InkChemistry

QUESTION WORKBOOK

Amines: preparation, basicity and nucleophilic reactions

Aromatic chemistry and amines · Unit C21

AQA 3.3.11.1, 3.3.11.2, 3.3.11.3 · OCR A 6.2.1 (a), 6.2.1 (b)

19 questions · 62 marks

PRINT EDITION

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SECTION A · Short, 1 to 2 marks

A1 APB-Q12
Suggest why a quaternary ammonium salt with a long hydrocarbon chain is used in fabric conditioner. [2]

A2 APB-Q18
Explain why ethanamide, CH_3CONH_2, is a much weaker base than ethylamine, $CH_3CH_2NH_2$. [2]

A3 APB-Q22
Give the observations when butylamine solution is added drop by drop to copper(II) sulfate solution until it is in excess. [2]

SECTION B · Standard, 3 to 5 marks

B1 APB-Q6
Outline the mechanism for the reaction of bromoethane with an excess of ammonia to form ethylamine. [5]

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B2 APB-Q2 Name the compounds $CH_3CH_2CH_2NH_2$ and $(CH_3)_4N^+Cl^-$, and explain why the ion in the second compound can act neither as a base nor as a nucleophile. [4]

B3 APB-Q11 Compare making ethylamine from bromoethane and ammonia with making it from bromomethane by way of a nitrile. [4]

B4 APB-Q14 Describe the reaction of ethanoyl chloride with methylamine, naming the type of reaction and the organic product. [4]

B5 APB-Q1 Identify each of these as a primary, secondary or tertiary amine: $(CH_3)_2CHNH_2$, $(CH_3CH_2)_2NH$, $(CH_3)_3N$. [3]

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B6 APB-Q3 Explain why a solution of methylamine is alkaline, giving an equation with state symbols. [3]

B7 APB-Q5 Explain why the reaction of bromoethane with ammonia gives a mixture of products. [3]

B8 APB-Q7 State the reagents used to convert nitrobenzene into phenylamine, and the purpose of the final reagent. [3]

B9 APB-Q8 Give the equation, using [H] for the reducing agent, for the reduction of propanenitrile, and name the reducing agent used in the laboratory and the one used in industry. [3]

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B10 APB-Q10 Calculate the percentage atom economy for making ethylamine by $CH_3CH_2Br + 2NH_3 \rightarrow CH_3CH_2NH_2 + NH_4Br$. Mr: CH_3CH_2Br 108.9, NH_3 17.0, $CH_3CH_2NH_2$ 45.0. [3]

B11 APB-Q13 Suggest two advantages of selling a medicine that contains an amine group as its hydrochloride salt rather than as the free amine, and what happens when the salt meets a strong base. [3]

B12 APB-Q16 Suggest whether phenylmethylamine, $C_6H_5CH_2NH_2$, is a stronger or a weaker base than phenylamine, $C_6H_5NH_2$, and explain your answer. [3]

B13 APB-Q20 Suggest the reagents and conditions for converting phenylamine into benzenediazonium chloride, and why the temperature must be controlled. [3]

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B14 APB-Q21 Describe how an azo dye is made from benzenediazonium chloride and phenol, and why the product is coloured. [3]

B15 APB-Q23 Justify the order of the three steps used to obtain phenylamine from nitrobenzene: heating under reflux with tin and concentrated hydrochloric acid, then adding an excess of sodium hydroxide solution, then separating the organic layer. [3]

SECTION C · Long, 6 marks or more

C1 APB-Q4 Explain the order of base strength of phenylamine, ammonia and ethylamine, starting with the weakest. [6]

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