Questions

Q1.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

The halogens are elements in Group 7 of the Periodic Table.

The halogens can be identified by their colour in an organic solvent such as hexane or cyclohexane.

Which sequence of colours is correct for chlorine, bromine and iodine dissolved in an organic solvent?

(1)

	Chlorine	Bromine	Iodine
☒ **A**	orange	red-brown	black
☒ **B**	pale green	orange	black
☒ **C**	orange	red-brown	purple
☒ **D**	pale green	orange	purple

(Total for question = 1 mark)

Q2.

This question is about the elements in Group 7 of the Periodic Table and some of their compounds.

What is the colour of iodine in the solid and gas states?

(1)

	Colour of iodine solid	Colour of iodine gas
☒ **A**	purple	brown
☒ **B**	purple	purple
☒ **C**	grey/black	brown
☒ **D**	grey/black	purple

(Total for question = 1 mark)

Q3.

This question is about the elements in Group 7 of the Periodic Table and some of their compounds.

Which of these reactions occurs?

(1)

- ☒ **A** $Br_2(aq) + 2NaCl(aq) \rightarrow 2NaBr(aq) + Cl_2(aq)$
- ☒ **B** $Br_2(aq) + 2NaF(aq) \rightarrow 2NaBr(aq) + F_2(aq)$
- ☒ **C** $Cl_2(aq) + 2NaBr(aq) \rightarrow 2NaCl(aq) + Br_2(aq)$
- ☒ **D** $Cl_2(aq) + 2NaF(aq) \rightarrow 2NaCl(aq) + F_2(aq)$

(Total for question = 1 mark)

Q4.

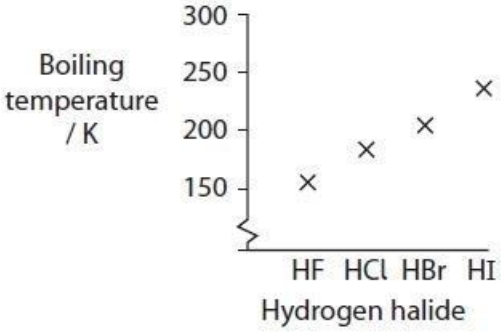
This question is about the elements in Group 7 of the Periodic Table and some of their compounds.

The hydrogen halides have the general formula HX, where X represents the symbol of the halogen.

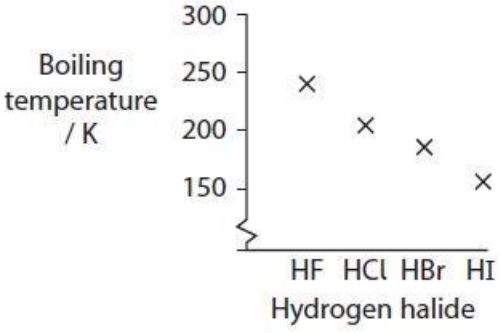
(i) Which diagram shows the trend in the boiling temperatures of the hydrogen halides?

(1)

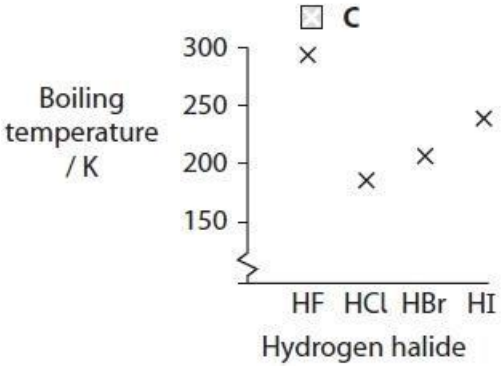
☒ **A**



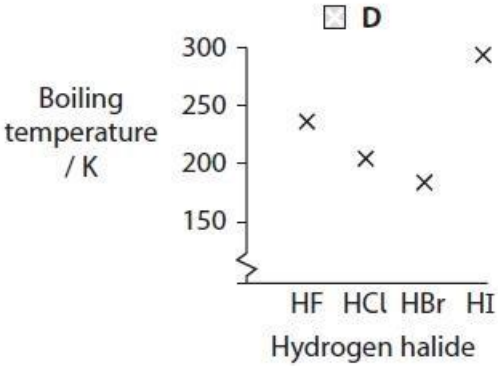
☒ **B**



☒ **C**



☒ **D**



(ii) What type of reaction occurs when ammonia gas reacts with hydrogen chloride gas?

(1)

☒ **A** acid-base
☒ **B** displacement
☒ **C** redox
☒ **D** substitution

(Total for question = 2 marks)

Q5.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

Barium ions can be identified by their flame colour.

A flame test was carried out on a mixture of barium chloride and magnesium chloride.

How does the presence of magnesium ions affect the appearance of the flame colour of barium ions?

(1)

☐ **A** the colour is more intense

☐ **B** a bright white colour completely masks the barium colour

☐ **C** there is no change

☐ **D** the barium colour is decreased by the white magnesium flame colour

(Total for question = 1 mark)

Q6.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

Barium ions can be identified by their flame colour.

What colour do barium ions give in a flame test?

(1)

☐ **A** green

☐ **B** lilac

☐ **C** red

☐ **D** yellow

(Total for question = 1 mark)

Q7.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

Barium ions can be identified by their flame colour.

