

NOMENCLATURE OF ORGANIC COMPOUNDS...

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Organic Chemistry:-

"Organic chemistry is that branch of chemistry which deals with the study of Hydrocarbons and their derivatives."

Hydrocarbons:

"Compounds containing carbon & hydrogen only are called Hydrocarbons."

Examples:-

Alkanes, Alkenes, Alkynes, Benzene, ...

Alkanes/ Paraffins

1) "Hydrocarbons in which there is single bond b/w C-atoms. are called alkanes or paraffins."

- 2) They are saturated hydrocarbons
- 3) They undergo substitution reactions.
- 4) They have general formula: C_nH_{2n+2}



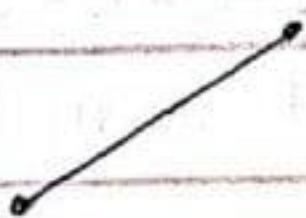
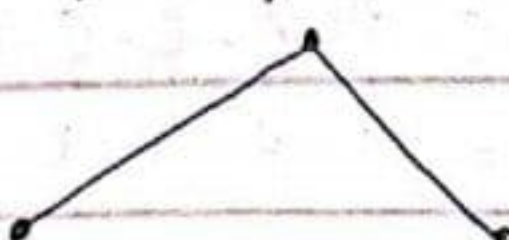
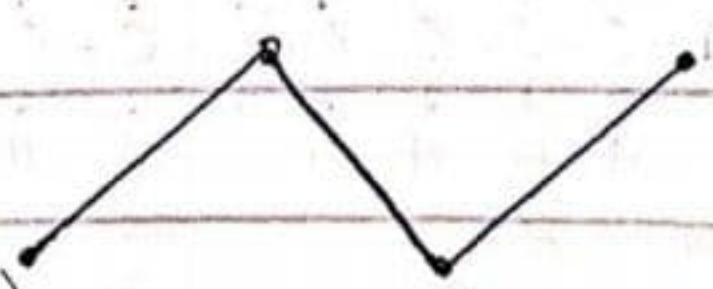
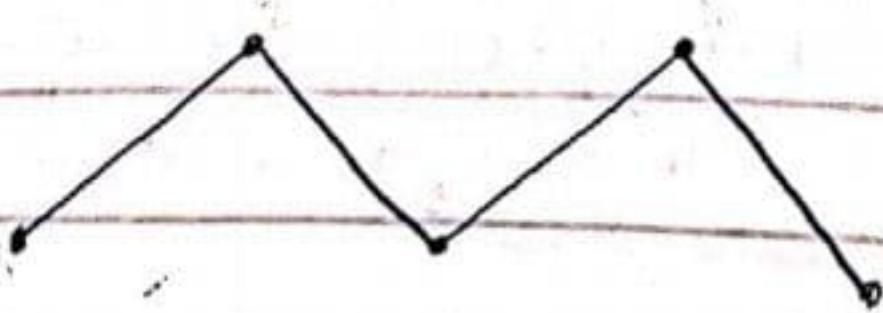
-: Homologous Series Of Alkanes :-

Name	Structural Formula
Methane	$ \begin{array}{c} H \\ \\ H - C - H \\ \\ H \end{array} $
Ethane	$ \begin{array}{cc} H & H \\ & \\ H - C - & C - H \\ & \\ H & H \end{array} $
Propane	$ \begin{array}{ccc} H & H & H \\ & & \\ H - C - & C - & C - H \\ & & \\ H & H & H \end{array} $
Butane	$ \begin{array}{cccc} H & H & H & H \\ & & & \\ H - C - & C - & C - & C - H \\ & & & \\ H & H & H & H \end{array} $
Pentane	$ \begin{array}{ccccc} H & H & H & H & H \\ & & & & \\ H - C - & C - & C - & C - & C - H \\ & & & & \\ H & H & H & H & H \end{array} $

