Group 0?

.....

.....

.....

.....
[1 mark]

0 1 . 2

Explain why the elements in Group 0 are unreactive.

.....

.....

.....
[1 mark]

0 1 . 3

How many electrons are in the outer shell of a helium atom?

.....

.....

.....

.....
[1 mark]

0 1 . 4

Which is the formula of argon gas?

Tick (✓) **one** box.

Ar

☐

Ar₂

☐

Ar₄

☐

Ar₈

☐

[1 mark]

0 2

The elements in Group 0 are called the noble gases.

0 2 . 1

Why are the noble gases unreactive?

Tick (✓) **one** box.

They have a stable arrangement of electrons.

☐

They have no electrons.

☐

They have no neutrons.

☐

They are gases at room temperature.

☐

[1 mark]

0 2 . 2

Name the noble gas with the smallest atomic number.

.....

.....

.....

[1 mark]

0 2 . 3

How many electrons are in the outer shell of a neon atom?

.....

.....

.....

[1 mark]

0 3

A helium atom has only two electrons.

A student says:

‘Helium should be in Group 2, because its atoms have two electrons in their outer shell.’

0 3 . 1

Evaluate the student’s statement.

.....

.....

.....

.....

.....

.....

[3 marks]

0 4

The Group 0 elements are all unreactive, but some of their physical properties change down the group.

0 4 . 1

Describe how the boiling points of the Group 0 elements change down the group.

Explain why all the Group 0 elements are unreactive.

.....

.....

.....

.....

.....

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.....

.....

[4 marks]

0 5

Table 1 shows the densities of some Group 0 elements at 0 °C.

Table 1

Noble gas	Density in g/dm ³
Helium	0.18
Neon	0.90
Argon	1.78
Krypton	3.75
Xenon	5.90

0 5 . 1

Describe the trend in density shown in Table 1.

.....

.....

[1 mark]

0 5 . 2

Calculate how many times denser xenon is than helium.
Give your answer to 2 significant figures.

.....

.....

.....

.....

.....

[2 marks]

0 5 . 3

Radon is below xenon in Group 0.
Predict the density of radon at 0 °C.

.....

.....

[1 mark]

0 6

Hydrogen and helium are both less dense than air, so either gas could be used to fill an airship.

Densities at room temperature: hydrogen 0.08 g/dm^3 , helium 0.17 g/dm^3 , air 1.2 g/dm^3 .
Hydrogen burns explosively in air. Helium is a noble gas.

0 6 . 1

Evaluate the use of hydrogen and helium to fill passenger airships.

.....

.....

.....

.....

.....

.....

[3 marks]

0 7

Table 2 shows the relative atomic masses and boiling points of some noble gases.

Table 2

Noble gas	Relative atomic mass	Boiling point in °C
Helium	4	-269
Neon	20	-246
Argon	40	-186
Krypton	84	-153
Xenon	131	-108

0 7 . 1

Describe the trend in boiling points shown in Table 2.

.....

.....

[1 mark]

0 7 . 2

Radon is below xenon in Group 0.
Predict the boiling point of radon.

.....

.....

.....

Boiling point = °C

[1 mark]

0 7 . 3

Which noble gases in Table 2 are gases at -200 °C?
Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 7 . 4

Helium is used to fill weather balloons.
Suggest **two** properties of helium that make it suitable for this use.

.....

.....

.....

.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Group 0 · 27 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: the noble gases

- noble gases (1)
-

01.2 [1 mark]

Answer: Their atoms have a stable arrangement of electrons / a full outer shell.

- (atoms have a) full outer shell / stable arrangement of electrons (1)
-

01.3 [1 mark]

Answer: 2

- 2 (1)
-

01.4 [1 mark]

Correct: Ar

Question 2 (3 marks)

02.1 [1 mark]

Correct: They have a stable arrangement of electrons.

02.2 [1 mark]

Answer: helium

- helium (1)
-

02.3 [1 mark]

Answer: 8

- 8 (1)
-

Question 3 (3 marks)

03.1 [3 marks]

Answer: The student is wrong. Helium's two electrons fill its outer (first) shell, so it has a stable arrangement like the other noble gases and is unreactive; Group 2 metals react by losing their two outer electrons. Helium belongs in Group 0.

- helium's two electrons are in the first shell, which is full with 2 electrons (1)
- so helium has a stable arrangement of electrons, like the other noble gases (1)
- helium is unreactive, unlike Group 2 metals, which react by losing their two outer electrons (1)
- judgement: helium belongs in Group 0, so the student is wrong (1)

Any 3 of the points above.

Question 4 (4 marks)

04.1 [4 marks]

Answer: Boiling points increase down the group as the relative atomic mass increases. The elements are unreactive because their atoms have stable arrangements of electrons: eight electrons in the outer shell (two for helium).

Levels of response

- **Level 2 (3–4)** A clear, logically linked answer covering the key points accurately.
- **Level 1 (1–2)** One or two relevant points with little linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- the boiling points increase down Group 0
 - boiling point increases as the relative atomic mass increases
 - the atoms have a stable arrangement of electrons / a full outer shell, so they do not easily gain, lose or share electrons
 - they have eight electrons in the outer shell, except helium, which has two (a full first shell)
-

Question 5 (4 marks)

05.1 [1 mark]

Answer: Density increases down the group.

- density increases down the group / as the relative atomic mass increases (1)

05.2 [2 marks]

Answer: 33

- $5.90 \div 0.18 (= 32.8)$ (1)
- 33 (1)

Notes: An answer of 32.8 (not 2 significant figures) scores 1 mark.

05.3 [1 mark]

Answer: any value greater than 5.90 g/dm^3 (the actual value is 9.7 g/dm^3)

- any value greater than $5.90 \text{ (g/dm}^3\text{)}$ (1)

Notes: Allow any value from 6 to 12 g/dm^3 .

Question 6 (3 marks)

06.1 [3 marks]

Answer: Hydrogen is less dense so gives slightly more lift, but it can burn explosively; helium is unreactive because its atoms have a full outer shell, so it is much safer. Helium is the better choice because safety matters more than the small difference in lift.

- hydrogen is less dense than helium, so it would give (slightly) more lift (1)
- hydrogen is flammable / burns explosively, so it is dangerous if there is a spark or flame (1)
- helium does not burn / is unreactive, so it is much safer (1)
- helium is unreactive because its atoms have a stable arrangement of electrons / a full outer shell (1)
- judgement: helium is the better choice for passenger airships, because safety matters more than the small difference in lift (1)

Any 3 of the points above.

Notes: For 3 marks the answer must include a judgement.

Question 7 (6 marks)

07.1 [1 mark]

Answer: The boiling point increases as the relative atomic mass increases (down the group).

- boiling point increases as relative atomic mass increases / down the group (1)
-

07.2 [1 mark]

Answer: any value from $-90\text{ }^{\circ}\text{C}$ to $-40\text{ }^{\circ}\text{C}$ (actual value $-62\text{ }^{\circ}\text{C}$)

- any value from -90 to $-40\text{ }(^{\circ}\text{C})$ (1)
-

07.3 [2 marks]

Answer: Helium and neon, because their boiling points are below $-200\text{ }^{\circ}\text{C}$.

- helium and neon (1)
- their boiling points are lower than $-200\text{ }^{\circ}\text{C}$ (1)

Notes: Both gases are needed for the first mark.

07.4 [2 marks]

Answer: It has a low density (less dense than air) and it is unreactive (not flammable).

- low density / less dense than air (1)
- unreactive / inert / not flammable (1)
- it is a gas even at very low temperatures (1)

Any 2 of the points above.
