



CHEMISTRY ONLINE
— TUITION —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

CHEMISTRY

ORGANIC CHEMISTRY

Level & Board	AQA (A-LEVEL)
TOPIC:	INTRODUCTION TO ORGANIC CHEMISTRY
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	10
TOTAL MARKS	38

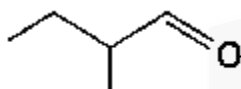
ChemistryOnlineTuition Ltd reserves the right to take legal action against any individual/ company/organization involved in copyright abuse.

Introduction to Organic Chemistry - 2

1.

(a)

Following is the skeletal formula of a branched chain aldehyde with molecular formula $C_5H_{10}O$ that is optically active.



(1)

(b)

To distinguish between separate samples of the two enantiomers of the branched chain aldehyde $C_5H_{10}O$ plane-polarized light is used.

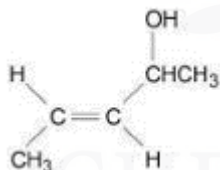
The plane-polarized light rotates in opposite directions for the two enantiomers.

As enantiomers have equal and opposite optical rotations, allowing for their differentiation using polarimetry.

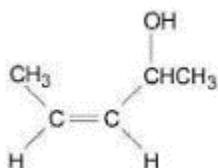
(2)

(c)

E form of a structural isomer of $C_5H_{10}O$ that shows both optical and geometric isomerism.



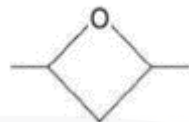
Z form of a structural isomer of $C_5H_{10}O$ that shows both optical and geometric isomerism.



(2)

(d)

Following are the two other cyclic isomers of $C_5H_{10}O$ that have an ether functional group and only three peaks in their ^{13}C NMR spectra.



2. B

(2)

(1)

3.

(a)

Fractional distillation or fractionation is a process that is used to separate petroleum into fractions.

(1)

(b)

C_9H_{20} is the molecular formula for an alkane with nine carbon atoms.

(1)

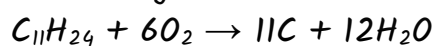
(c)

Equation for the complete combustion of the alkane $C_{11}H_{24}$ is as
 $C_{11}H_{24} + 17O_2 \rightarrow 11CO_2 + 12H_2O$

(1)

(d)

Equation for the incomplete combustion of $C_{11}H_{24}$ to produce carbon and water only is as:



(1)

4. C

(1)

5.

(a)

Having different boiling points and different volatilities is the physical property of alkenes that allows them to be separated from a mixture by fractional distillation.

(1)

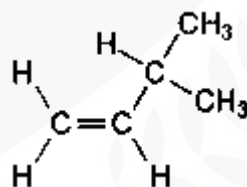
(b)

i.

Structural isomerism refers to phenomenon in which compounds with the same molecular formula but differing in their structural, displayed, or structural formulae. They have identical numbers and types of atoms, satisfying the empirical formula.

(2)

ii.

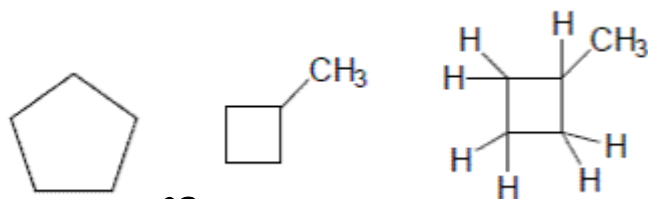


Name: 3-methylbut-1-ene

(1)

iii.

Structure of a functional group isomer of pent-1-ene is as



(1)

(c)

$C_{13}H_{28}$ represents the molecular formula of X

Use of ethane: It is used for making plastics or polymers or polythene

Also used for ripening fruit.

(2)

6. A

(1)

7.

(a)

Following are few characteristics of a homologous series.

- **General formula:** Shared among members of a named homologous series.
- **Chemically similar:** have the same or similar chemical reactions.
- **Same functional group:** same for all compounds in the series.
- **Trend in physical properties:** Boiling points increase with higher molecular mass.
- **Increase by CH_2 :** Successive molecules differ by CH_2 unit (molecular mass increase by approximately 14 g/mol).

(2)

(b)

Fractional distillation is a process used to separate octane from a mixture containing several different alkanes.

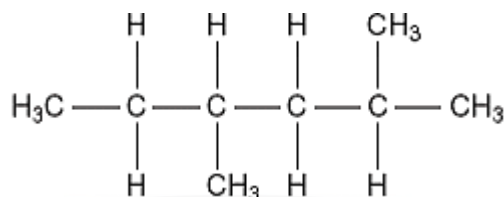
(1)

(c)

Structural isomerism: Structural isomerism refers to phenomenon in which compounds with the same molecular formula but differing in their structural, displayed, or structural formulae. They have identical numbers and types of atoms, satisfying the empirical formula.

Name: 2,4-dimethylhexane

Empirical formula: C₄H₉



(4)

(d)

The branched isomer has a lower boiling point than octane due to the following factors:

Less Surface Contact/Less Surface Area/Less Polarizable Molecule:

- The branched isomer has reduced surface contact and a smaller surface area compared to octane.
- The molecule is less polarizable, resulting in weaker intermolecular forces.

Fewer/Weaker/Less Van der Waals' (vdw) Forces:

- The branched isomer experiences fewer or weaker Van der Waals' forces compared to octane.
- The reduced contact area allows for fewer points of contact between molecules.

More Spherical or Fewer Points of Contact:

- The branched isomer has a more spherical shape or fewer points of contact, contributing to weaker intermolecular forces.

(2)

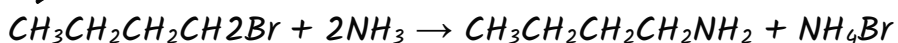
8. B

CHEMISTRY ONLINE

(1)

9.

Equation:



Name of product:

(1-)butylamine

(3)

10. B

(1)



I am Sorry !!!!!