Which of the following should be used for a flame test on barium carbonate?

(1)

☒ **A** iron wire and water

☒ **B** iron wire and concentrated hydrochloric acid

☒ **C** nichrome wire and water

☒ **D** nichrome wire and concentrated hydrochloric acid

(Total for question = 1 mark)

Q8.

Answer the question with a cross in the box you think is correct ☒ . If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒ .

The nitrates of lithium, rubidium and strontium are all white solids. The compounds are held together by ionic bonds.

These three compounds cannot be identified with certainty from a flame test as the colours seen are similar.

Concentrated hydrochloric acid is used in a flame test procedure.

(i) Which of the following is a reason for dipping the flame test wire in concentrated hydrochloric acid during a flame test procedure?

(1)

- ☐ **A** it dissolves metal ions from the wire
- ☐ **B** it neutralises hydroxide ions that might colour the flame
- ☐ **C** it reduces the metal ions to metal atoms
- ☐ **D** it reacts with the compounds to form volatile chlorides

(ii) The flame colour given by these three solids in the flame test are shades of

(1)

- ☐ **A** green
- ☐ **B** lilac
- ☐ **C** red
- ☐ **D** yellow

(iii) What is the best explanation for why metal ions produce different flame colours?

Different wavelengths of light energy are

(1)

- ☐ **A** required to promote electrons to higher energy levels
- ☐ **B** released because electrons move from lower to higher energy levels
- ☐ **C** released due to different gaps between energy levels
- ☐ **D** required for electron transfer from non-metal ions to metal ions

(Total for question = 3 marks)

Q9.

This question is about tests for ions.

Which compound does **not** give a red colour in a flame test?

(1)

- ☒ **A** calcium chloride
- ☒ **B** lithium carbonate
- ☒ **C** sodium iodide
- ☒ **D** strontium bromide

(Total for question = 1 mark)

Q10.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about the reactions of the halogens and halide ions.

Fluorine is an element in Group 7.

Group 7 includes the elements chlorine, bromine and iodine.

Some information about the melting and boiling temperatures of Group 7 elements is shown in the table.

Element	Melting temperature / K	Boiling temperature / K
chlorine	172	238
bromine	266	332
iodine	387	457

Which is the expected boiling temperature of fluorine, in kelvin, K?

(1)

- ☒ **A** 4
- ☒ **B** 85
- ☒ **C** 575
- ☒ **D** 610

(Total for question = 1 mark)

Q11.

This question is about tests for ions.

A wire is used for a flame test.

Which material would be most suitable for a flame test wire?

(1)

- ☒ **A** copper
- ☒ **B** iron
- ☒ **C** magnesium
- ☒ **D** platinum

(Total for question = 1 mark)

Q12.

Hydrogen bromide gas reacts with ammonia gas

$$HBr + NH_3 \rightarrow NH_4Br$$

What would be observed during this reaction?

(1)

- ☒ **A** bubbles
- ☒ **B** decolorisation
- ☒ **C** steamy fumes
- ☒ **D** white smoke

(Total for question = 1 mark)

Q13.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about dissolving different compounds.

Which of these compounds is the most soluble in water?

(1)

- ☐ **A** barium sulfate
- ☐ **B** calcium sulfate
- ☐ **C** magnesium sulfate
- ☐ **D** strontium sulfate

(Total for question = 1 mark)

Q14.

This question is about water.

Liquid water is a good solvent for many, but not all, ionic compounds. Which is **least** soluble in water?

(1)

- ☐ **A** barium hydroxide
- ☐ **B** calcium hydroxide
- ☐ **C** magnesium hydroxide
- ☐ **D** sodium hydroxide

(Total for question = 1 mark)

Q15.

This question is about the solubility of metal hydroxides.

Which of these metal hydroxides is the most soluble in water?

(1)

- ☒ **A** barium hydroxide
- ☒ **B** calcium hydroxide
- ☒ **C** magnesium hydroxide
- ☒ **D** potassium hydroxide

(Total for question = 1 mark)

Q16.

This question is about s-block elements and some of their compounds.

Which pair of statements describes the trends **down** Group 2?

(1)

	Solubility of sulfates	Solubility of hydroxides
☒ **A**	increases	increases
☒ **B**	decreases	increases
☒ **C**	decreases	decreases
☒ **D**	increases	decreases

(Total for question = 1 mark)

Q17.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about trends within Group 2 of the Periodic Table.

Which of the following describes the trends in the solubility in water of the Group 2 hydroxides and sulfates going down the group?

(1)

	Solubility in water	
	Hydroxides	Sulfates
☐ **A**	increases	increases
☐ **B**	increases	decreases
☐ **C**	decreases	increases
☐ **D**	decreases	decreases

(Total for question = 1 mark)

Q18.

Answer the question with a cross in the box you think is correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

This question is about trends within Group 2 of the Periodic Table.

Which of the following describes the trends in thermal stability of the Group 2 carbonates and nitrates going down the group?

(1)

	Thermal stability	
	Carbonates	Nitrates
☐ **A**	increases	increases
☐ **B**	increases	decreases
☐ **C**	decreases	increases
☐ **D**	decreases	decreases

(Total for question = 1 mark)