Homologous Series of Alkanes:-

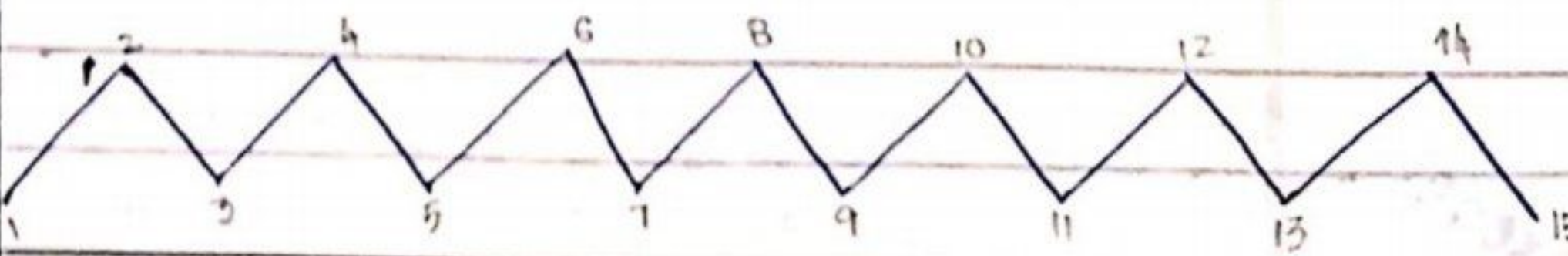
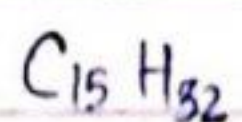
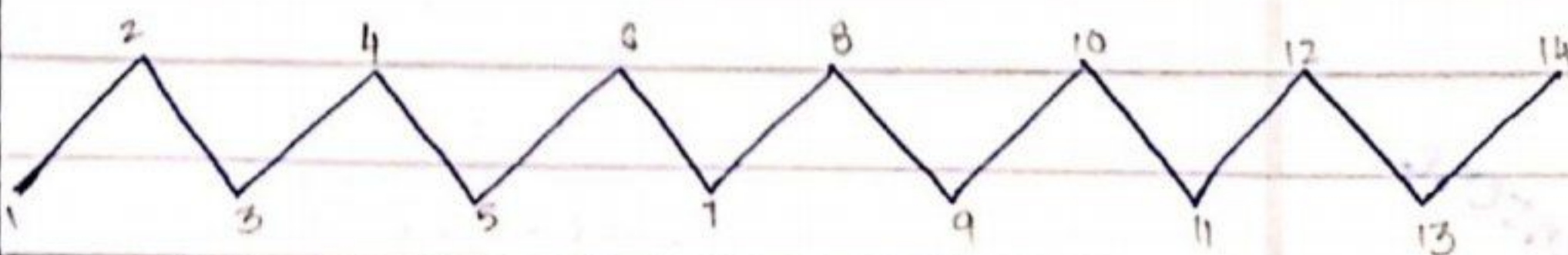
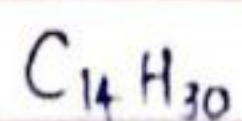
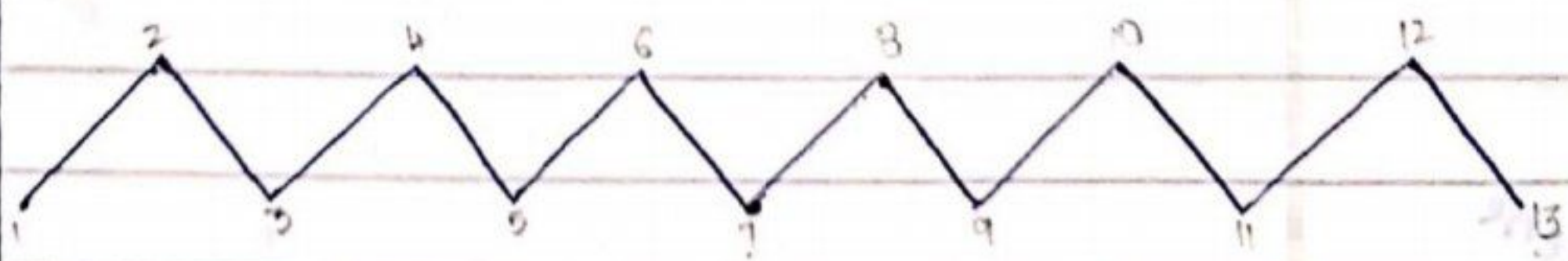
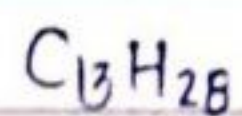
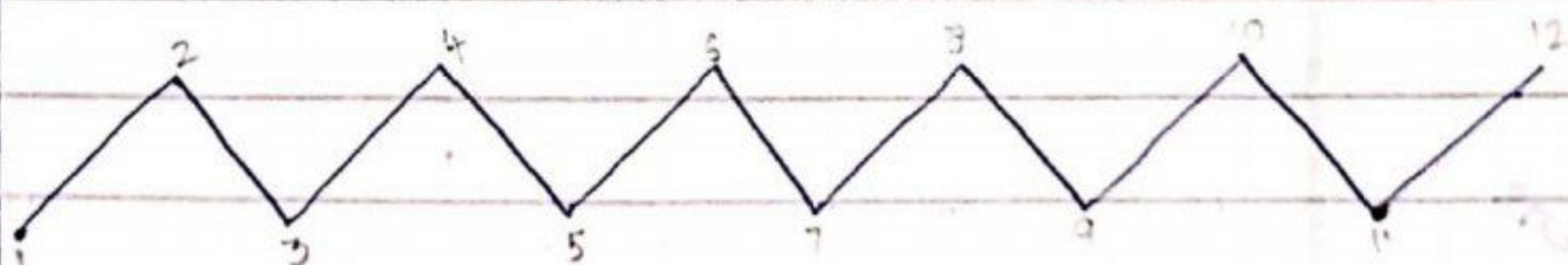
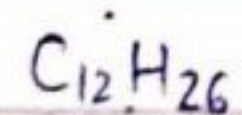
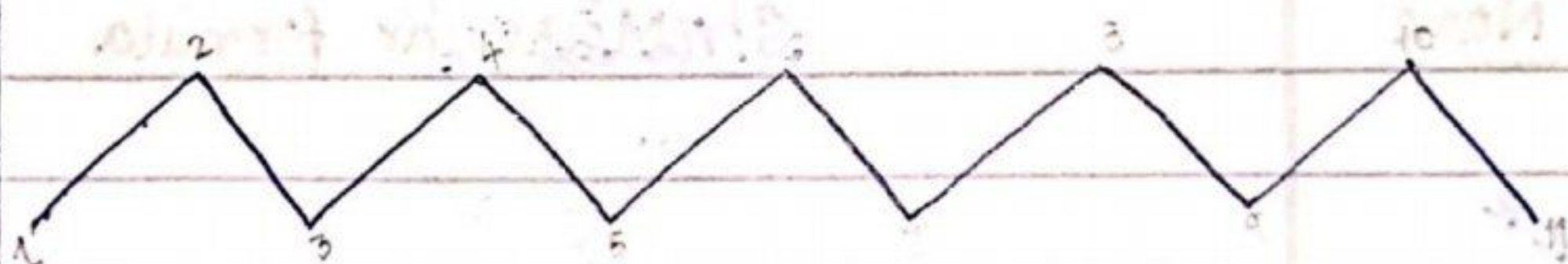
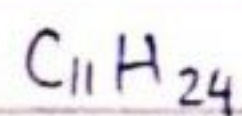
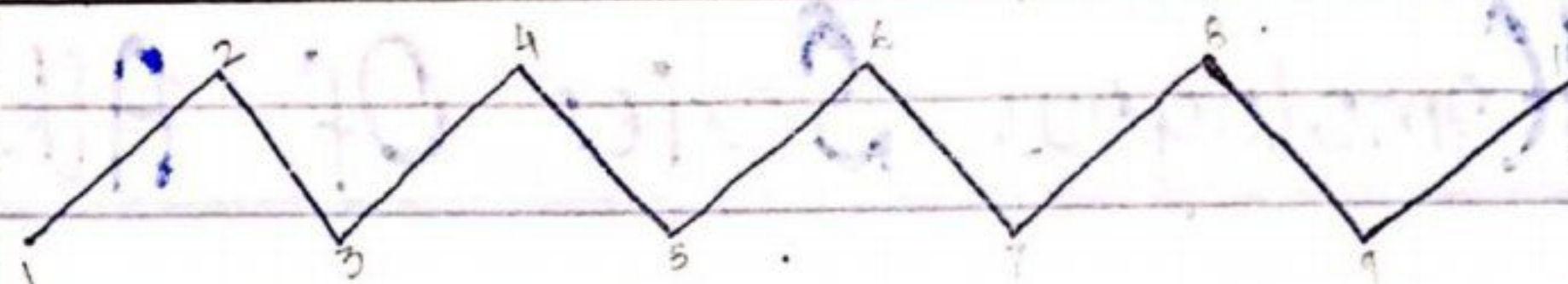
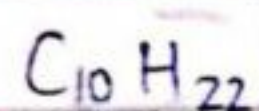
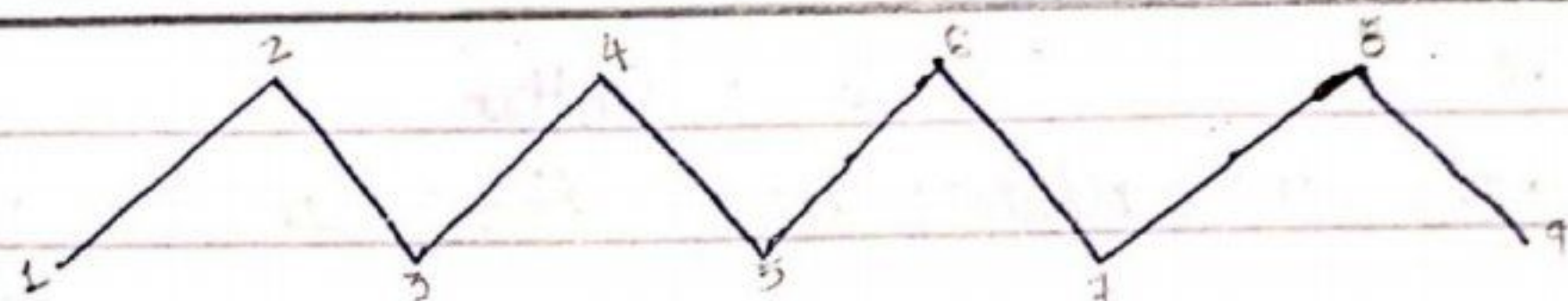
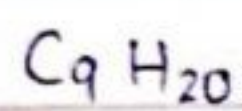
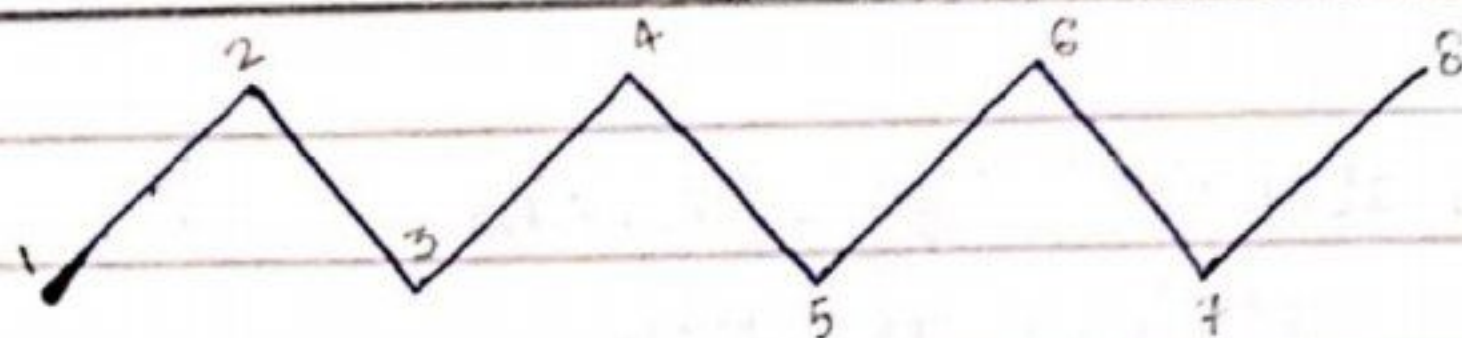
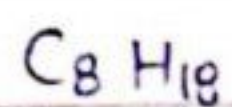
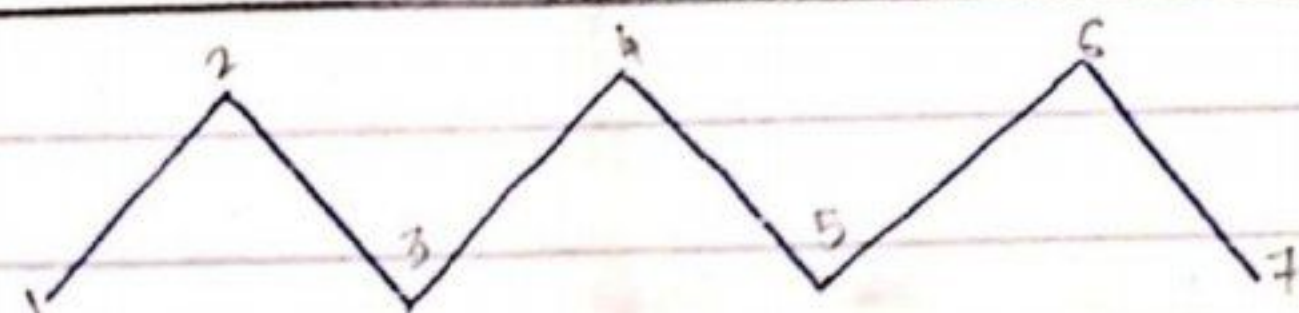
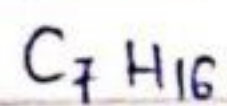
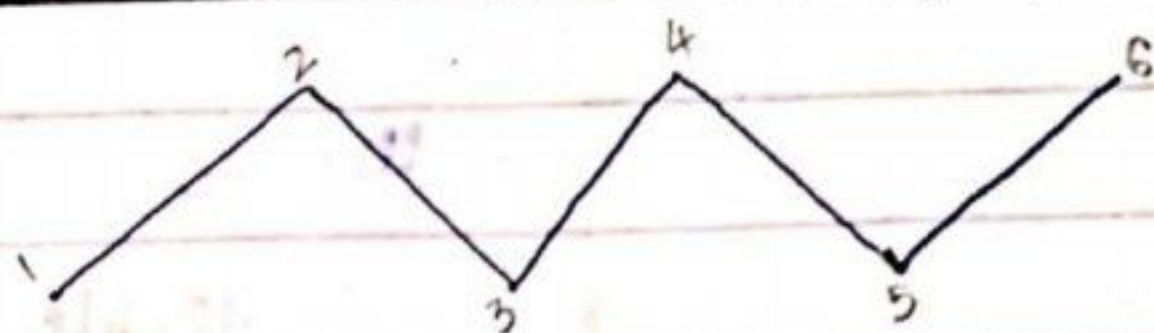
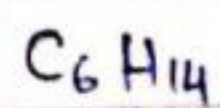
"Series of compounds in which each member is differ from adjacent member by CH_2 -group is called homologous series and these compounds are called homologos."



