

AS SECTION 2 - INORGANIC 1 - PRACTICE QUESTIONS

1 For each of the following reactions, select from the list below, the **formula** of a sodium halide that would react as described.

NaF NaCl NaBr NaI

Each **formula** may be selected once, more than once or not at all.

(a) This sodium halide is a white solid that reacts with concentrated sulfuric acid to give a brown gas.

Formula of sodium halide
(1 mark)

(b) When a solution of this sodium halide is mixed with silver nitrate solution, no precipitate is formed.

Formula of sodium halide
(1 mark)

(c) When this solid sodium halide reacts with concentrated sulfuric acid, the reaction mixture remains white and steamy fumes are given off.

Formula of sodium halide
(1 mark)

(d) A colourless aqueous solution of this sodium halide reacts with orange bromine water to give a dark brown solution.

Formula of sodium halide
(1 mark)

2 There are many uses for Group 2 metals and their compounds.

(a) State a medical use of barium sulfate.
State why this use of barium sulfate is safe, given that solutions containing barium ions are poisonous.

[2 marks]

Use

Why this use is safe

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- (b) Magnesium hydroxide is used in antacid preparations to neutralise excess stomach acid.

Write an equation for the reaction of magnesium hydroxide with hydrochloric acid.

[1 mark]

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- (c) Solutions of barium hydroxide are used in the titration of weak acids.

State why magnesium hydroxide solution could **not** be used for this purpose.

[1 mark]

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- (d) Magnesium metal is used to make titanium from titanium(IV) chloride.

Write an equation for this reaction of magnesium with titanium(IV) chloride.

[1 mark]

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- (e) Magnesium burns with a bright white light and is used in flares and fireworks.

Use your knowledge of the reactions of Group 2 metals with water to explain why water should **not** be used to put out a fire in which magnesium metal is burning.

[2 marks]

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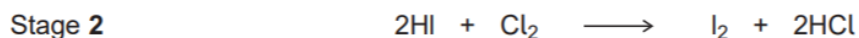
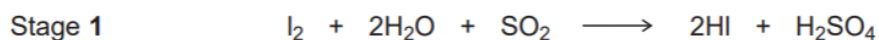
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3 This question is about Group 7 chemistry.

- (a) Sea water is a major source of iodine.
The iodine extracted from sea water is impure. It is purified in a two-stage process.



- (i) State the initial oxidation state and the final oxidation state of sulfur in Stage 1. [2 marks]

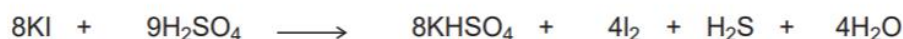
Oxidation state of S in SO_2

Oxidation state of S in H_2SO_4

- (ii) State, in terms of electrons, what has happened to chlorine in Stage 2. [1 mark]

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- (b) When concentrated sulfuric acid is added to potassium iodide, iodine is formed in the following redox equations.



- (i) Balance the equation for the reaction that forms sulfur. [1 mark]

- (ii) Deduce the half-equation for the formation of iodine from iodide ions. [1 mark]

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- (iii) Deduce the half-equation for the formation of hydrogen sulfide from concentrated sulfuric acid. [1 mark]

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- (c) A yellow precipitate is formed when silver nitrate solution, acidified with dilute nitric acid, is added to an aqueous solution containing iodide ions.

- (i) Write the **simplest ionic** equation for the formation of the yellow precipitate. [1 mark]

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(ii) State what is observed when concentrated ammonia solution is added to this yellow precipitate. [1 mark]

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(iii) State why the silver nitrate solution is acidified when testing for iodide ions. [1 mark]

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(iv) Explain why dilute hydrochloric acid is **not** used to acidify the silver nitrate solution in this test for iodide ions. [1 mark]

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(d) Chlorine is toxic to humans. This toxicity does not prevent the large-scale use of chlorine in water treatment.

(i) Give **one** reason why water is treated with chlorine. [1 mark]

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(ii) Explain why the toxicity of chlorine does **not** prevent this use. [1 mark]

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(iii) Write an equation for the reaction of chlorine with cold water. [1 mark]

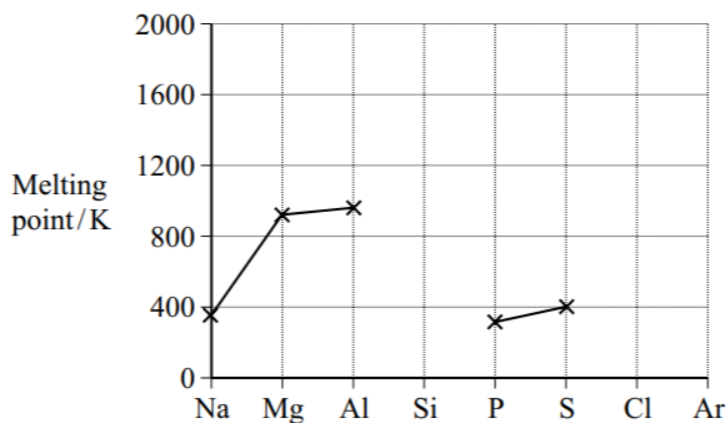
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- (e) Give the formulas of the **two** different chlorine-containing compounds that are formed when chlorine reacts with cold, dilute, aqueous sodium hydroxide. [1 mark]

Formula 1

Formula 2

- 4 (a) The diagram below shows the melting points of some of the elements in Period 3.



- (i) On the diagram, use crosses to mark the approximate positions of the melting points for the elements silicon, chlorine and argon. Complete the diagram by joining the crosses.
- (ii) By referring to its structure and bonding, explain your choice of position for the melting point of silicon.

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- (iii) Explain why the melting point of sulphur, S₈, is higher than that of phosphorus, P₄

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(8 marks)

(b) State and explain the trend in melting point of the Group II elements Ca–Ba.

Trend

Explanation

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(3 marks)