

IGCSE Chemistry 0620 Paper 5 Practice

Paper (Core)

Total: 40 marks · 1 hour 15 minutes · 4 questions · 20 parts

Question 1 · Acid-base titration and calculation [10]

- (a) State the apparatus used to measure exactly 25.0 cm³ of sodium hydroxide solution for a titration. [1]
- (b) Explain why the burette is rinsed with a little of the sulfuric acid before it is filled. [2]
- (c) Four titres are 12.4, 13.9, 12.5 and 12.6 cm³. Identify the anomalous titre and calculate the mean of the other three. [2]
- (d) 25.0 cm³ of 0.100 mol/dm³ sodium hydroxide is neutralised by a mean titre of 12.5 cm³ of sulfuric acid ($\text{H}_2\text{SO}_4 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$). Calculate the concentration of the acid. Show your working. [3]
- (e) Name the indicator used in this titration and state the colour change at the end point. [2]

Question 2 · Calorimetry and enthalpy of neutralisation [10]

- (a) Explain why the solutions are mixed in a polystyrene cup and why the cup is covered after mixing. [2]
- (b) After mixing, the temperature rises from 25.0 °C to 28.4 °C. The total mass of solution is 100 g and its specific heat capacity is 4.2 J/(g °C). Calculate the energy released. Show your working. [3]
- (c) 50.0 cm³ of 0.500 mol/dm³ hydrochloric acid is exactly neutralised by 50.0 cm³ of 0.500 mol/dm³ sodium hydroxide. Use your answer to (b) to calculate the enthalpy change of neutralisation in kJ/mol, with the correct sign. [3]
- (d) The literature value is -57.3 kJ/mol. Give one reason why the experimental value of -57.1 kJ/mol is slightly different. [1]
- (e) Suggest one improvement that would reduce heat loss in this experiment. [1]

Question 3 · Rate of reaction and gas collection [10]

- (a) Magnesium reacts with dilute hydrochloric acid and the hydrogen is collected in a gas syringe. In the first 20 s, 30 cm³ of hydrogen is collected. Calculate the initial rate in cm³/s. [2]
- (b) After 60 s a total of 72 cm³ of hydrogen has been collected. Calculate the average rate from 0 to 60 s. [2]
- (c) At room temperature the molar volume of a gas is 24 dm³/mol. Use the 72 cm³ of hydrogen to calculate the mass of magnesium that has reacted (Mg = 24). [3]
- (d) Explain why the slope of the volume-time graph, and therefore the rate of reaction, gradually decreases between 0 and 60 s. [2]
- (e) To compare the effect of temperature on the rate, which condition must be kept constant apart from temperature? [1]

Question 4 · Tests for ions and chromatography [10]

- (a) An unknown solution gives a lilac colour in a flame test. Name the cation it contains and explain why the flame is viewed through blue cobalt glass. [2]
- (b) Adding sodium hydroxide solution to an unknown solution gives a white precipitate. The precipitate dissolves when excess sodium hydroxide is added. Name one possible cation. [2]
- (c) Describe the test and the observation that would confirm the presence of sulfate ions in a solution. [2]
- (d) In a chromatogram a spot moves 4.8 cm from the start line while the solvent front moves 6.0 cm. Calculate the R_f value of the spot. [2]
- (e) State why the start line is drawn in pencil rather than in ink, and give one experimental condition that affects the R_f value. [2]