InkChemistry

QUESTION WORKBOOK

Elimination from halogenoalkanes, and CFCs and the ozone layer

Alkanes and halogenoalkanes · Unit C17

AQA 3.3.3.2, 3.3.3.3 · OCR A 4.2.2 (e)

17 questions · 58 marks

NAVY SCREEN EDITION

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SECTION A · Short, 1 to 2 marks

A1 EH-Q3

Explain the difference in the role of the hydroxide ion in elimination and in nucleophilic substitution. [2]

A2 EH-Q6

Suggest why 2-bromo-2-methylpropane gives only one alkene on elimination, and name it. [2]

A3 EH-Q16

Suggest two equations to show how nitrogen monoxide radicals, NO•, from aircraft engines can catalyse the decomposition of ozone in the same way as chlorine radicals. [2]

SECTION B · Standard, 3 to 5 marks

B1 EH-Q1

State the reagent and conditions for the elimination of hydrogen bromide from 2-bromopropane, and describe a test that shows the organic product is an alkene and not an alcohol. [4]

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B2 EH-Q2

Draw the mechanism for the elimination reaction of 2-bromopropane with hydroxide ions. [4]

B3 EH-Q4

Deduce the structures and names of every alkene formed when 2-bromopentane, $CH_3CHBrCH_2CH_2CH_3$, is heated with ethanolic potassium hydroxide. [4]

B4 EH-Q7

Compare the conditions and products of the reactions of a halogenoalkane with hydroxide ions that favour substitution and that favour elimination. [4]

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B5 EH-Q12

Explain why CFCs reach the stratosphere and why it is the C–Cl bond rather than the C–F bond that breaks there, and explain why HFCs such as CH_2FCF_3 do not deplete the ozone layer. [4]

B6 EH-Q14

Evaluate the use of HFCs as replacements for CFCs in refrigerators and air conditioning. [4]

B7 EH-Q20

Outline the evidence from different research groups that showed CFCs to be the cause of ozone depletion, including what has been measured since the Montreal Protocol. [4]

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B8 EH-Q9 Explain how ozone is formed in the stratosphere and why the ozone layer is beneficial. [3]

B9 EH-Q10 Give equations to show how chlorine radicals catalyse the decomposition of ozone, and the overall equation. [3]

B10 EH-Q11 Explain why a chlorine radical is described as a catalyst for the decomposition of ozone, and why a small amount of CFC can break down a large amount of ozone. [3]

B11 EH-Q18 Suggest every alkene formed when 3-bromohexane, $CH_3CH_2CHBrCH_2CH_2CH_3$, is heated with ethanolic potassium hydroxide. [3]

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B12 EH-Q19 Explain why the loss of ozone is greatest over Antarctica in the southern spring. [3]

B13 EH-Q22 Justify the choice of potassium hydroxide dissolved in ethanol, heated under reflux, when propene is to be made from 2-bromopropane, rather than aqueous potassium hydroxide warmed gently. [3]

SECTION C · Long, 6 marks or more

C1 EH-Q21 Explain how CFCs released at ground level lead to the breakdown of ozone in the stratosphere, and why a small amount of CFC breaks down a very large amount of ozone. [6]

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