

AS Level Chemistry A
H032/01 Breadth in chemistry

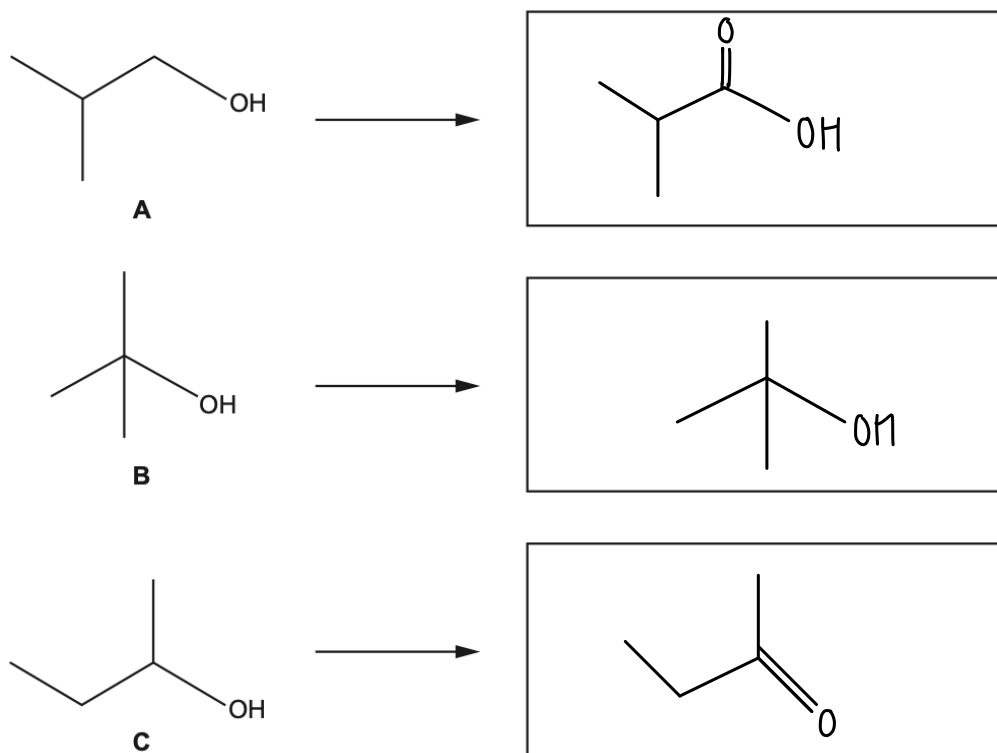
Question Set 22

1. This question is about alcohols and alkanes.

(a) Three alcohols **A**, **B** and **C** are structural isomers of $C_4H_{10}O$.

Each alcohol is **refluxed** with acidified potassium dichromate(VI), $H^+/Cr_2O_7^{2-}$.

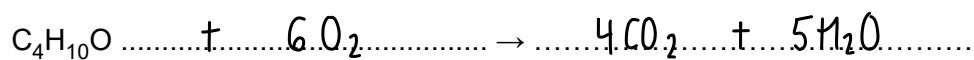
(i) Draw the structures for the organic products.
If there is no reaction, write '**NONE**'.



(ii) Write the systematic name for alcohol **C**. *butanone*

[3]

(iii) Complete the equation below for the complete combustion of alcohol **A**.



[1]

[1]

- (b) Under suitable conditions, butane, C_4H_{10} , reacts with chlorine by radical substitution.
A mixture of organic compounds is formed, including C_4H_9Cl , and compounds **D** and **E**.

- (i) Complete the table below to show the mechanism for the initiation and propagation stages of the reaction of C_4H_{10} with chlorine to form C_4H_9Cl .

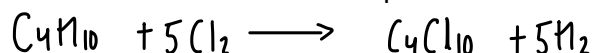
Initiation	Equation $Cl_2 \longrightarrow 2Cl\cdot$ Conditions $UV\ light$
Propagation $C_4H_{10} + Cl\cdot \rightarrow \cdot C_4H_9 + HCl$ $\cdot C_4H_9 + Cl_2 \rightarrow C_4H_9Cl + Cl\cdot$

In your equations, use molecular formulae and 'dots' (\cdot) with any radicals.

[3]

- (ii) Organic compound **D** is formed by substitution of **all** the H atoms in butane by Cl atoms.

Write the equation for the formation of compound **D** from butane. Use molecular formulae.



[1]

- (iii) Organic compound **E** is formed by the substitution of **some** of the H atoms in butane by Cl atoms.

A chemist found that 0.636 g of compound **E** has a volume of 78.0 cm^3 . Under the conditions used, the molar gas volume is $32.5\text{ dm}^3\text{ mol}^{-1}$.

$$\downarrow 0.078\text{ dm}^3$$

Determine the molecular formula of compound **E**.

[3]

- iii) 1 mole of any gas at RTP occupies 24 dm^3 .

$$32.5\text{ dm}^3 = 1\text{ mole}$$

$$1\text{ dm}^3 = \frac{1}{32.5}\text{ moles}$$

$$0.078\text{ dm}^3 = 2.4 \times 10^{-3}\text{ moles}$$

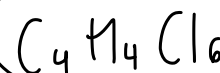
$$\text{moles} = \frac{\text{mass}}{M_r} \Rightarrow M_r = \frac{\text{mass}}{\text{moles}} = \frac{0.636}{2.4 \times 10^{-3}} = 265$$

$$\rightarrow M_r = 265$$

$$M_r\text{ of } C_4H_8Cl_2 = 127$$

$$C_4H_6Cl_4 = 196$$

$$C_4H_4Cl_6 = 265$$



Total Marks for Question Set 22: 12

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge