

GCSE Chemistry

Worksheet: Comparison with Group 1 elements

TIME 25 min	TOTAL 24 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Comparison with Group 1 elements

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

Iron and copper are transition metals. Sodium and potassium are Group 1 metals. Table 1 shows some of their properties.

Table 1

Metal	Melting point in °C	Density in g/cm³
Sodium	98	0.97
Potassium	63	0.86
Iron	1538	7.87
Copper	1085	8.96

0 1 . 1

Compare the melting points of the transition metals with the melting points of the Group 1 metals.

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.....

[1 mark]

0 1 . 2

Which metal in Table 1 has the highest density?

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.....

.....

.....

[1 mark]

0 1 . 3

Which statement about transition metals is correct?

Tick (✓) **one** box.

They are softer than Group 1 metals.

☐

They are harder and stronger than Group 1 metals.

☐

They react more vigorously with water than Group 1 metals.

☐

They have lower densities than Group 1 metals.

☐

[1 mark]

0 1 . 4

The density of water is 1.00 g/cm^3 .

Use Table 1 to explain why sodium floats on water but iron sinks.

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.....

.....

[2 marks]

0 2

Iron and nickel are transition metals. Sodium and potassium are Group 1 metals.

0 2 . 1

Which property is typical of transition metals but not of Group 1 metals?

Tick (✓) **one** box.

High melting point

☐

Low density

☐

Soft enough to cut with a knife

☐

Reacts vigorously with cold water

☐

[1 mark]

0 2 . 2

Which metal reacts most vigorously with cold water?

Tick (✓) **one** box.

Iron

☐

Nickel

☐

Copper

☐

Potassium

☐

[1 mark]

0 3

Iron and nickel are transition metals. Sodium and potassium are Group 1 metals.

0 3 . 1

Describe how the reaction of potassium with cold water is different from the reaction of nickel with cold water.

.....

.....

.....

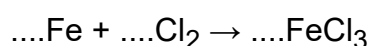
.....

[2 marks]

0 3 . 2

Iron reacts with chlorine only when it is heated. The product is iron(III) chloride, FeCl₃.

Balance the equation.



.....

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[1 mark]

0 3 . 3

Sodium reacts with chlorine without being heated.

What does this suggest about the reactivity of iron compared with sodium?

.....

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[1 mark]

0 3 . 4

Explain why iron is used to build bridges but sodium is not.

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[2 marks]

0 4

Two unlabelled metal samples are being tested. Sample A conducts electricity and is very hard. Sample B also conducts electricity but is soft enough to cut with a knife. One sample is a transition metal and the other is a Group 1 metal.

0 4 . 1

Describe a test, other than hardness, that could confirm which sample is the Group 1 metal. Give the expected result.

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[2 marks]

0 5

Metal **X** melts at 1495 °C and has a density of 8.9 g/cm³. It forms compounds containing X²⁺ ions and compounds containing X³⁺ ions.

0 5 . 1

Explain why metal X is very unlikely to be a Group 1 metal. Compare its properties with those of Group 1 metals.

[3 marks]

0 6

A student says:

‘Transition metals are unreactive, so they are not useful in chemical reactions.’

0 6 . 1

Evaluate the student’s statement.

[2 marks]

0 7

Transition metals and Group 1 metals are both metals, but they have different typical properties.

0 7 . 1

Describe **two** physical differences and **two** chemical differences between transition metals and Group 1 metals.

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[4 marks]

END OF QUESTIONS

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

Mark scheme

GCSE Chemistry · Worksheet: Comparison with Group 1 elements · 24 marks

Question 1 (5 marks)

01.1 [1 mark]

Answer: The transition metals have much higher melting points.

- transition metals have (much) higher melting points (1)
-

01.2 [1 mark]

Answer: copper

- copper (1)

Notes: Allow Cu.

01.3 [1 mark]

Correct: They are harder and stronger than Group 1 metals.

01.4 [2 marks]

Answer: Sodium (0.97 g/cm^3) is less dense than water; iron (7.87 g/cm^3) is denser than water.

- the density of sodium (0.97 g/cm^3) is less than that of water (1)
 - the density of iron (7.87 g/cm^3) is greater than that of water (1)
-
-

Question 2 (2 marks)

02.1 [1 mark]

Correct: High melting point

02.2 [1 mark]

Correct: Potassium

Question 3 (6 marks)

03.1 [2 marks]

Answer: Potassium reacts vigorously (fizzes, melts, burns with a lilac flame); nickel shows no visible reaction.

- potassium reacts vigorously / fizzes / melts / burns (with a lilac flame) (1)
- nickel does not react / shows no visible reaction (1)

03.2 [1 mark]

Answer: $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$

- $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$ (1)

03.3 [1 mark]

Answer: Iron is less reactive than sodium.

- iron is less reactive (than sodium) (1)

03.4 [2 marks]

Answer: Iron is strong and hard and does not react quickly with water or oxygen; sodium is soft and reacts vigorously with water.

- iron is strong / hard (1)
- iron has a high melting point (1)
- iron does not react quickly with water / oxygen (1)
- sodium is soft / reacts (vigorously) with water / oxygen (1)

Any 2 of the points above.

Question 4 (2 marks)

04.1 [2 marks]

Answer: Add a small piece of each sample to cold water: the Group 1 metal fizzes and reacts quickly; the transition metal shows little or no reaction.

- add a small piece of each sample to (cold) water (1)
- the Group 1 metal (B) fizzes / reacts quickly; the transition metal (A) shows little or no reaction (1)

Notes: Allow: compare densities — the Group 1 metal is less dense (and may float on water).

Question 5 (3 marks)

05.1 [3 marks]

Answer: Group 1 metals have low melting points and low densities, but X has a very high melting point and a high density; Group 1 metals only form 1+ ions, but X forms 2+ and 3+ ions.

- Group 1 metals have low melting points, but X has a very high melting point (1)
 - Group 1 metals have low densities, but X has a high density (1)
 - Group 1 metals only form 1+ ions, but X forms ions with different charges (2+ and 3+) (1)
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Question 6 (2 marks)

06.1 [2 marks]

Answer: Transition metals are much less reactive than Group 1 metals, but they are not unreactive (iron rusts, and reacts with chlorine when heated). Many transition metals and their compounds are very useful in chemical reactions as catalysts.

- transition metals are less reactive than Group 1 metals, but they are not unreactive, e.g. iron reacts with oxygen and water (rusts) / reacts with chlorine when heated (1)
- many transition metals and their compounds are useful as catalysts, e.g. iron in the Haber process (1)
- their low reactivity is useful in itself, e.g. for pipes or structures that must not react quickly with water or air (1)

Any 2 of the points above.

Question 7 (4 marks)

07.1 [4 marks]

Answer: Physical: transition metals have higher melting points and higher densities, and are harder and stronger. Chemical: transition metals are much less reactive with water, oxygen and halogens, and they form ions with different charges.

- physical: transition metals have (much) higher melting points (1)
- physical: transition metals have (much) higher densities (1)
- physical: transition metals are harder / stronger (1)
- chemical: transition metals react much less vigorously with water / oxygen (1)
- chemical: transition metals react much less vigorously with halogens (1)
- chemical: transition metals form ions with different charges; Group 1 metals only form 1+ ions (1)

Any 4 of the points above.

Notes: Maximum 2 marks for physical differences and maximum 2 marks for chemical differences. Allow the converse statements about Group 1 metals.
