

[Identification of ions by chemical and spectroscopic means
(Flame tests (metal ions), Tests for carbonate, sulfate, halides
(Awareness of instrumental methods like flame emission spectroscopy))]

Q1.a(2019)



1

2.2

BOTH required
ALLOW multiples

Q1.b(2019)

Potassium bromide $\checkmark$

Q1.c(2019)

Bromine less reactive (than chlorine) / ORA $\checkmark$
Bromine displaced/replaced by chlorine $\checkmark$

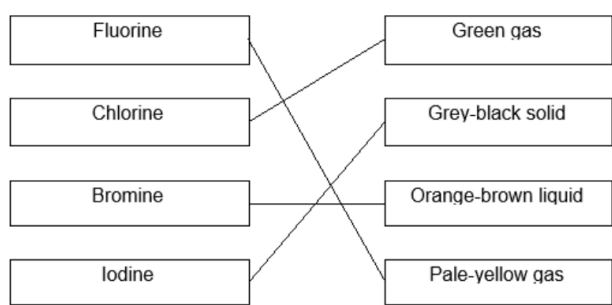
2

2×1.1

Chlorine is more reactive (than bromine)
Chlorine displaces bromine

DO NOT ALLOW chloride / bromide

Q2.(2020)



3

3 x 1.1

All 4 correct scores 3 marks
2/3 correct scores 2 marks
1 correct scores 1 mark

Q3.(2020)

<p>Please refer to the marking instructions on page 4 of this mark scheme for guidance on how to mark this question.</p> <p>Level 3 (5–6 marks) Describes a detailed method of comparing the reactivity of the four metals. AND Describes in detail how the results of their method are used to place the four metals in an order of reactivity.</p> <p><i>There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.</i></p> <p>Level 2 (3–4 marks) Describes a suitable method of comparing the reactivity of the four metals. AND Gives an outline of how the results of their method are used to place the four metals in an order of reactivity.</p> <p><i>There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence.</i></p> <p>Level 1 (1–2 marks) Describes a basic method of comparing the reactivity of the four metals. OR Attempts to describe how the results of their method are used to place the four metals in an order of reactivity.</p> <p><i>There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant.</i></p> <p>0 marks <i>No response or no response worthy of credit.</i></p>	<p>6</p>	<p>3 x 1.2 3 x 2.2</p>	<p>AO1.2 Demonstrates knowledge and understanding of scientific techniques and procedures Describes a suitable method of comparing the reactivity of the four metals e.g.</p> <ul style="list-style-type: none"> • score the amount of fizzing • measure the rise in temperature • time how long it takes for the metal to disappear • time how long it takes to capture a certain volume of the gas • Describes the variables that need to be controlled e.g. <ul style="list-style-type: none"> ○ same amount of metal ○ same volume of acid ○ same concentration of acid ○ same temperature of acid <p>AO2.2 Application of knowledge and understanding of scientific enquiry, techniques and procedures Describes how the results of their method are used to place the four metals in an order of reactivity e.g.</p> <ul style="list-style-type: none"> • the more fizzing the more reactive the metal • the greater the temperature rise the more reactive the metal • the quicker the metal disappears the more reactive the metal • the less time to collect the volume of gas the more reactive the metal
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Q4.a(2021)

7✓

Q4.b(2021)

Less reactive✓

Q4.c(2021)

Solid ✓

Q4.d(2021)

Higher ✓

Q5.a(2022)

black solid/dark-grey solid ✓	1	3.2a	Both colour and solid needed for mark ALLOW dark purple, dark blue, blue-black DO NOT ALLOW blue/green
Q5.b(2022)			
1.28 x 10 ⁻¹² m ☐			
1.28 x 10 ⁻¹⁰ m ☒			
1.28 x 10 ¹⁰ m ☐			
1.28 x 10 ¹² m ☐			
✓			
Q5.c(2022)			
bromine ✓			
Q5.d(2022)			
linear scale on x-axis ✓	4	3 x 2.2	points need to cover ≥ half the grid Non-linear scale gives access to M4 only
all 4 points plotted correctly scores 2 marks ✓✓			ALLOW ± ½ small square for plots only 3 or 2 points plotted correctly scores 1 mark IGNORE only 1 point plotted correctly
line of best fit through points ✓		1.2	ECF from plotted points DO NOT ALLOW dot to dot line DO NOT ALLOW multiple lines IGNORE line before first plot and after last plot
Q5.e(2022)			
Value read from graph ✓	1	3.1a	ALLOW ± 1 small square DO NOT ALLOW mark if no line of best fit present
Q5.f(2022)			
(fluorine molecules) are the smallest/smaller ✓	2	3.1b	Answers must imply a comparative e.g. smallest not just small
(fluorine) has the lowest boiling point/lower ✓			ALLOW Least amount of energy needed to boil DO NOT ALLOW simply quoting values from the table without an interpretation
Q5.g(2022)			
(same) number of electrons/7 electrons in outer energy level ✓	2	1.1	ALLOW shells for energy levels throughout IGNORE they both have 2 electrons on their inner shell
(different) numbers of energy levels/F has 2 energy levels but Cl has 3 energy levels/Cl has one more energy level ✓			IGNORE chlorine has more electrons ALLOW 1 mark for correct drawing of both fluorine and chlorine atoms/correct electronic structures if no other mark scored

Q6.(2023)

A

Q7.a(2024)

	Group 1	Group 7	Group 0
They are non-metals.		✓	✓
They are soft solids.	✓		
They form coloured gases.		✓	

✓✓✓

3

3 x 1.1

1 mark for each correct **row**

Q7.b(2024)

Group 1 element	Time for piece of metal to disappear (s)
potassium	4
lithium	21
sodium	12

✓✓

2

2 x 2.1

All 3 correct = 2 marks
Any 1 correct = 1 mark

Q7.c(2024)

Group 7 element	Observation
bromine	The iron glows brightly.
chlorine	The iron glows very brightly.
iodine	The iron only glows slightly.

✓✓

2

2 x 2.1

All 3 correct = 2 marks
Any 1 correct = 1 mark

Q7.d(2024)

(The boiling points) increase ✓

1

3.1a

ALLOW (become) higher / become less negative / more positive

Q7.e(2024)

Between -175 and -225 °C ✓

1

3.2a

ALLOW -153 to -245

NOTE if answer line is blank check the table, but
the answer line takes precedence