<u>Molecular</u> formula	Line Drawing Structure
CH_4	N/A (not applicable)
C_2H_6	
C_3H_8	
C_4H_{10}	
C_5H_{12}	

formula

Line Drawing formula



Alkenes / Olefins

1) "Hydrocarbons in which there is double bond b/w carbon atom are called alkenes or olefins."

2) They are unsaturated hydrocarbons

3) They undergo addition reaction

4) They have general formula: C_nH_{2n}

Note cycloalkane and alkene have same general formula

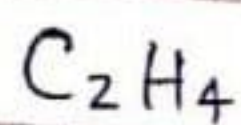


- Homologous Series Of Alkenes -

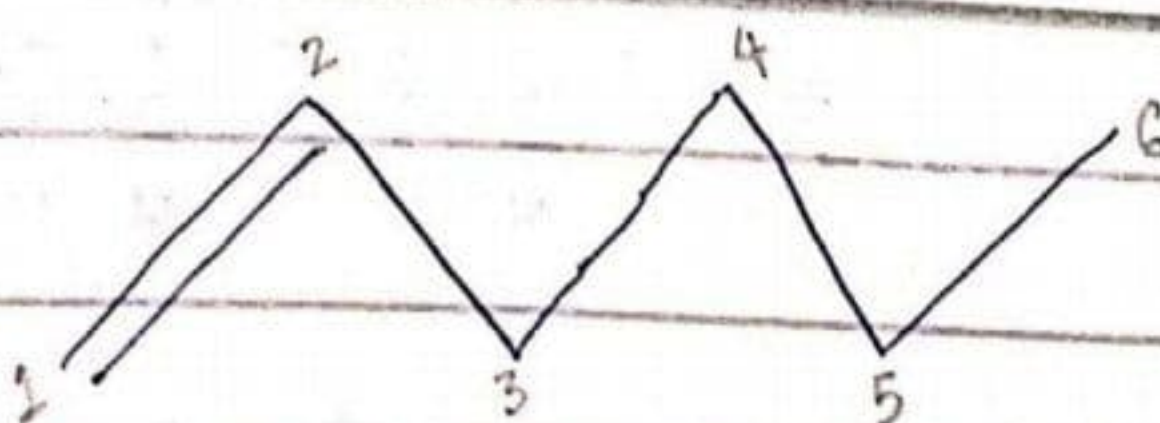
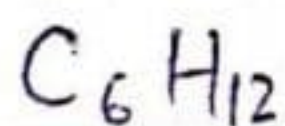
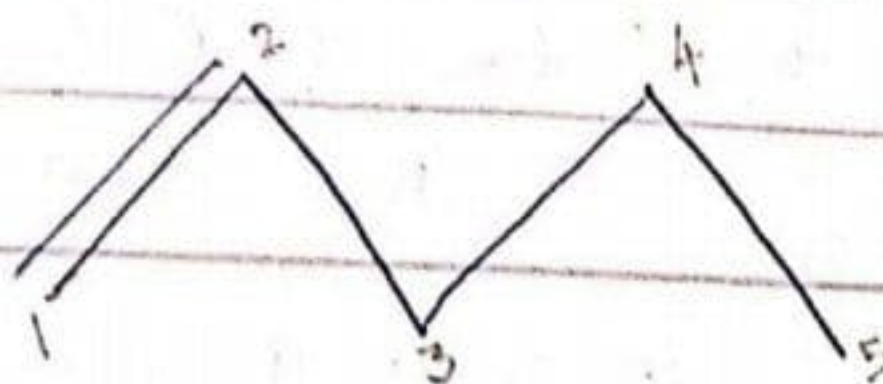
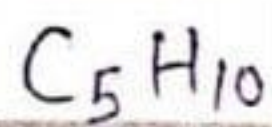
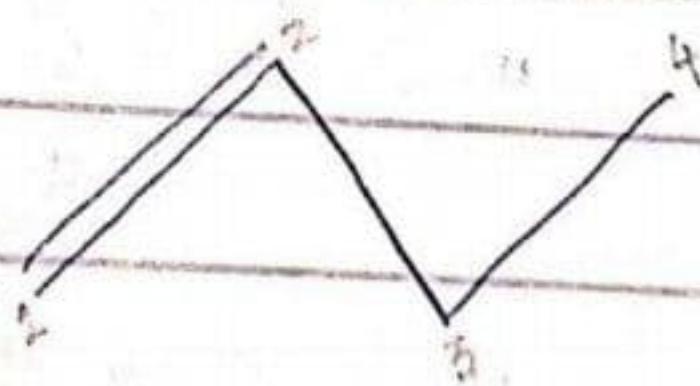
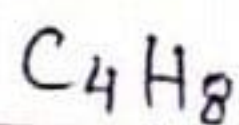
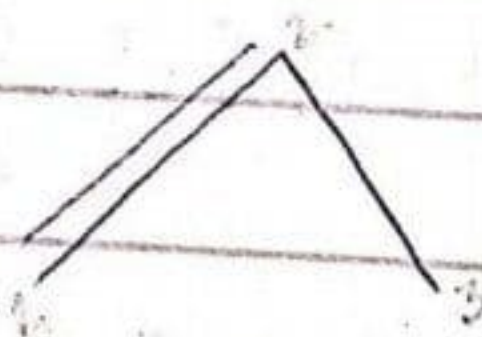
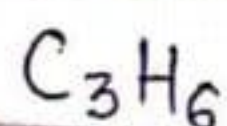
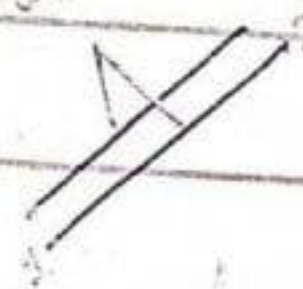
Name	structural formula
Ethene	$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$
Propene	$\begin{array}{c} \text{H} & \text{H} & \text{H} \\ & & \\ \text{H} - \text{C} = \text{C} - \text{C} - \text{H} \\ & & \\ & & \text{H} \end{array}$
Butene	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} \\ & & & \\ \text{H} - \text{C} = \text{C} - \text{C} - \text{C} - \text{H} \\ & & & \\ & & \text{H} & \text{H} \end{array}$
Pentene	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & \\ \text{H} - \text{C} = \text{C} - \text{C} - \text{C} - \text{C} - \text{H} \\ & & & & \\ & & \text{H} & \text{H} & \text{H} \end{array}$
Hexene	$\begin{array}{c} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ & & & & & \\ \text{H} - \text{C} = \text{C} - \text{C} - \text{C} - \text{C} - \text{C} - \text{H} \\ & & & & & \\ & & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$

Molecular Formula

Line Drawing Formula



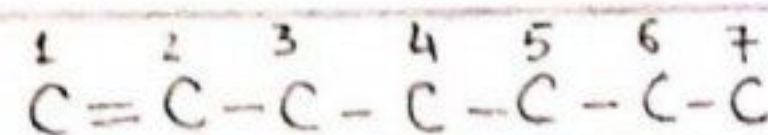
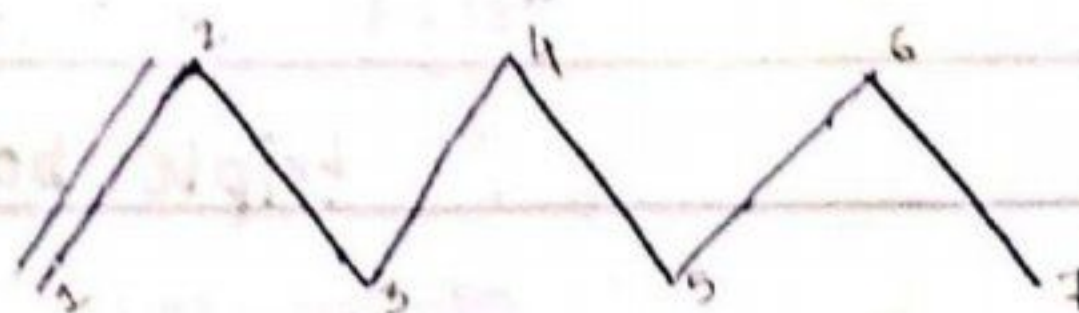
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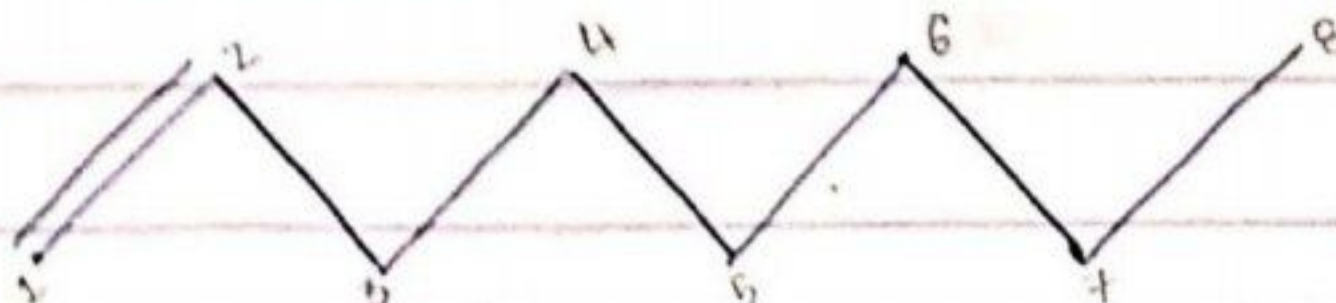
Formula

Line Drawing Formula

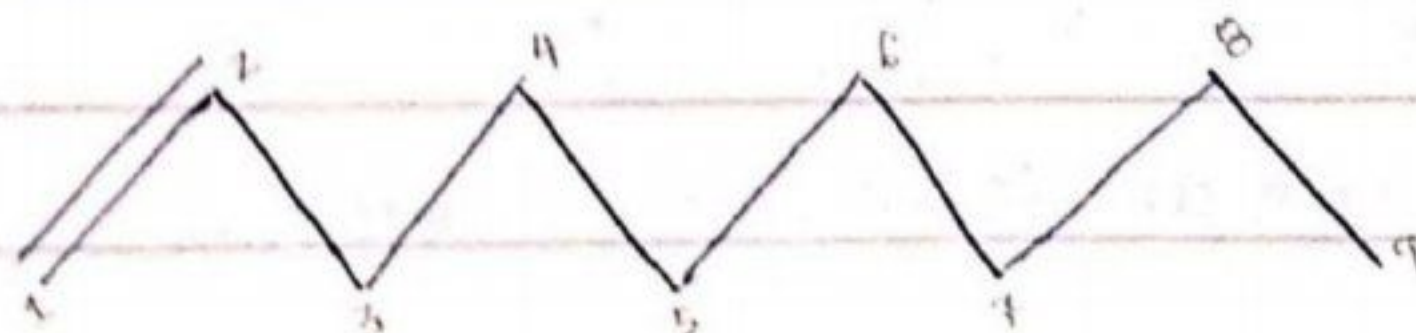
C_7H_{14}



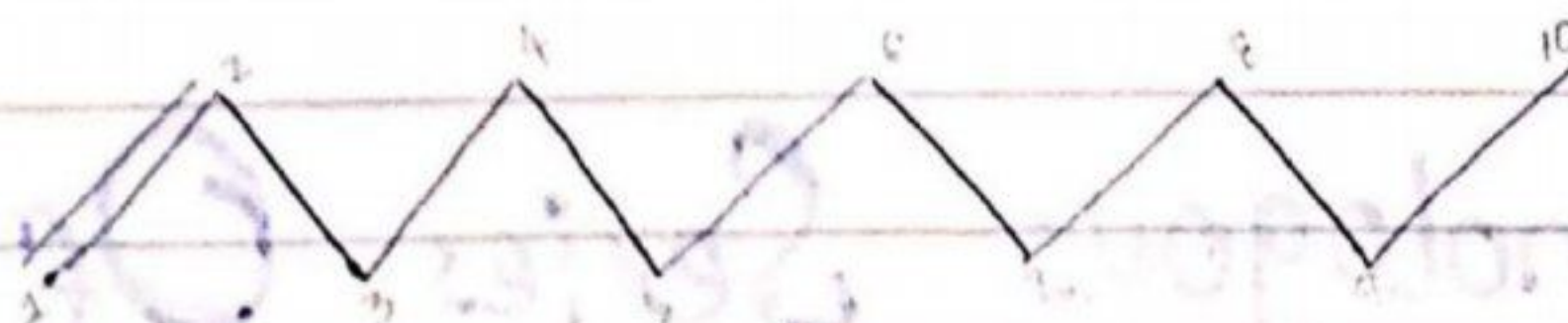
C_8H_{16}



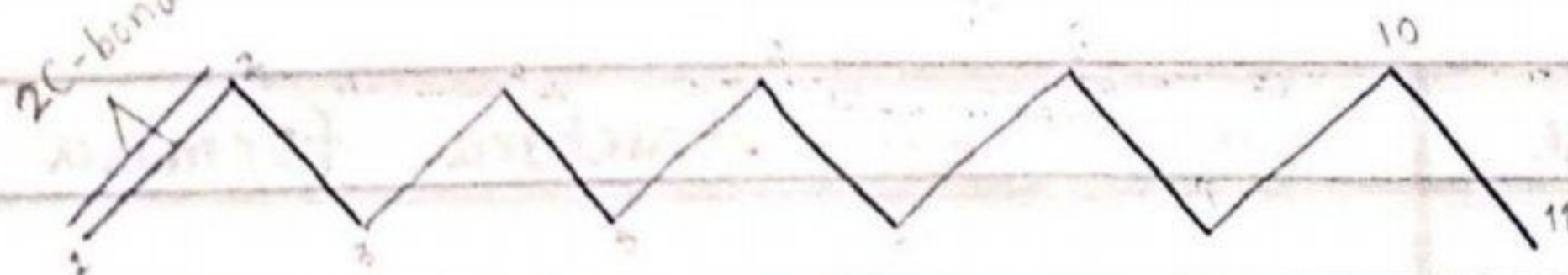
C_9H_{18}



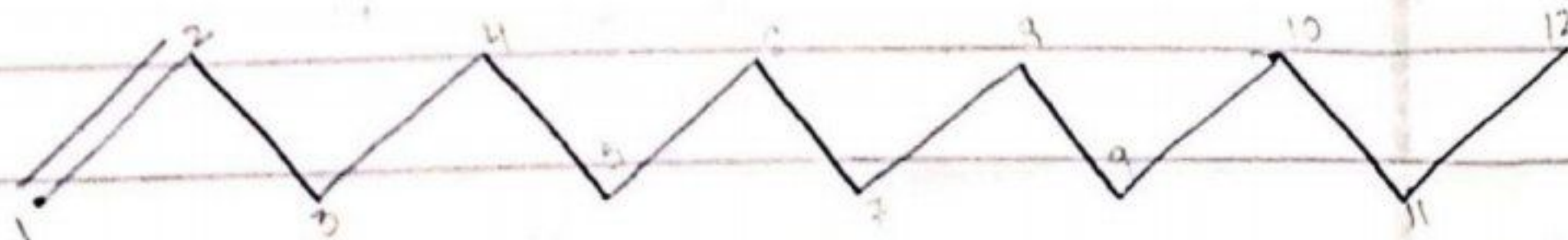
$C_{10}H_{20}$



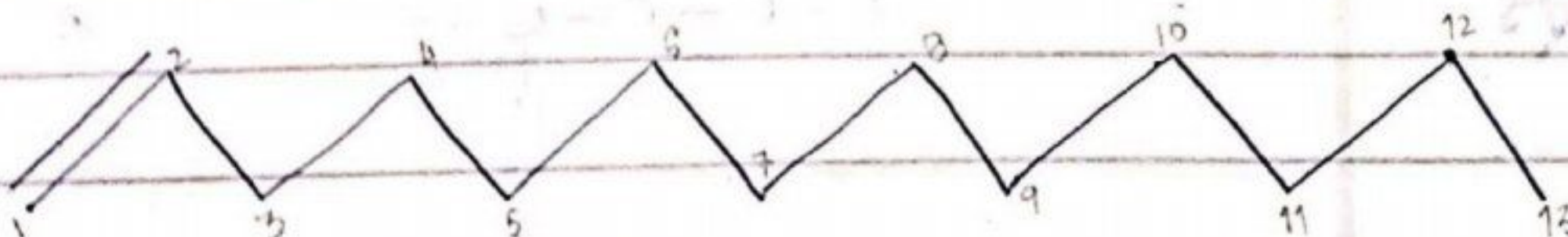
$C_{11}H_{22}$



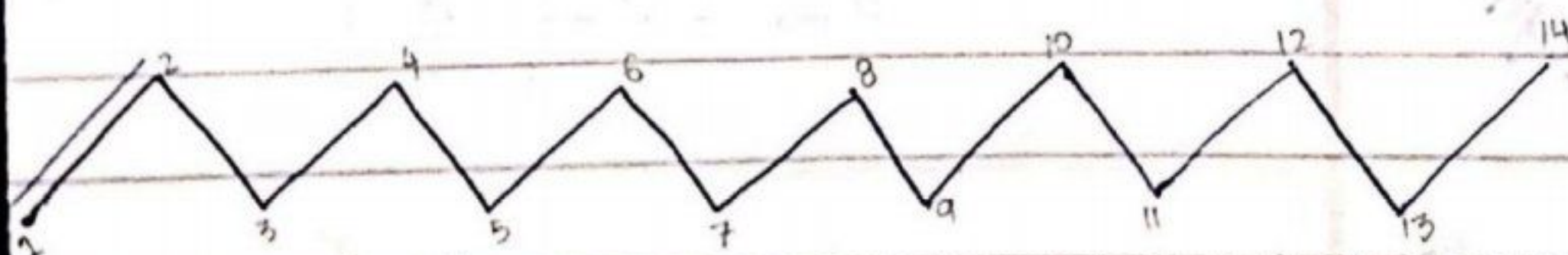
$C_{12}H_{24}$



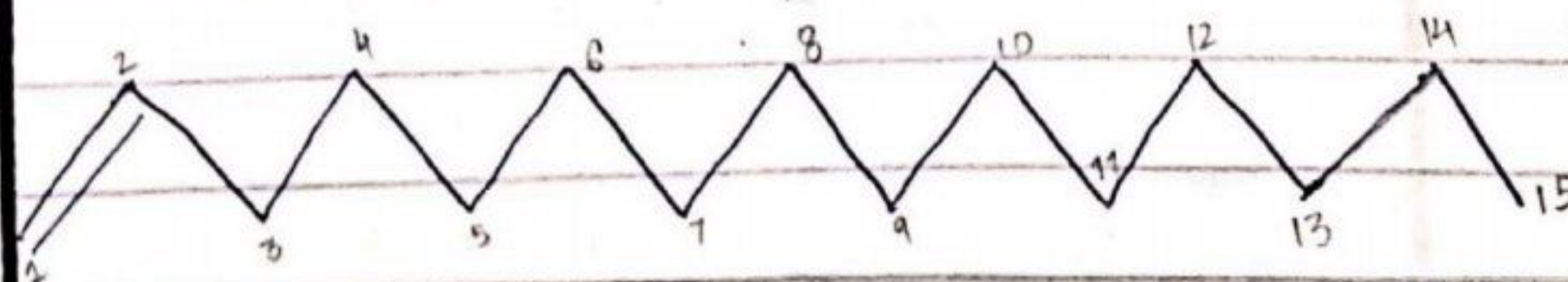
$C_{13}H_{26}$



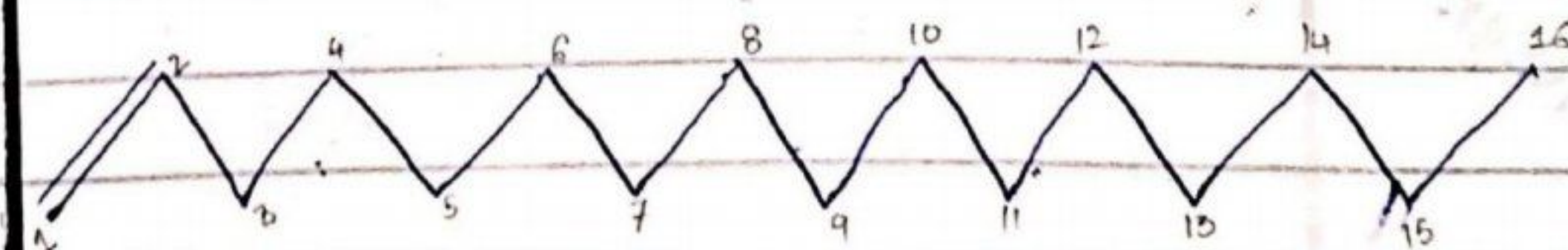
$C_{14}H_{28}$



$C_{15}H_{30}$



$C_{16}H_{32}$



Alkynes

"Hydrocarbons in which there is triple bond b/w carbon atoms are called alkynes."

They are unsaturated hydrocarbons.

They undergo addition reaction

They have general formula: C_nH_{2n-2}

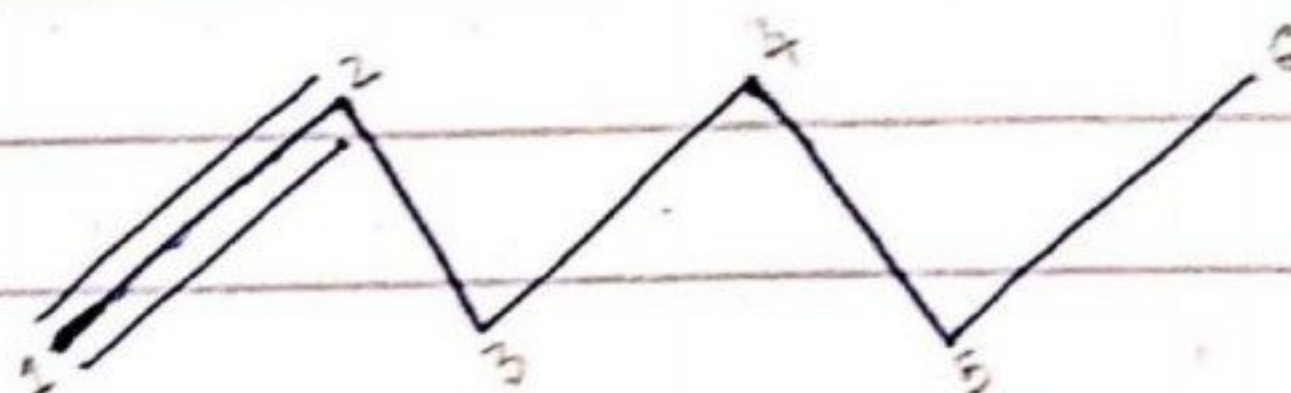
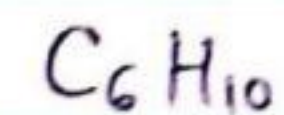
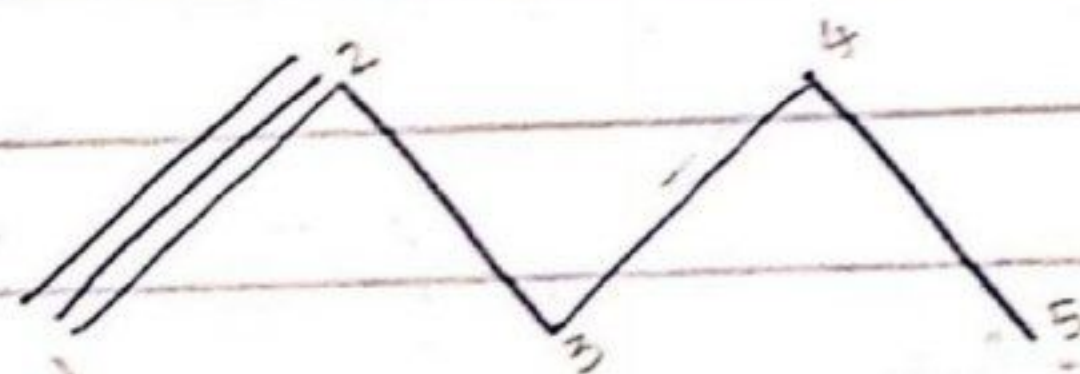
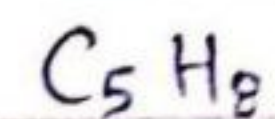
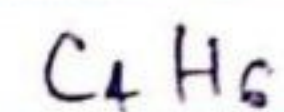
