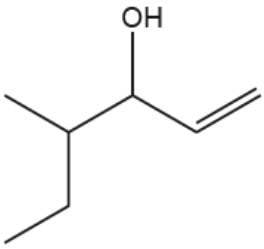
Alcohols and haloalkanes – 2021/20 GCE AS Chemistry A

1. Nov/2021/Paper_H032/01/No.17

What is the systematic name of the compound below?



A 3-methylhex-5-en-4-ol

B 4-methylhex-1-en-3-ol

C 2-ethylpent-4-en-3-ol

D 4-ethylpent-1-en-3-ol

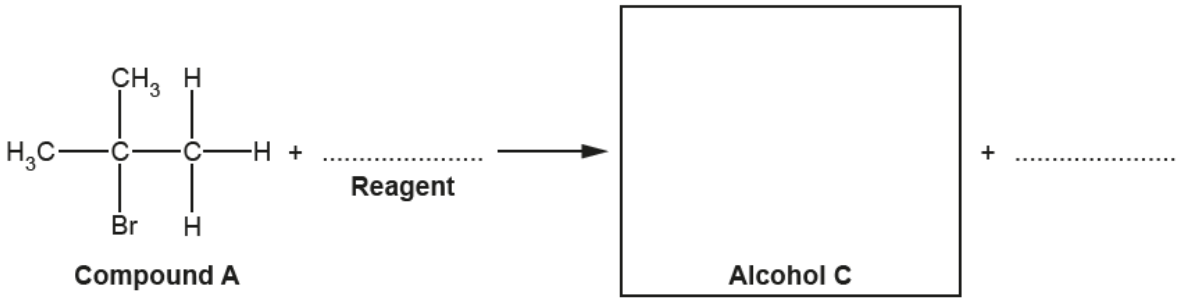
Your answer ☐ **[1]**

2. Nov/2021/Paper_H032/01/No.24(c)

(c) Compound **A** can be refluxed with a reagent to make alcohol **C**.

(i) Choose a reagent for this reaction and complete the equation for this reaction.

Your equation should show the structure of alcohol **C**.



Compound A **Alcohol C**

[2]

(ii) Draw a labelled diagram to show how you would set up apparatus for reflux.

[2]

3. Nov/2020/Paper_H032/01/No.17

Potassium ferrate(VI) contains two potassium ions for every ferrate(VI) ion.

What is the formula of the ferrate(VI) ion?

A FeO_3^{2-}

B FeO_4^{2-}

C FeO_5^{2-}

D FeO_6^{2-}

Your answer ☐ **[1]**

4. Nov/2021/Paper_H032/02/No.7(c)

(c) Compounds **A** and **B** are structural isomers of $(CH_3)_3COH$.

(i) Compound **A** is a secondary alcohol.

What is the systematic name of compound **A**?

..... **[1]**

(ii) Compound **B** is a branched primary alcohol.

Compound **B** is refluxed with acidified potassium dichromate(VI) as an oxidising agent.

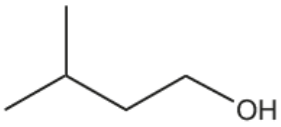
Write the equation for the reaction that takes place.

Use structures for organic compounds and [O] for the oxidising agent.

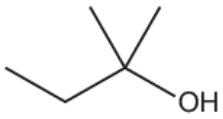
[3]

5. Nov/2020/Paper_H032/02/No.5

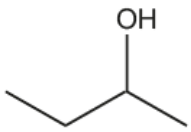
This question is about the alcohols **A–F** shown below.



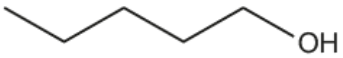
A



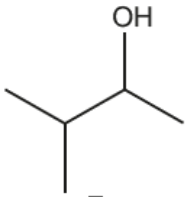
B



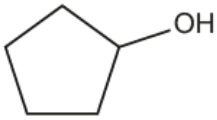
C



D



E



F

(a) Which of the alcohols **A–F** are secondary alcohols?

..... **[2]**

(b) Complete a balanced equation for the complete combustion of alcohol **C**.

$CH_3CH_2CH(OH)CH_3$ + ... → ..... + ... **[1]**

(c) What is the systematic name of alcohol **B**?

..... **[1]**

(d) Alcohol **A** can be prepared by the alkaline hydrolysis of the bromoalkane, $(CH_3)_2CHCH_2CH_2Br$. The hydrolysis with aqueous NaOH is shown in **equation 5.1**.

$(CH_3)_2CHCH_2CH_2Br + NaOH \longrightarrow \underset{\textbf{alcohol A}}{(CH_3)_2CHCH_2CH_2OH} + NaBr$ **equation 5.1**

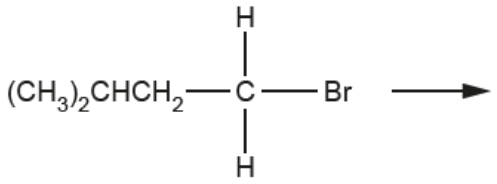
A student gently heats a mixture of $(CH_3)_2CHCH_2CH_2Br$ and NaOH(aq) for 25 minutes.

(i) Calculate the atom economy for the preparation of alcohol **A** in **equation 5.1**.

atom economy = ... % **[2]**

(ii) Outline the mechanism for the alkaline hydrolysis of $(CH_3)_2CHCH_2CH_2Br$.
The structure of $(CH_3)_2CHCH_2CH_2Br$ has been provided.

Show curly arrows, relevant lone pairs and dipoles, and the products.



