InkChemistry

QUESTION WORKBOOK

Group 2 compounds: solubility, uses and the sulfate test

Group 2 and Group 7 · Unit C13

AQA 3.2.2 · OCR A 3.1.2 (e); 3.1.4

19 questions · 67 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 GCS-Q11

Suggest why barium hydroxide would not be suitable as an indigestion remedy in place of magnesium hydroxide. [2]

A2 GCS-Q21

Suggest why heating lithium nitrate gives a brown gas but heating sodium nitrate does not. [2]

SECTION B · Standard, 3 to 5 marks

B1 GCS-Q2

Give one use each of magnesium hydroxide, calcium hydroxide, calcium oxide and barium sulfate, and the property of each compound that makes it suitable. [4]

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B2 GCS-Q3 Explain why barium sulfate is given as a suspension for a barium meal, although barium ions are toxic, while magnesium sulfate (Epsom salts) can be taken dissolved in water. [4]

B3 GCS-Q4 Describe how to test a solution for sulfate ions, giving the reagents, the positive result and the ionic equation, with state symbols, for the reaction. [4]

B4 GCS-Q5 Explain why the solution is acidified before barium chloride is added in the sulfate test, why sulfuric acid cannot be the acid, and why fizzing when the acid is added does not spoil the test. [4]

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B5 GCS-Q15 Evaluate the use of calcium carbonate rather than calcium oxide to remove sulfur dioxide from power-station flue gases. [4]

B6 GCS-Q22 Describe how to compare the thermal stabilities of magnesium carbonate and calcium carbonate in the laboratory, including how to make the test fair and how to avoid suck-back. [4]

B7 GCS-Q23 Describe a test, with its positive result, for each of hydrogen, oxygen, chlorine and sulfur dioxide. [4]

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B8 GCS-Q24 Explain how a student could show that a solution of an unknown salt contains nitrate ions, using sodium hydroxide solution and aluminium foil, and why sodium hydroxide is first warmed with the solution on its own. [4]

B9 GCS-Q27 Show that the concentration of sulfate ions in a solution is 0.100 mol dm^{-3}, given that excess barium chloride solution added to 25.0 cm^3 of it gives 0.583 g of dry barium sulfate. Ar values: Ba 137.3, S 32.1, O 16.0. [4]

B10 GCS-Q8 Calculate the volume, in cm^3, of 0.0500 mol dm^{-3} hydrochloric acid neutralised by a tablet containing 0.350 g of magnesium hydroxide. Ar values: H 1.0, O 16.0, Mg 24.3. [3]

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B11 GCS-Q9 Calculate the mass of calcium oxide, in tonnes, needed to remove 2.50 tonnes of sulfur dioxide from flue gases. Ar values: O 16.0, S 32.1, Ca 40.1. [3]

B12 GCS-Q13 Suggest why a student who added barium chloride solution to tap water from a limestone area saw a white precipitate, and what she should do to find out whether the water contains sulfate ions. [3]

B13 GCS-Q14 Compare the results obtained when sodium hydroxide solution and dilute sulfuric acid are added separately to solutions of magnesium chloride and barium chloride. [3]

B14 GCS-Q19 Explain why barium carbonate needs a higher temperature to decompose than magnesium carbonate. [3]

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B15 GCS-Q20 Calculate the volume of oxygen, in cm^3 at room temperature and pressure, given off when 1.48 g of magnesium nitrate is fully decomposed by heating. Ar values: N 14.0, O 16.0, Mg 24.3; molar gas volume = 24.0 $dm^3\ mol^{-1}$. [3]

B16 GCS-Q26 Suggest why damp blue litmus paper held in chlorine turns red and then white, while damp blue litmus paper held in sulfur dioxide turns red and stays red. [3]

SECTION C · Long, 6 marks or more

C1 GCS-Q18 Describe how sodium hydroxide solution and dilute sulfuric acid could be used to identify which of four solutions contains Mg^{2+}, Ca^{2+}, Sr^{2+} and Ba^{2+} ions. Give the expected observations and explain them. [6]

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