InkChemistry

QUESTION WORKBOOK

Halide ions, the silver nitrate test, concentrated sulfuric acid, and chlorine in water

Group 2 and Group 7 · Unit C13

AQA 3.2.3.1, 3.2.3.2 · OCR A 3.1.3, 3.1.4

21 questions · 73 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 HI-Q23

Suggest why hydrogen fluoride is a weak acid in water while hydrogen chloride is a strong acid. [2]

SECTION B · Standard, 3 to 5 marks

B1 HI-Q2

Explain the trend in the reducing ability of the halide ions from fluoride to iodide. [4]

B2 HI-Q4

Describe what is seen when concentrated sulfuric acid is added to solid sodium bromide, naming the substance responsible for each observation, and give the equation for the redox step. [4]

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B3 HI-Q13 Evaluate the use of chlorine to treat public drinking water. [4]

B4 HI-Q19 Explain how warming a solution with sodium hydroxide solution and testing with red litmus paper identifies ammonium ions, and why the litmus paper must be damp and must not touch the test tube. [4]

B5 HI-Q20 Describe and explain what is seen when hydrogen bromide gas meets moist air, and when a glass rod dipped in concentrated ammonia solution is held in the gas. Give an equation for each change. [4]

B6 HI-Q5 Deduce the oxidation state of sulfur in sulfuric acid and in each sulfur-containing product of the reaction of sodium iodide with concentrated sulfuric acid. [3]

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B7 HI-Q6 Explain why the reaction of solid sodium chloride with concentrated sulfuric acid is not a redox reaction, and give its equation with state symbols. [3]

B8 HI-Q7 Describe how acidified silver nitrate and ammonia solution are used to show that a solution contains bromide ions. [3]

B9 HI-Q8 Explain why dilute nitric acid is added before silver nitrate in the test for halide ions, and why hydrochloric acid cannot be used instead. [3]

B10 HI-Q9 Suggest how a student could show that a solution containing iodide ions also contains chloride ions, using acidified silver nitrate and ammonia solution. [3]

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B11 HI-Q10

Suggest the products formed when concentrated sulfuric acid is added to solid sodium astatide, explain your suggestion, and give an equation for the step that forms hydrogen sulfide. [3]

B12 HI-Q11

Give the equation, with state symbols, for the reaction of chlorine with cold dilute sodium hydroxide solution, name the product that acts as a bleach, and give the oxidation state of chlorine in it. [3]

B13 HI-Q12

Explain, using oxidation states, why the reaction of chlorine with water is described as disproportionation. [3]

B14 HI-Q14

Calculate the mass of sodium chlorate(I) formed when 6.00 dm^3 of chlorine, measured at room temperature and pressure, reacts with excess cold dilute sodium hydroxide. Ar values: O 16.0, Na 23.0, Cl 35.5; molar gas volume = 24.0 $dm^3\ mol^{-1}$. [3]

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B15 HI-Q15 Calculate the mass of silver chloride precipitated when excess acidified silver nitrate is added to 30.0 cm^3 of 0.120 mol dm^{-3} sodium chloride solution. Ar values: Cl 35.5, Ag 107.9. [3]

B16 HI-Q16 Compare what is seen when concentrated sulfuric acid is added to solid sodium chloride and to solid sodium iodide. [3]

B17 HI-Q22 Calculate the relative atomic mass of X, and identify X, when 0.250 g of a pure sodium halide NaX gives 0.613 g of dry silver halide AgX with excess acidified silver nitrate. Ar values: Na 23.0, Ag 107.9. [3]

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B18
HI-Q25

Deduce the oxidation state of chlorine in each chlorine-containing species in the reaction $3Cl_2(aq) + 6NaOH(aq) \rightarrow 5NaCl(aq) + NaClO_3(aq) + 3H_2O(l)$, which takes place in hot concentrated alkali, and explain why the reaction is a disproportionation. [3]

SECTION C · Long, 6 marks or more

C1
HI-Q17

Describe how test-tube reactions could be used to find out whether an unknown solution contains carbonate, sulfate or chloride ions. Give the order of the tests, the reagents and the observations, and explain the order. [6]

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C2 HI-Q24 Describe and explain the reactions of solid sodium chloride, sodium bromide and sodium iodide with concentrated sulfuric acid. Include observations, equations and the trend in the reducing ability of the halide ions. [6]

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