InkChemistry

QUESTION WORKBOOK

Measuring an enthalpy change: calorimetry

Energetics · Unit C04

AQA 3.1.4.2 · OCR A 3.2.1, PAG 3

14 questions · 43 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 MEC-Q11
Give two assumptions made when q = mcΔT is applied to a solution in a polystyrene cup. [2]

A2 MEC-Q12
Identify the limiting reagent when 3.00 g of zinc is added to 25.0 cm^3 of 0.500 mol dm^{-3} copper(II) sulfate, and justify the answer. Ar of Zn = 65.4. [2]

A3 MEC-Q13
Suggest why, in a displacement reaction, the mass of the zinc is not added to the mass of the solution when q = mcΔT is used. [2]

A4 MEC-Q15
Suggest why the temperature continues to rise for about a minute after zinc powder is added to copper(II) sulfate solution. [2]

SECTION B · Standard, 3 to 5 marks

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B1 MEC-Q1

State the equation used to calculate the heat energy transferred in a calorimetry experiment, giving the unit of each quantity, and use it to calculate the heat needed to raise the temperature of 75.0 g of water by 8.4 °C. c = 4.18 J g^{-1} K^{-1}. [4]

B2 MEC-Q9

Explain why the enthalpy of combustion of ethanol measured with a spirit burner and a copper can is less exothermic than the data-book value. [4]

B3 MEC-Q6

Calculate the percentage uncertainty in a temperature rise of 6.8 °C measured with a thermometer that has an uncertainty of ±0.1 °C in each reading. [3]

B4 MEC-Q7

Explain why a reaction in solution is carried out in a polystyrene cup with a lid rather than in a glass beaker. [3]

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B5 MEC-Q8 Explain why the temperature rise in required practical 2 is found by extrapolating the cooling line back to the time of mixing rather than taken from the highest temperature recorded. [3]

B6 MEC-Q14 Suggest three changes to the spirit burner method that would give an enthalpy of combustion closer to the data-book value, and explain how each one helps. [3]

B7 MEC-Q16 Compare the polystyrene cup method with the spirit burner method in terms of heat loss and how close their results come to data-book values. [3]

B8 MEC-Q18 Explain why the enthalpy of neutralisation of hydrocyanic acid, HCN, by sodium hydroxide is much less exothermic than that of hydrochloric acid. [3]

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B9 MEC-Q20 Suggest how the temperature change should be found when ammonium nitrate is dissolved in water in a polystyrene cup, an endothermic change, with readings taken every 30 s. [3]

SECTION C · Long, 6 marks or more

C1 MEC-Q10 Describe how to determine the enthalpy change for the reaction of zinc with copper(II) sulfate solution, including how the results are processed. [6]

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