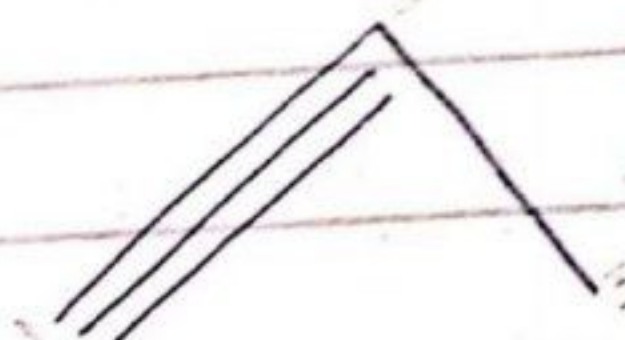
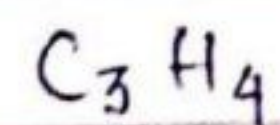
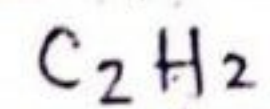


Homologous Series Of Alkynes:-

Name	Structural formula
Ethyne	$H - C \equiv C - H$
Propyne	$\begin{array}{c} H \\ \\ H - \overset{1}{C} \equiv \overset{2}{C} - \overset{3}{C} - H \\ \\ H \end{array}$
Butyne	$\begin{array}{c} H \quad H \\ \quad \\ H - \overset{1}{C} \equiv \overset{2}{C} - \overset{3}{C} - \overset{4}{C} - H \\ \quad \\ H \quad H \end{array}$
Pentyne	$\begin{array}{c} H \quad H \quad H \\ \quad \quad \\ H - \overset{1}{C} \equiv \overset{2}{C} - \overset{3}{C} - \overset{4}{C} - \overset{5}{C} - H \\ \quad \quad \\ H \quad H \quad H \end{array}$
Hexyne	$\begin{array}{c} H \quad H \quad H \quad H \\ \quad \quad \quad \\ H - \overset{1}{C} \equiv \overset{2}{C} - \overset{3}{C} - \overset{4}{C} - \overset{5}{C} - \overset{6}{C} - H \\ \quad \quad \quad \\ H \quad H \quad H \quad H \end{array}$

