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# CHEMISTRY

## ORGANIC CHEMISTRY

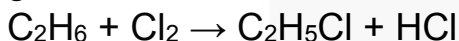
Level & Board	AQA (A-LEVEL)
TOPIC:	INTRODUCTION TO ORGANIC CHEMISTRY
PAPER TYPE:	QUESTION PAPER - 3
TOTAL QUESTIONS	10
TOTAL MARKS	31

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## Introduction to Organic Chemistry - 3

1. Chlorination of ethane follows a free-radical substitution mechanism. This mechanism is similar to that which occurs when methane is chlorinated.

The overall equation for the reaction of ethane to form chloroethane is given below.



State the conditions and outline a mechanism for this reaction. Show how butane can be formed in this reaction.

(5)

2. Propanone can be reduced to form an alcohol.  
A functional group isomer of the alcohol formed is

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

(1)

3. Chlorine can be used to make chlorinated alkanes such as dichloromethane.

(a) Write an equation for each of the following steps in the mechanism for the reaction of chloromethane ( $\text{CH}_3\text{Cl}$ ) with chlorine to form dichloromethane ( $\text{CH}_2\text{Cl}_2$ ).

Initiation step

First propagation step

Second propagation step

The termination step that forms a compound with empirical formula  $\text{CH}_2\text{Cl}$ .

(4)

(b) When chlorinated alkanes enter the upper atmosphere, carbon-chlorine bonds are broken.

This process produces a reactive intermediate that catalyses the decomposition of ozone.

The overall equation for this decomposition is  $2\text{O}_3 \rightleftharpoons 3\text{O}_2$

Name the type of reactive intermediate that acts as a catalyst in this reaction.

Write two equations to show how this intermediate is involved as a catalyst in the decomposition of ozone.

(3)

4. How many structural isomers, which are aldehydes, have the molecular formula  $C_5H_{10}O$ ?

- A. 2
- B. 3
- C. 4
- D. 5

(1)

5. Two stereoisomers of but-2-ene are formed when 2-bromobutane reacts with ethanolic potassium hydroxide.

(a) Explain what is meant by the term stereoisomers.

(2)

(b) Draw the structures and give the names of the two stereoisomers of but-2-ene.

(2)

(c) Name this type of stereoisomerism.

(1)

6. Which does not contain an asymmetric carbon atom?

- A.  $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_3$
- B.  $\text{CH}_3\text{CH}_2\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CH}_3$
- C.  $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{OH}$
- D.  $\text{CH}_3\text{CH}_2\text{CHClCH}_3$

(1)

7. Branched chain alkanes are often preferred as fuels.

Draw the structure of two branched chain isomers of hexane and name the first isomer.

(3)

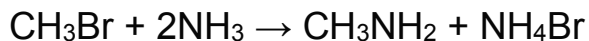
8. Which compound is not an isomer of the following compound?



- A.  $\text{CH}_3\text{CH}_2\text{COCH}_3$
- B.  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{OH}$
- C.  $(\text{CH}_3)_2\text{CHCHO}$
- D.  $\text{CH}_2=\text{CHCH}_2\text{CHO}$

(1)

9. Bromomethane reacts with the nucleophile ammonia according to the following equation.



(a) Explain what is meant by the term nucleophile.

(2)

(b) Name the organic product of this reaction.

(1)

(c) Outline a mechanism for this reaction.

(3)

10. How many isomers are there of  $\text{C}_3\text{H}_9\text{N}$ ?

- A. 2
- B. 3
- C. 4
- D. 5

(1)



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