InkChemistry

QUESTION WORKBOOK

Preparing, purifying and testing an organic solid and liquid

Organic synthesis · Unit C22

AQA 3.3.9.2; RP10 · OCR A 4.2.3, 6.2.5; PAG 5, PAG 6

18 questions · 58 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 PP-Q17

Give two hazards in the preparation of aspirin from ethanoic anhydride, with a precaution for each. [2]

A2 PP-Q21

Suggest two reasons why a student's purified ethyl ethanoate distils steadily at 76 °C, when the data-book boiling point is 77 °C. [2]

SECTION B · Standard, 3 to 5 marks

B1 PP-Q1

Explain why a mixture of ethanol, ethanoic acid and concentrated sulfuric acid is heated under reflux rather than in an open flask, why anti-bumping granules are added, and why the top of the condenser is left open. [4]

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B2 PP-Q4 Explain why, when recrystallising crude aspirin, a student warms the funnel before the hot filtration, and why the final crystals are washed with a small volume of ice-cold solvent. [4]

B3 PP-Q8 Describe how crude ethyl ethanoate is washed with sodium carbonate solution in a separating funnel. [4]

B4 PP-Q2 Explain why cold water is added to the aspirin reaction mixture after heating under reflux, and why the flask is then stood in ice. [3]

B5 PP-Q3 Explain why the minimum volume of hot solvent is used to dissolve the crude solid during recrystallisation. [3]

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B6 PP-Q5 Explain how a melting point determination shows whether a sample of aspirin is pure. [3]

B7 PP-Q6 Calculate the percentage uncertainty in the mass of a product weighed by difference on a balance reading to 0.01 g, when the empty watch glass weighs 24.36 g and the watch glass with the product 26.51 g. [3]

B8 PP-Q9 Explain why crude ethyl ethanoate is washed with sodium carbonate solution, and why the separating funnel must be vented during the wash. [3]

B9 PP-Q10 Describe how anhydrous calcium chloride is used to dry the washed ester, and how the end point of drying is recognised. [3]

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B10 PP-Q13 Suggest, for crude 1-bromobutane (density 1.27 g cm^{-3}) washed with water in a separating funnel, which layer holds the product, how a student could confirm which layer is aqueous, and which layer is kept. [3]

B11 PP-Q14 Suggest what a melting range of 126 to 131 °C shows about a student's aspirin, two possible causes, and what the student should do next. [3]

B12 PP-Q15 Suggest three reasons why the yield of purified ethyl ethanoate is well below 100%. [3]

B13 PP-Q18 Evaluate a student's claim that a sample of ethyl ethanoate must be pure because it distilled between 76 and 78 °C. [3]

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B14 PP-Q19 Explain why phenylamine, which boils at 184 °C, distils at about 98 °C when steam is passed through the reaction mixture. [3]

B15 PP-Q20 Describe how the boiling temperature of a purified liquid is measured during its redistillation, and the result that shows it is pure. [3]

SECTION C · Long, 6 marks or more

C1 PP-Q7 Describe how a sample of crude aspirin is purified by recrystallisation and how its purity is then tested. [6]

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