Molecular Formula

Line Drawing Formula

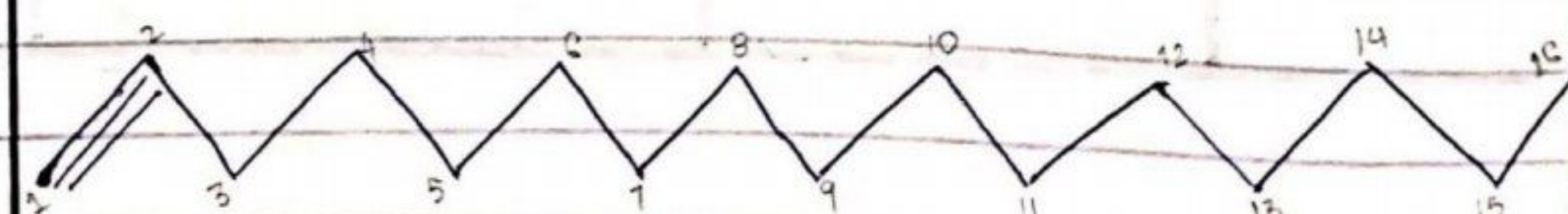
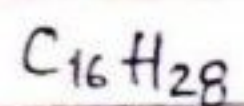
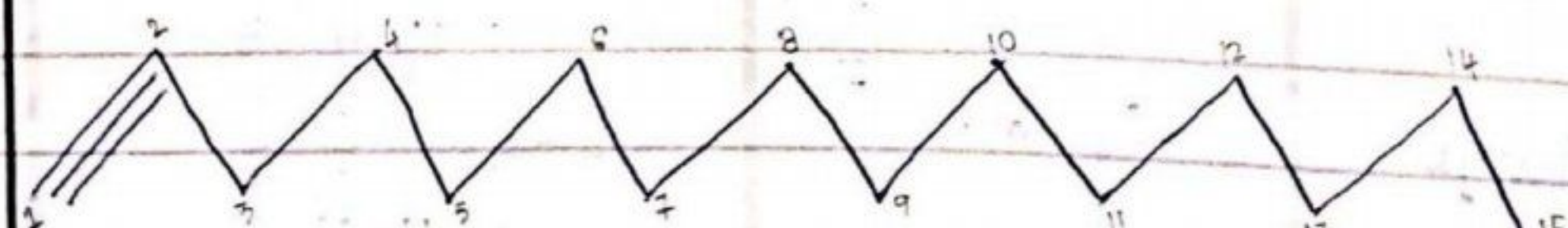
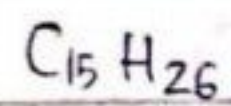
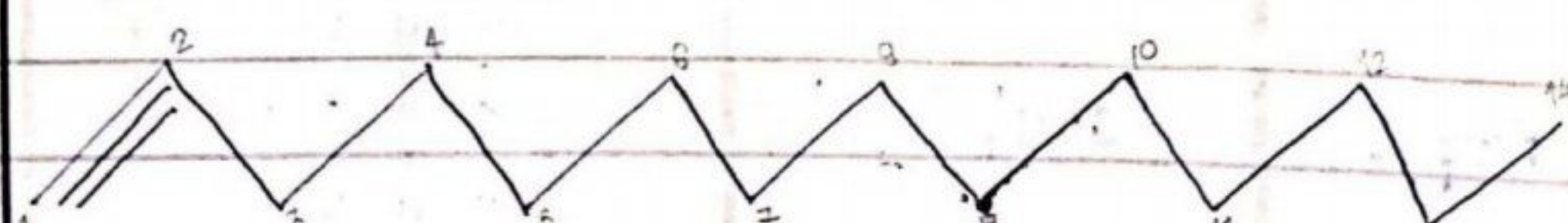
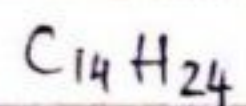
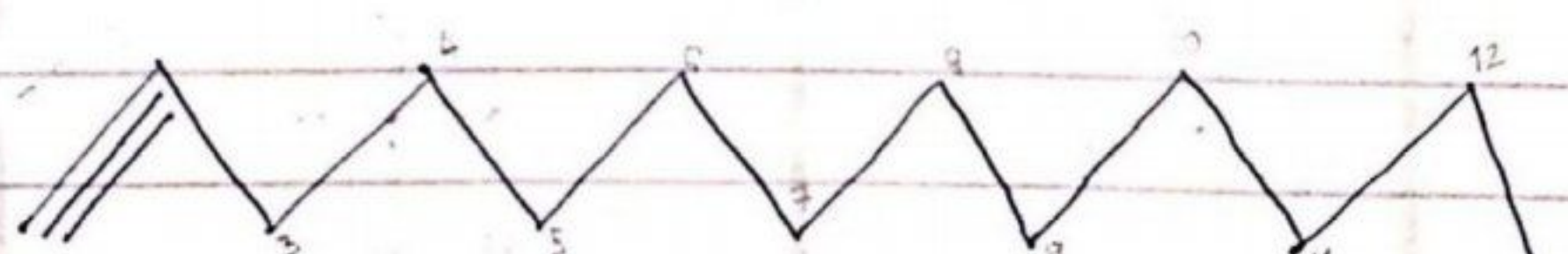
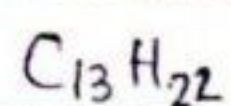
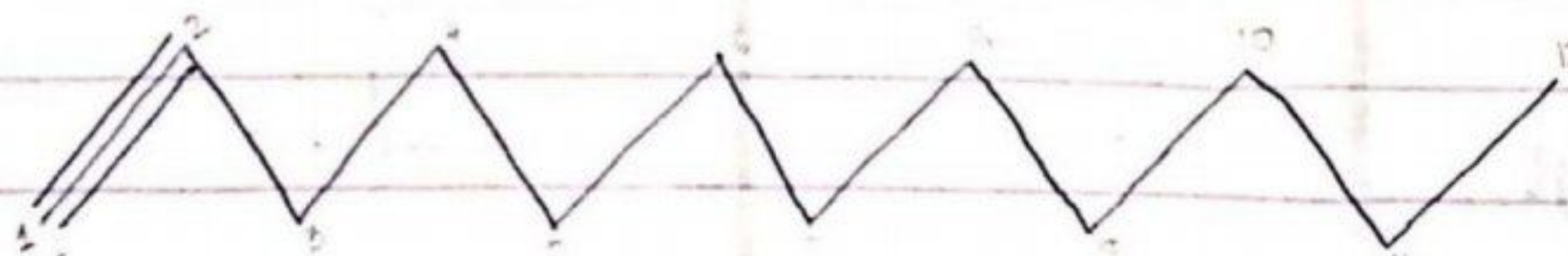
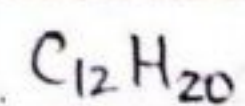
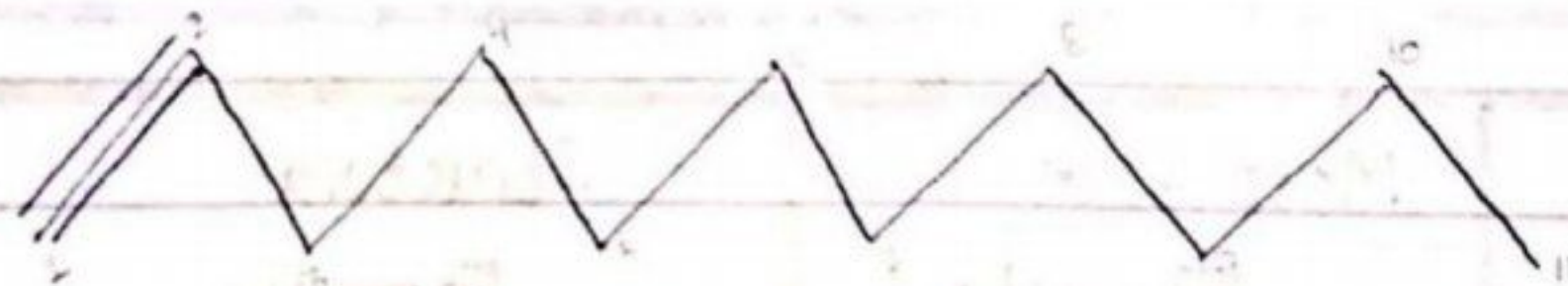
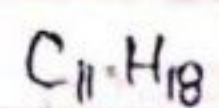
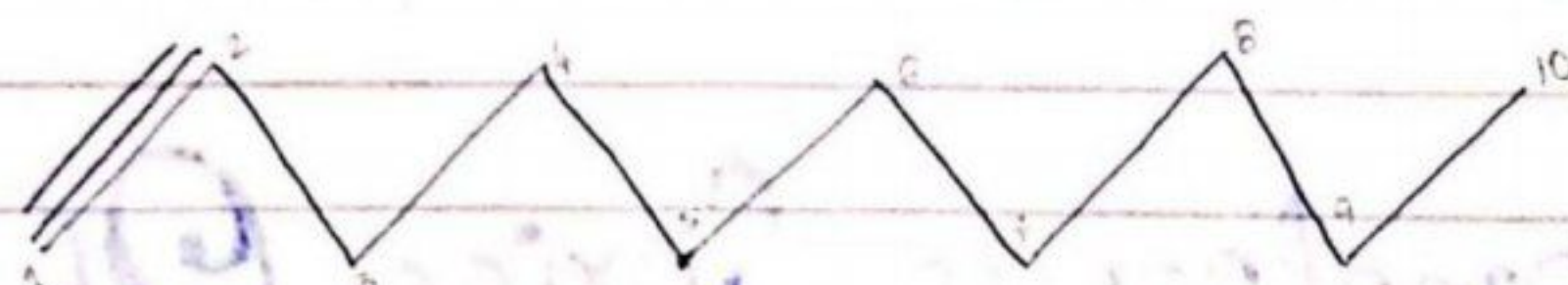
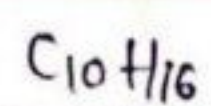
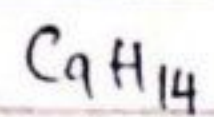
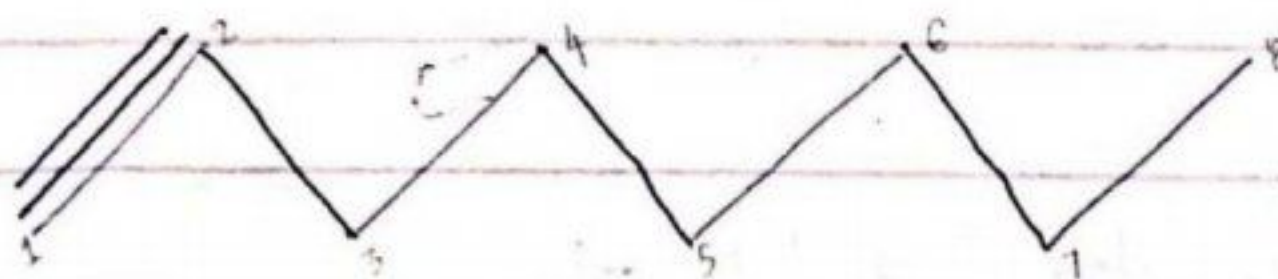
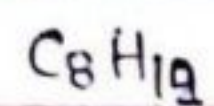
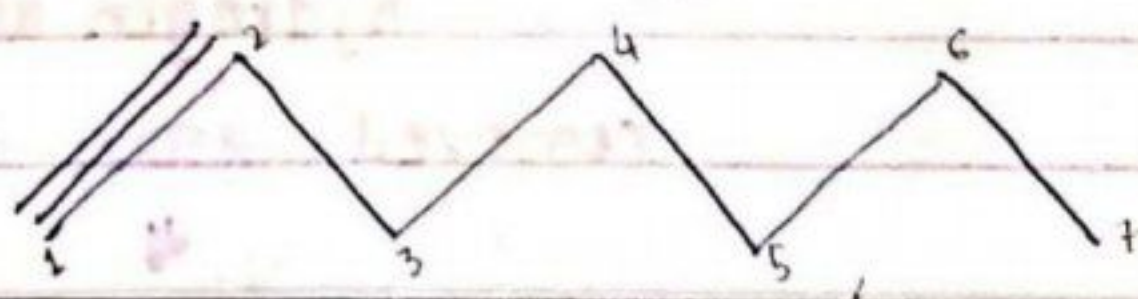
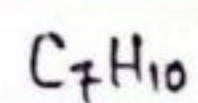


