

Exercise walk-through

2.5.1

Halogenoalkanes: reaction choice and hydrolysis evidence

Pearson Edexcel · International A-Level · Chemistry

Check the sign and denominator

Your turn

The solution gains 1.20 kJ while 0.0200 mol reacts. What is the molar reaction enthalpy?

- A. $+60.0 \text{ kJ mol}^{-1}$
- B. $-60.0 \text{ kJ mol}^{-1}$
- C. $-0.0240 \text{ kJ mol}^{-1}$
- D. $-1.20 \text{ kJ mol}^{-1}$

Conditions change the chlorine product

Your turn

Hot concentrated alkali reacts with chlorine. Which oxyanion forms?

- A. ClO^-
- B. ClO_3^-
- C. Cl^- only
- D. No reaction

Independent identification

Your turn

$\text{C}_3\text{H}_6\text{O}$ has a carbonyl IR absorption and gives a positive Fehling's test. Which structure fits all evidence?

- A. CH_3COCH_3
- B. $\text{CH}_3\text{CH}_2\text{CHO}$
- C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- D. CH_3COOH

Exercises 2.1·2.3

2.1 Classify $\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$, $\text{CH}_3\text{CHBrCH}_3$ and $(\text{CH}_3)_3\text{CBr}$ as primary, secondary or tertiary. Explain the classification rule. [4]

2.2 Give the product and reagent conditions to convert bromoethane to ethanol and to ethene. [4]

2.3 Give the organic product from bromoethane with alcoholic KCN and explain the carbon count. [2]

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2.1 Primary, secondary and tertiary respectively. Count carbon groups attached to the carbon bearing Br, not the total carbons or the name locant.

2.2 Give the product and reagent conditions to convert bromoethane to ethanol and to ethene. [4]

2.2 Ethanol with warm aqueous KOH; ethene with hot ethanolic KOH.

2.3 Give the organic product from bromoethane with alcoholic KCN and explain the carbon count. [2]

2.3 Propanenitrile, $\text{CH}_3\text{CH}_2\text{CN}$. The cyanide carbon joins the original two-carbon chain, giving three carbons.

Exercises 3.1·3.2

3.1 For primary bromoethane with OH^- , describe the two electron-pair arrows and the products. Then explain the additional step needed when NH_3 replaces OH^- as nucleophile. [5]

3.2 Matched primary chloro-, bromo- and iodoalkanes are tested with aqueous AgNO_3 in ethanol. Predict the hydrolysis order, explain it, and give two controls. Explain why differing precipitate solubilities limit a precise kinetic comparison. [5]

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3.1 For primary bromoethane with OH^- , describe the two electron-pair arrows and the products. Then explain the additional step needed when NH_3 replaces OH^- as nucleophile. [5]

3.1 One arrow starts at an oxygen lone pair and ends at the C bearing Br; the other starts at C–Br and ends at Br. Ethanol and Br^- form. Ammonia first gives $\text{CH}_3\text{CH}_2\text{NH}_3^+$; a second NH_3 removes H^+ to give ethylamine and NH_4^+ .

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3.2 Iodo > bromo > chloro, because C–I is weakest and C–Cl strongest of these bonds. Match temperature and concentrations/volumes. Different detection thresholds/precipitate solubilities mean visible appearance is not a direct identical-conversion measurement in all cases.