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CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	ALCOHOLS
PAPER TYPE:	QUESTION PAPER - 4
TOTAL QUESTIONS	10
TOTAL MARKS	26

Alcohols - 4

1. In the production of bioethanol, glucose ($C_6H_{12}O_6$) is converted into a dilute aqueous solution of ethanol and carbon dioxide.

Give the name of this process and state three essential conditions necessary to produce a good yield of ethanol.

(4)

2. Which compound is formed when 1-phenylethanol reacts with acidified potassium dichromate(VI)?

A. $C_6H_5CH_2CH_2OH$
B. $C_6H_5CH_2CHO$
C. $C_6H_5COCH_3$
D. $C_6H_5CH_2COOH$

(1)

3. When 3-bromo-3-methylpentane, $CH_3CH_2CBr(CH_3)CH_2CH_3$, is treated with aqueous ethanolic potassium hydroxide, a mixture of 3-methylpentan-3-ol, 3-methylpent-2-ene and an isomeric alkene is formed.

(a) Name the type of mechanism occurring in the formation of 3-methylpentan-3-ol from 3-bromo-3-methylpentane.

Why is it difficult to oxidise.

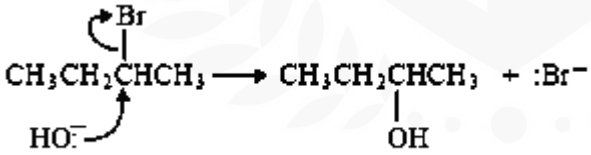
(2)

(b) Name and outline a mechanism for the formation of 3-methlypent-2-ene in the above reaction.

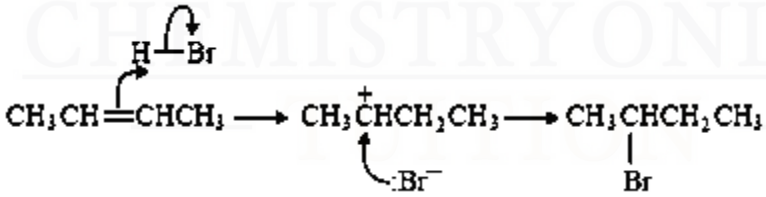
(4)

4. In which of the following is a curly arrow used incorrectly?

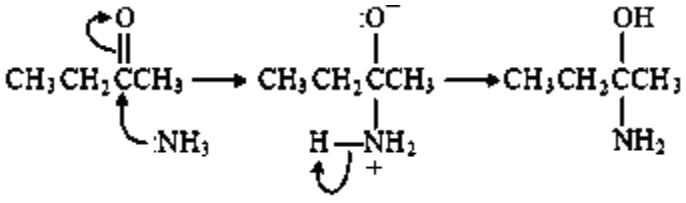
A.

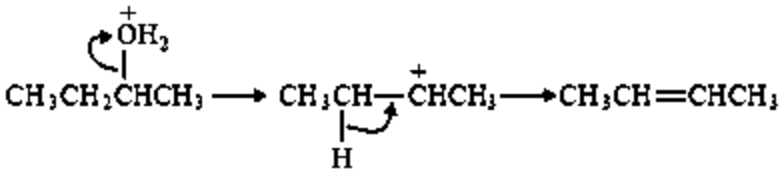


B.



C.

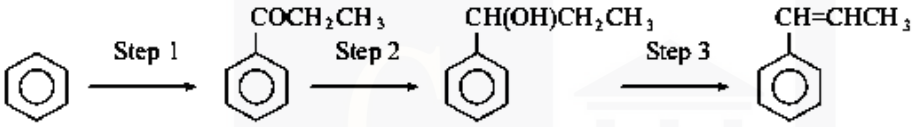




D.

(1)

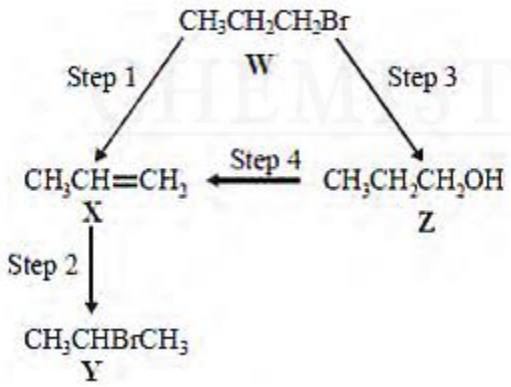
5. Consider the following reaction sequence:



For step 3, name the type of reaction taking place and suggest a suitable reagent or combination of reagents.

(3)

6. For this question refer to the reaction scheme below.



Which one of the following reagents would not bring about the reaction indicated?

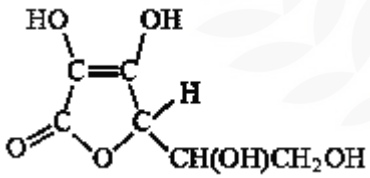
A. Step 1 : alcoholic KOH
B. Step 2 : aqueous Br_2
C. Step 3 : aqueous NaOH
D. Step 4 : concentrated H_2SO_4

(1)

7. Butan-1-ol can be oxidised to form a carboxylic acid. Using [O] to represent the oxidising agent, write an equation for this reaction and name the product.

(2)

8. Which one of the following is not a correct statement about vitamin C, shown below?



A. It is a cyclic ester.
B. It can form a carboxylic acid on oxidation.
C. It decolourises a solution of bromine in water.
D. It is a planar molecule.

(1)

9. Pentanal can be formed by the oxidation of an alcohol.
Identify this alcohol. And state the class to which this alcohol belongs.

(2)

10. Any ethanol present in the breath of a drinker can be detected by using a breathalyser.

The ethanol is converted into ethanoic acid.

The breathalyser has negative and positive electrodes.

A current is measured and displayed in terms of alcohol content.

The overall redox equation is as follows

$CH_3CH_2OH(l) + O_2(g) \rightarrow CH_3COOH(l) + H_2O(l)$

(a) Draw the displayed formula for ethanoic acid.

(1)

(b) Deduce a half-equation for the reduction of atmospheric oxygen to water in acidic solution at one electrode of the breathalyser.

(1)

(c) Deduce a half-equation for the oxidation of ethanol in water to ethanoic acid at the other electrode of the breathalyser.

(1)

(d) The earliest breathalysers used laboratory chemicals to oxidise the ethanol to ethanoic acid.

Detection was by a colour change.

Identify a reagent or combination of reagents that you would use in the laboratory to oxidise ethanol to ethanoic acid.

State the colour change that you would expect to see.

(2)

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