



A-Level Chemistry

Group 7 (Multiple Choice)

Question Paper

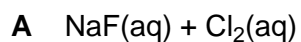
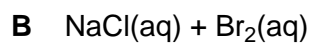
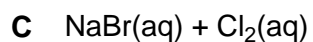
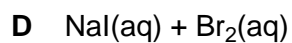
Time available: 33 minutes

Marks available: 30 marks

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1.

Which pair of solutions, when mixed, reacts to form a dark brown solution?

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(Total 1 mark)

2.

Some solid sodium halides are reacted with concentrated sulfuric acid.

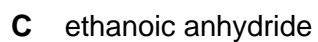
Which solid sodium halide does **not** produce a sulfur-containing gas as one of the products?

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(Total 1 mark)

3.

Which compound forms a white precipitate when added to aqueous silver nitrate?

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(Total 1 mark)

4.

Which property increases down Group 7?

- A ability to oxidise a given reducing agent ☐
- B boiling point ☐
- C electronegativity ☐
- D first ionisation energy ☐

(Total 1 mark)

5.

Which equation shows a redox reaction that does **not** occur?

- A $\text{Br}_2(\text{aq}) + 2 \text{KI}(\text{aq}) \rightarrow \text{I}_2(\text{aq}) + 2 \text{KBr}(\text{aq})$ ☐
- B $\text{Cl}_2(\text{g}) + 2 \text{KI}(\text{aq}) \rightarrow \text{I}_2(\text{aq}) + 2 \text{KCl}(\text{aq})$ ☐
- C $\text{Cl}_2(\text{g}) + 2 \text{KBr}(\text{aq}) \rightarrow \text{Br}_2(\text{aq}) + 2 \text{KCl}(\text{aq})$ ☐
- D $\text{I}_2(\text{aq}) + 2 \text{KBr}(\text{aq}) \rightarrow \text{Br}_2(\text{aq}) + 2 \text{KI}(\text{aq})$ ☐

(Total 1 mark)

6.

On heating, magnesium reacts vigorously with element **X** to produce compound **Y**. An aqueous solution of **Y**, when treated with aqueous silver nitrate, gives a white precipitate that is readily soluble in dilute aqueous ammonia. What is the minimum mass of **X** that is needed to react completely with 4.05 g of magnesium?

- A 11.83 g
- B 5.92 g
- C 5.33 g
- D 2.67 g

(Total 1 mark)

7.

The boiling points of the halogens increase down Group VII because

- A covalent bond strengths increase.
- B bond polarities increase.
- C the surface areas of the molecules increase.
- D electronegativities increase.

(Total 1 mark)

- 8.** An aqueous solution of a sodium salt gave no precipitate when treated with either silver nitrate solution or barium chloride solution. Which one of the following could be the formula of the sodium salt?
- A NaI
 - B Na_2SO_4
 - C NaBr
 - D NaF
- (Total 1 mark)**

- 9.** Which one of the following statements concerning halogen chemistry is true?
- A Sodium chloride produces chlorine when treated with concentrated sulphuric acid.
 - B Sodium chloride produces chlorine when treated with bromine.
 - C Sodium bromide produces bromine when treated with concentrated sulphuric acid.
 - D Sodium bromide produces bromine when treated with iodine in aqueous potassium iodide.
- (Total 1 mark)**

- 10.** An aqueous solution of a white solid gives a yellow precipitate with aqueous silver nitrate. The formula of the white solid could be
- A AgBr
 - B AgI
 - C NaBr
 - D NaI
- (Total 1 mark)**

- 11.** What will you see when a solution of silver nitrate is added to a solution containing bromide ions, and concentrated aqueous ammonia is added to the resulting mixture?
- A a white precipitate soluble in concentrated aqueous ammonia
 - B a white precipitate insoluble in concentrated aqueous ammonia
 - C a cream precipitate soluble in concentrated aqueous ammonia
 - D a yellow precipitate insoluble in concentrated aqueous ammonia
- (Total 1 mark)**

12.

Which one of the following statements is true?

- A A blue solution containing the ion $[\text{CoCl}_4]^{2-}$ turns pink when added to an excess of water.
- B A purple solution is formed when chlorine is bubbled into aqueous sodium bromide.
- C A yellow precipitate is formed when aqueous silver nitrate is added to aqueous sodium chloride.
- D A green solution containing the ion $[\text{CuCl}_4]^{2-}$ turns blue when added to an excess of concentrated hydrochloric acid.

(Total 1 mark)

13.

When vanadium reacts with chlorine at 400°C , a brown compound is obtained. When an aqueous solution containing 0.193 g of this compound was treated with aqueous silver nitrate all the chlorine in the compound was precipitated as silver chloride. The mass of silver chloride (AgCl) produced was 0.574 g. Which one of the following could be the formula of the brown compound?

- A VCl
- B VCl_2
- C VCl_3
- D VCl_4

(Total 1 mark)

14.

The reaction between sodium iodide and concentrated phosphoric acid produces hydrogen iodide but no iodine. The reaction of sodium iodide with concentrated sulphuric acid produces mainly iodine. The difference in product occurs because, in comparison with sulphuric acid, phosphoric acid is

- A the weaker acid.
- B the stronger oxidising agent.
- C the weaker oxidising agent.
- D the stronger reducing agent.