[3]

(iii) Name this type of mechanism.

..... **[1]**

(e) The student decides to prepare alcohol **A** using the same method as in **(d)** but using the chloroalkane $(CH_3)_2CHCH_2CH_2C\mathit{l}$ instead of the bromoalkane, $(CH_3)_2CHCH_2CH_2Br$.

State and explain how the rates of hydrolysis of the chloroalkane and the bromoalkane would differ.

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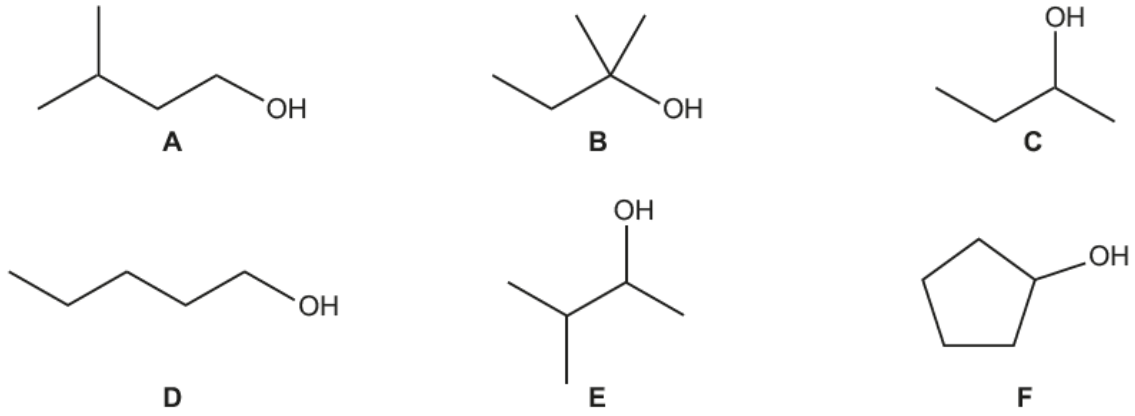
..... **[2]**

(f)* The structures of **A–F** are repeated below.

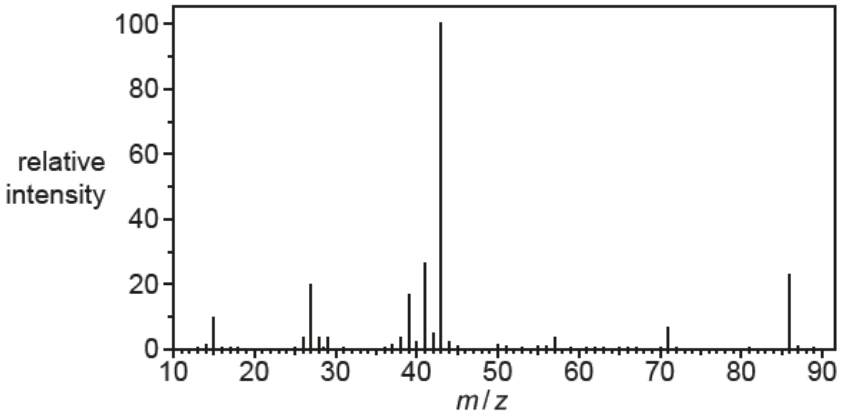


Compound **X** is one of the alcohols **A–F**.

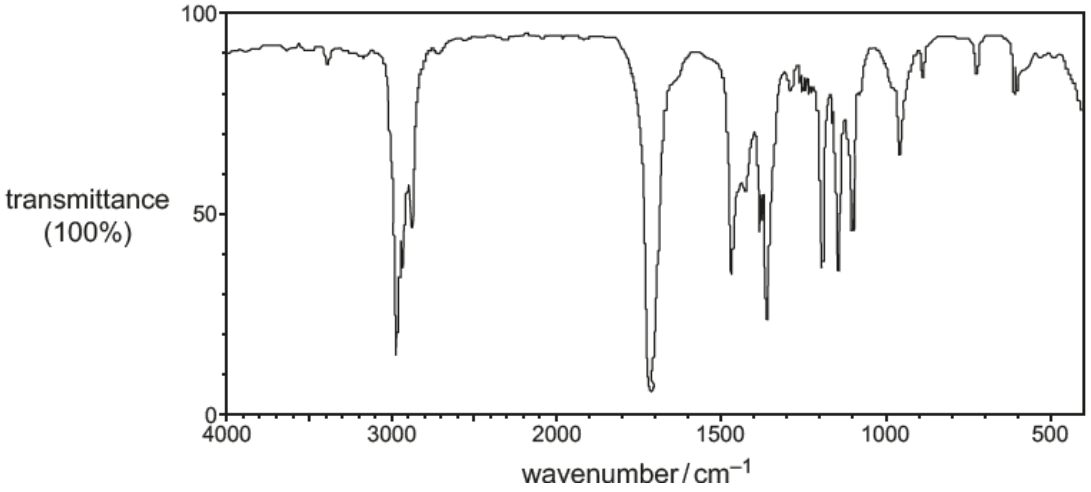
A student refluxes compound **X** with acidified potassium dichromate(VI) as an oxidising agent. A pure sample of the organic product **Y** is obtained from the resulting mixture.

The mass spectrum and IR spectrum of **Y** are shown below.

Mass spectrum of Y



IR spectrum of Y



Using this information, identify compound **X** and product **Y**, and write an equation for the formation of product **Y** from compound **X**. You may use [O] to represent the oxidising agent.

In your answer you should make clear how your conclusions are linked to the evidence. **[6]**

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Additional answer space if required

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