Edexcel Chemistry A-level - Inorganic Chemistry MCQ

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.

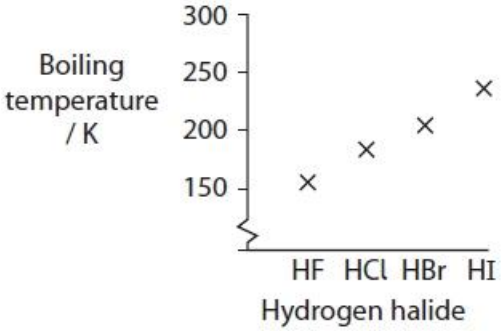
This question is about the elements in Group 7 of the Periodic Table and some of their compounds.

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

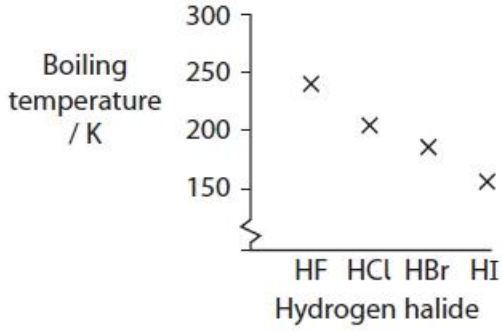
(i) Which diagram shows the trend in the boiling temperatures of the hydrogen halides?

(1)

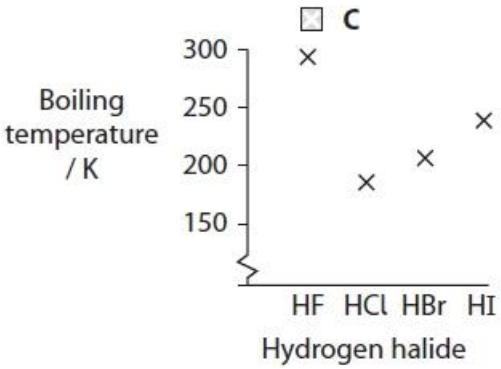
☒ **A**



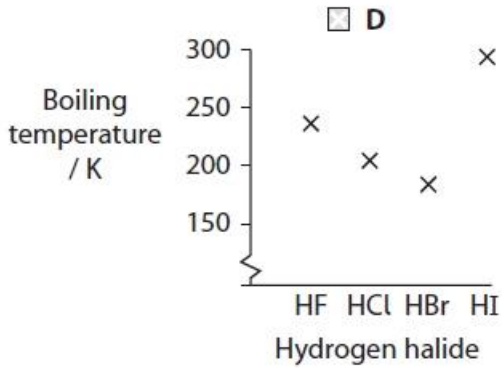
☒ **B**



☒ **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)

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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)

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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)

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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)

Mark Scheme

Q1.

Question Number	Answer	Mark
	The only correct answer is D (pale green – orange - purple) **A** *is not correct because chlorine is not orange and the colour stated for bromine is for the pure liquid state and solid iodine can appear black but not in an organic solvent* **B** *is not correct because solid iodine can appear black but not in an organic solvent* **C** *is not correct because chlorine is not orange and the colour stated for bromine is in the pure liquid state*	(1)

Q2.

Question number	Answer	Mark
	The only correct answer is D (grey/black solid, purple gas) ***A*** *is incorrect because iodine solid is not purple and iodine gas is not brown* ***B*** *is incorrect because iodine solid is not purple* ***C*** *is incorrect because iodine gas is not brown*	**(1)**

Q3.

Question number	Answer	Mark
	The only correct answer is C ($Cl_2(aq) + 2NaBr(aq) \rightarrow 2NaCl(aq) + Br_2(aq)$) ***A*** *is incorrect because bromine is less reactive than chlorine so no reaction occurs* ***B*** *is incorrect because bromine is less reactive than fluorine so no reaction occurs* ***D*** *is incorrect because chlorine is less reactive than fluorine so no reaction occurs*	**(1)**

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Q4.

Question number	Answer	Mark
(i)	**The only correct answer is C** (graph C) ***A*** *is incorrect because HF has a much higher boiling temperature than expected due to hydrogen bonding* ***B*** *is incorrect because these is an increase in boiling temperature from HCl to HI as the number of electrons in the molecules increases so the London forces increase in strength* ***D*** *is incorrect because HBr has a higher boiling temperature than HCl as there are more electrons in the molecules*	**(1)**

Question number	Answer	Mark
(ii)	**The only correct answer is A** (acid-base) ***B*** *is incorrect there is no displacement taking place* ***C*** *is incorrect because neither substance is oxidised or reduced* ***D*** *is incorrect because there is no substitution taking place*	**(1)**

Q5.

Question Number	Answer	Mark
	The only correct answer is C (there is no change) **A** *is not correct because magnesium ions have no effect on flame colour* **B** *is not correct because the elemental magnesium and not the metal ions give a white colour* **D** *is not correct because magnesium ions have no effect on flame colour*	**(1)**

Q6.