(Total 1 mark)

15.

A white salt dissolves in water to give a solution which gives a cream coloured precipitate when aqueous silver nitrate is added. This precipitate is insoluble in dilute aqueous ammonia but is soluble in concentrated aqueous ammonia. The original white salt could be

- A AgI
- B NaI
- C AgBr
- D NaBr

(Total 1 mark)

16.

In which one of the following reactions does the metal species undergo reduction?

- A $\text{MnO}_2 + 4\text{HCl} \rightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
- B $[\text{Cu}(\text{H}_2\text{O})_6]^{2+} + 4\text{Cl}^- \rightarrow [\text{CuCl}_4]^{2-} + 6\text{H}_2\text{O}$
- C $\text{CrO}_7^{2-} + 2\text{OH}^- \rightarrow 2\text{CrO}_4^{2-} + \text{H}_2\text{O}$
- D $\text{TiO}_2 + 2\text{C} + 2\text{Cl}_2 \rightarrow \text{TiCl}_4 + 2\text{CO}$

(Total 1 mark)

17.

A test for chloride ions in aqueous solution involves adding dilute nitric acid followed by aqueous silver nitrate.

What is the reason for adding the nitric acid?

- A To convert AgNO_3 into $[\text{Ag}(\text{NO}_3)_2]^-$
- B To decrease the solubility of silver chloride
- C To increase the pH of the solution
- D To prevent the precipitation of other silver compounds

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(Total 1 mark)

18.

Which species is **not** a possible product of the reactions between chlorine and water?

- A Cl^-
- B ClO^-
- C O_2
- D OH^-

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(Total 1 mark)

19.

Which statement is correct?

- A Chloride ions reduce concentrated sulfuric acid to form sulfur dioxide.
- B Bromide ions reduce concentrated sulfuric acid to form sulfur.
- C Bromide ions reduce iodine to form iodide ions.
- D Iodide ions reduce chlorine to form chloride ions.

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(Total 1 mark)

20.

Which is a correct trend down Group 7 from fluorine to iodine?

- A The boiling point of the element decreases.
- B The oxidising ability of the element decreases.
- C The electronegativity of the atom increases.
- D The first ionisation energy of the atom increases.

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(Total 1 mark)

21.

Which one of the following statements is true?

- A Bromine liberates iodine from aqueous sodium iodide.
- B Chlorine liberates fluorine from aqueous sodium fluoride.
- C Silver iodide is soluble in aqueous ammonia.
- D Concentrated sulphuric acid liberates chlorine from solid sodium chloride.

(Total 1 mark)

22.

Which one of the following is **not** a correct trend down Group VII?

- A The first ionisation energy of the atom decreases.
- B The oxidising power of the element increases.
- C The electronegativity of the atom decreases.
- D The boiling point of the element increases.

(Total 1 mark)

23.

Which one of the following can act as an oxidising agent but not as a reducing agent?

- A CH_3CHO
- B Fe^{2+}
- C I^-
- D MnO_4^-

(Total 1 mark)

24.

Which of these substances reacts most rapidly to produce a silver halide precipitate with acidified silver nitrate?

- A CH_3Br ☐
- B CH_3Cl ☐
- C CH_3F ☐
- D CH_3I ☐

(Total 1 mark)

25.

Which one of the following is the electron arrangement of the strongest reducing agent?

- A $1s^2 2s^2 2p^5$
- B $1s^2 2s^2 2p^6 3s^2$
- C $1s^2 2s^2 2p^6 3s^2 3p^5$
- D $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$

(Total 1 mark)

26.

Which of these species is the best reducing agent?

- A Cl_2 ☐
- B Cl^- ☐
- C I_2 ☐
- D I^- ☐

(Total 1 mark)

27.

Which statement is **not** correct about the addition of chlorine to water?

- A** Chlorine can react with water to form an alkaline solution.
- B** Chlorine can react with water to produce chloride ions and oxygen.
- C** Chlorine can be added to drinking water to kill bacteria.
- D** Chlorine can react with water to produce chloride ions and chlorate(I) ions.

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(Total 1 mark)

28.

Which species is the best oxidising agent?

A Cl_2

☐

B Cl^-

☐

C Br_2

☐

D Br^-

☐

(Total 1 mark)

29.

Which equation represents a reaction that does take place?

A $\text{Cl}_2 + 2\text{NaI} \rightarrow 2\text{NaCl} + \text{I}_2$

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B $\text{Br}_2 + 2\text{NaCl} \rightarrow 2\text{NaBr} + \text{Cl}_2$

☐

C $\text{NaCl} + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{NaOH}$

☐

D $2\text{HCl} + \text{H}_2\text{SO}_4 \rightarrow \text{Cl}_2 + \text{SO}_2 + 2\text{H}_2\text{O}$

☐

(Total 1 mark)

30.

Which species is **not** produced by a redox reaction between solid sodium iodide and concentrated sulfuric acid?

A Na_2SO_4 ☐

B H_2S ☐

C S ☐

D SO_2 ☐

(Total 1 mark)