Structural Formula

[illegible]

Molecular Formula

Line Drawing Formula



Alkyl Group

"When hydrogen atom of alkane is removed, group formed is called Alkyl Group."

Alkyl Groups are denoted by $-R$

where $R = C_nH_{2n+1}$

Rule:

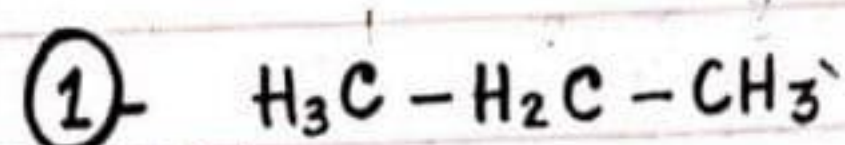
ane is replaced by yl.



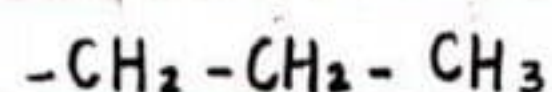
Homologous Series Of Alkyls:-

Name	Molecular Formula	Structural Formula	Abbreviation
• Methyl	$-CH_3$	$\begin{array}{c} H \\ \\ H - C - H \\ \\ H \end{array}$	Me.
• Ethyl	$-C_2H_5$	$\begin{array}{c} H & H \\ & \\ -C & -C- H \\ & \\ H & H \end{array}$	Et.
• n-Propyl	$-C_3H_7$	$\begin{array}{c} H & H & H \\ & & \\ -C^1 & -C^2 & -C^3-H \\ & & \\ H & H & H \end{array}$	n-Pr.
• n-Butyl	$-C_4H_9$	$\begin{array}{c} H & H & H & H \\ & & & \\ -C^1 & -C^2 & -C^3 & -C^4-H \\ & & & \\ H & H & H & H \end{array}$	n-Bu.

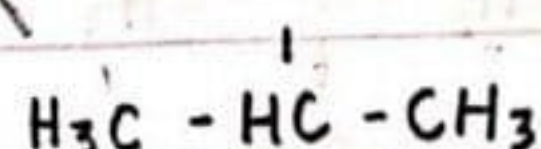
Some Important Alkyl Groups:-



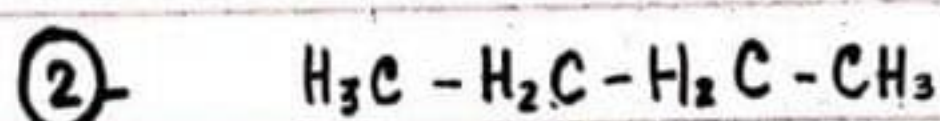
n-Propane



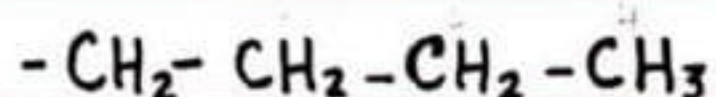
n-Propyl



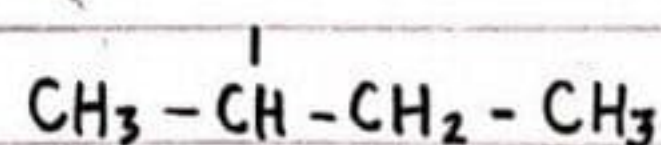
Secondary propyl
or (iso propyl)



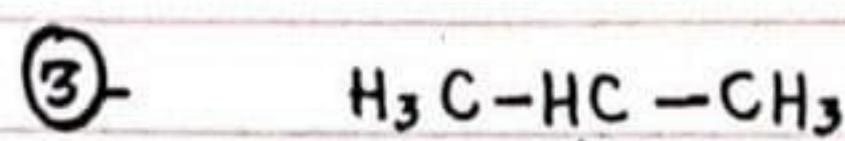
n-Butane



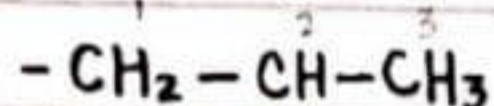
n-Butyl



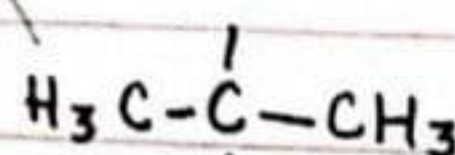
Sec-butyl



(isobutane)

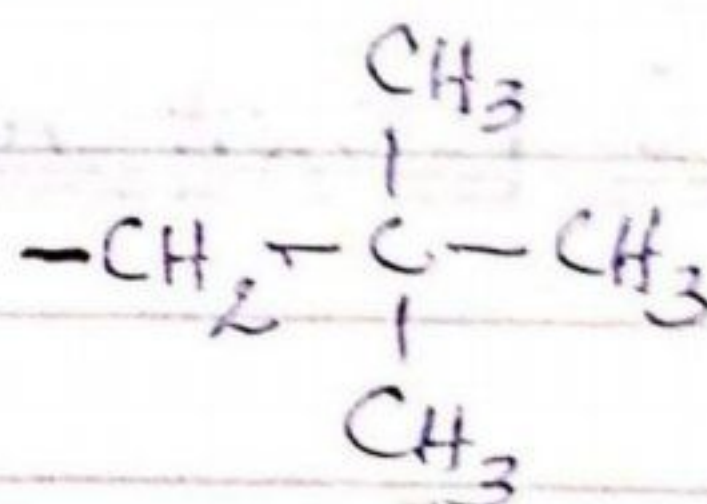
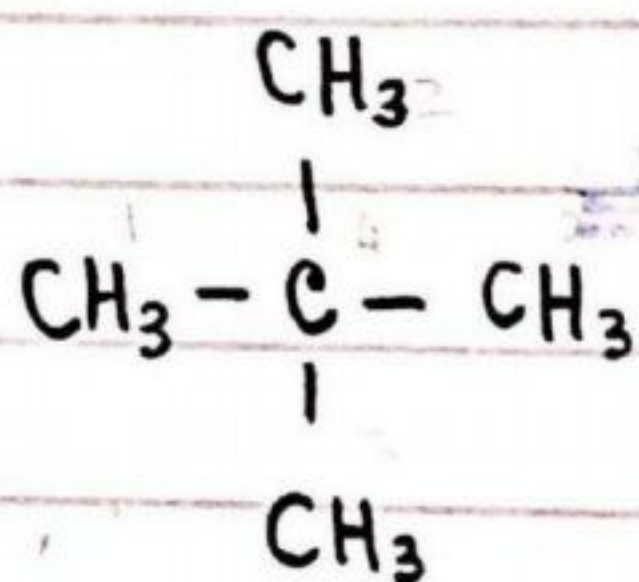