Question Number	Answer	Mark
	The only correct answer is A (green) **B** *is not correct because this is the colour for potassium ions* **C** *is not correct because this is the colour for lithium, calcium and strontium ions* **D** *is not correct because this is the colour for sodium ions*	**(1)**

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Q7.

Question Number	Answer	Mark
	The only correct answer is D (nichrome wire and concentrated hydrochloric acid) **A** *is not correct because iron wire is not used* **B** *is not correct because iron wire is not used* **C** *is not correct because concentrated hydrochloric acid and not water is needed*	(1)

Q8.

Question Number	Answer	Mark
(i)	The only correct answer is **D** (it reacts with the compounds to form volatile chlorides) ***A** is not correct because hydrochloric acid doesn't dissolve the metal* ***B** is not correct because there are no hydroxide ions present and they don't colour the flame* ***C** is not correct because hydrochloric acid doesn't reduce the metal ions*	(1)

Question Number	Answer	Mark
(ii)	The only correct answer is **C** (red) ***A** is not correct because ions giving green shades include barium ions* ***B** is not correct because ions giving lilac shades include potassium ions* ***D** is not correct because ions giving yellow shades include sodium ions*	(1)

Question Number	Answer	Mark
(iii)	The only correct answer is ***C*** (released due to different gaps between energy levels) ***A** is not correct because promoting electrons in a flame test uses heat energy* ***B** is not correct because promoting electrons does not release light* ***D** is not correct because electrons are promoted within the metal atoms energy levels not transferred to non-metal ions*	(1)

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Q9.

Question Number	Answer	Mark
	The only correct answer is C (sodium iodide) **A** *is not correct because calcium in calcium chloride gives a 'brick red flame* **B** *is not correct because lithium in lithium carbonate gives a 'crimson red' flame* **D** *is not correct because strontium in strontium bromide gives a 'red' flame*	**(1)**

Q10.

Question Number	Answer	Mark
	The only correct answer is B (85 K) **A** *is not correct because the Tb trend would suggest approx. 160 K. Therefore 4 K is much too low for fluorine* **C** *is not correct because this figure is derived from the trend in Tm (not Tb), with F placed at the bottom of Group 7 (575 K is the melting temperature of astatine)* **D** *is not correct because although this figure is derived from the trend in Tb, F is placed at the bottom of Group 7 (610 K is the boiling temperature of astatine)*	**(1)**

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Q11.

Question Number	Answer	Mark
	The only correct answer is D (Platinum) **A** *is not correct because copper will give a flame colour* **B** *is not correct because iron is insufficiently inert* **C** *is not correct because magnesium will burn with a white flame*	**(1)**

Q12.

Question Number	Answer	Mark
	D (white smoke)	**(1)**

Q13.

Question Number	Answer	Mark
	The only correct answer is C (magnesium sulfate) ***A*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2* ***B*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2* ***D*** *is incorrect because Group 2 sulfates decrease in solubility down Group 2*	**(1)**

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Q14.

Question Number	Answer	Mark
	The only correct answer is C ***A*** *is not correct because barium hydroxide is the most soluble group 2 hydroxide* ***B*** *is not correct because calcium is below magnesium in the Periodic Table so this is more soluble* ***D*** *is not correct because group 1 hydroxides are very soluble compared to group 2 hydroxides*	**(1)**

Q15.

Question Number	Answer	Mark
	The only correct answer is D ***A*** *is not correct because it is the 2nd most soluble* ***B*** *is not correct because it is the 3rd most soluble* ***C*** *is not correct because it is the least soluble*	**(1)**

Q16.

Question Number	Answer	Mark
	The only correct answer is B (solubility of sulfates decreases and solubility of hydroxides increases down group 2) **A** *is not correct because the solubility of Group 2 sulfates deceases down the group* **C** *is not correct because the solubility of Group 2 hydroxides increases down the group* **D** *is not correct because the solubility of Group 2 sulfates decreases down the group and the solubility of Group 2 hydroxides increases down the group*	**(1)**

Q17.

Question Number	Answer	Mark
	The only correct answer is B (hydroxides – increases, sulfates – decreases) ***A** is not correct because sulfate solubility does not increase down the group* ***C** is not correct because hydroxide solubility does not decrease down the group and sulfate solubility does not increase down the group* ***D** is not correct because hydroxide solubility does not decrease down the group*	**(1)**

Q18.

Question Number	Answer	Mark
	The only correct answer is A (carbonates – increases, nitrates – increases) ***B** is not correct because thermal stability of Group 2 nitrates does not decrease down the group* ***C** is not correct because thermal stability of Group 2 carbonates does not decrease down the group* ***D** is not correct because thermal stabilities of Group 2 carbonates and nitrates do not decrease down the group*	**(1)**