Iso-butyl



Tertiary Butyl

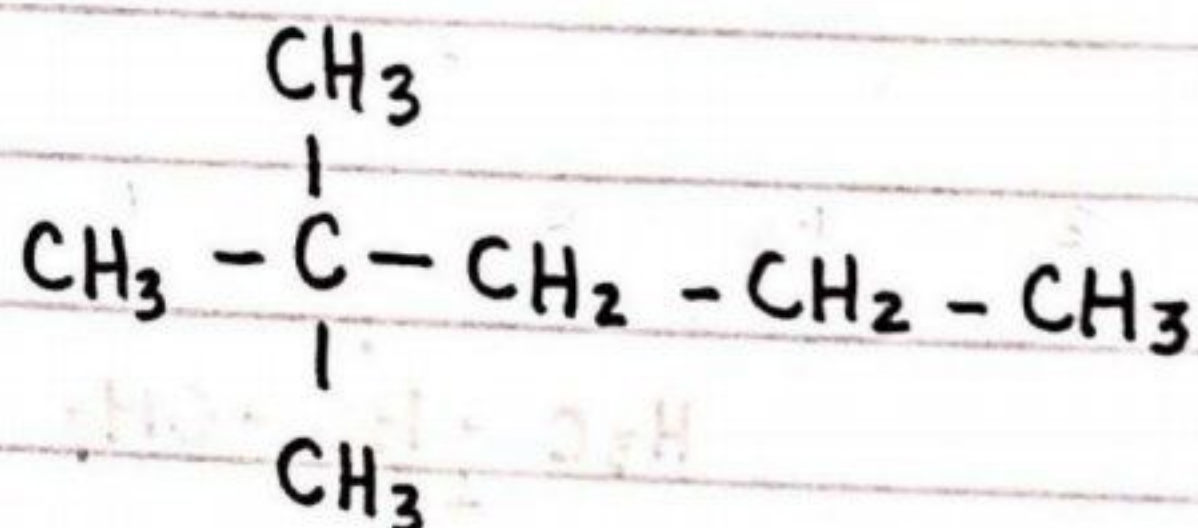
④



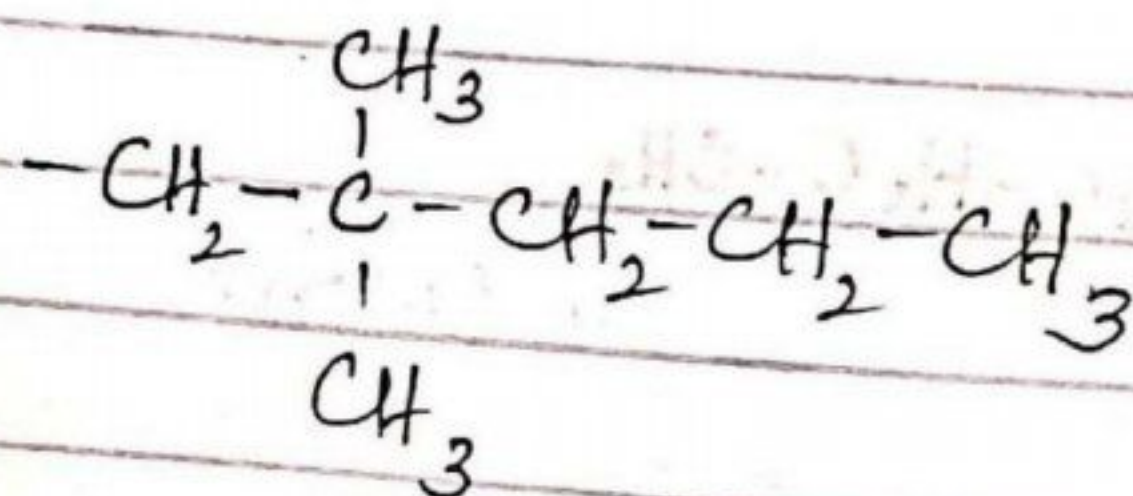
(Neo-pentane)

Neopentyl

⑤



(Neo-heptane)



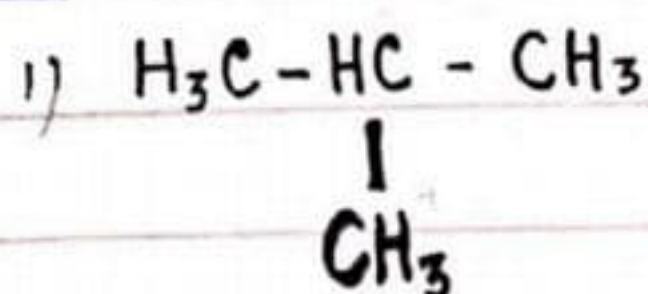
Neohexyl

Nomenclature Of Alkanes:-

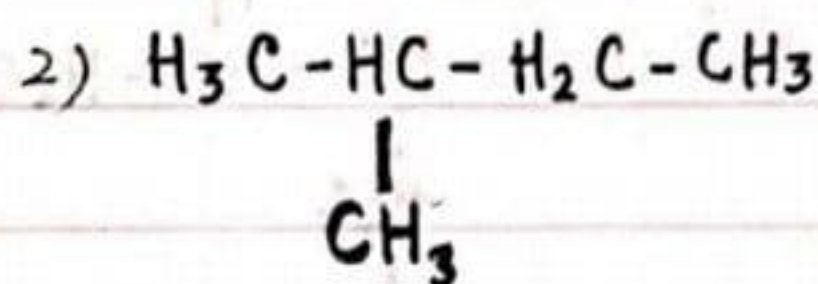
Common Names :-

CH_4 = Marsh gas

Iso:-

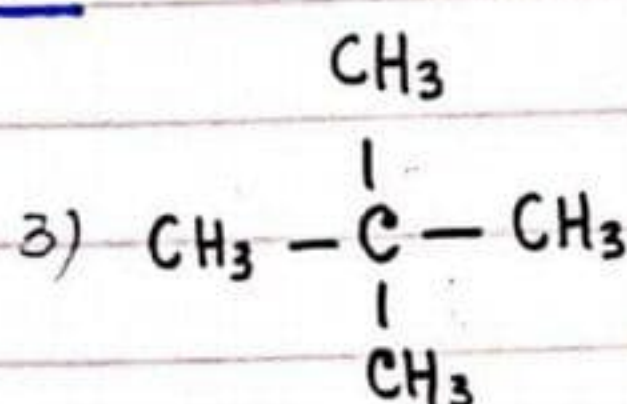


Iso-butane

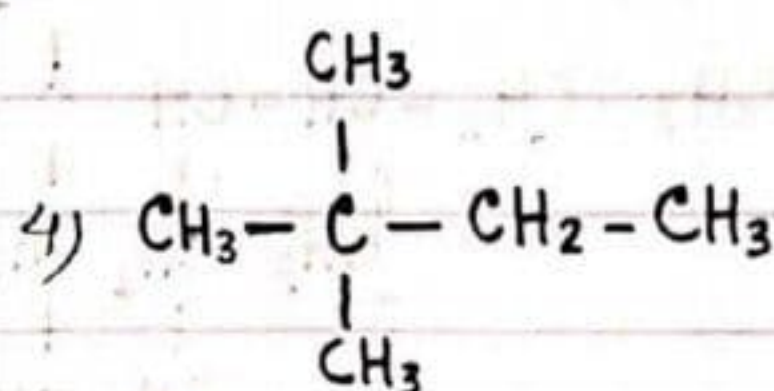


Iso-pentane

Neo:-

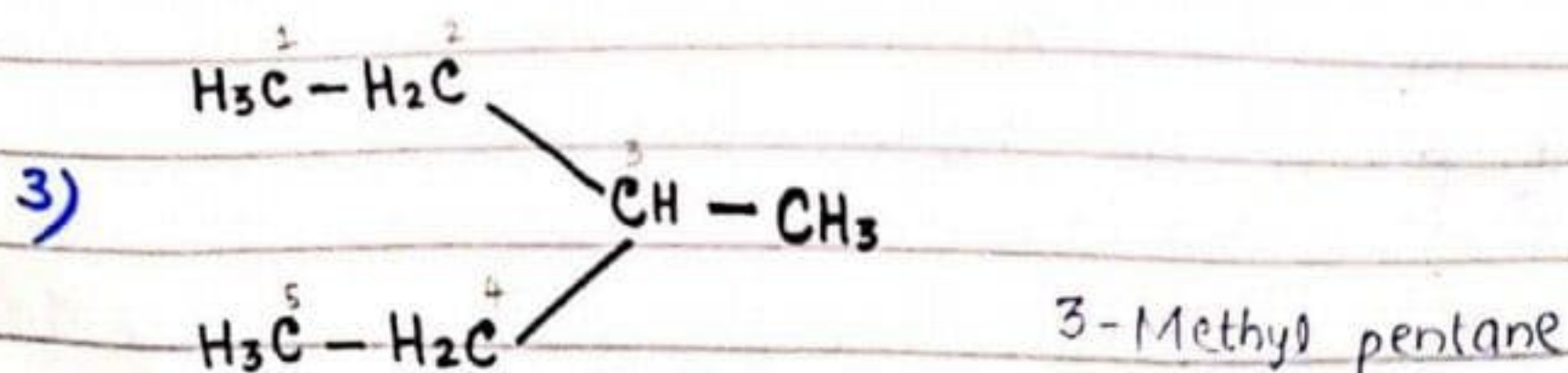
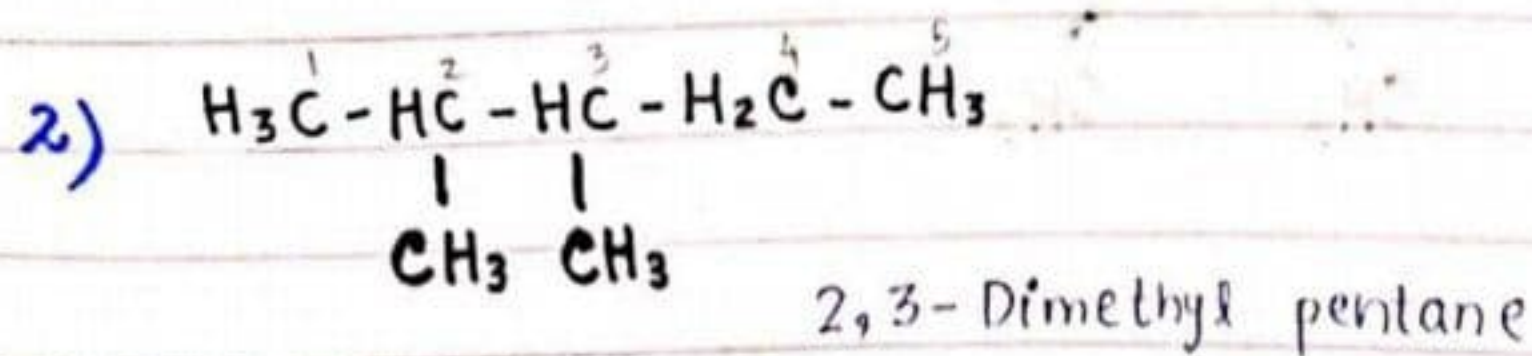
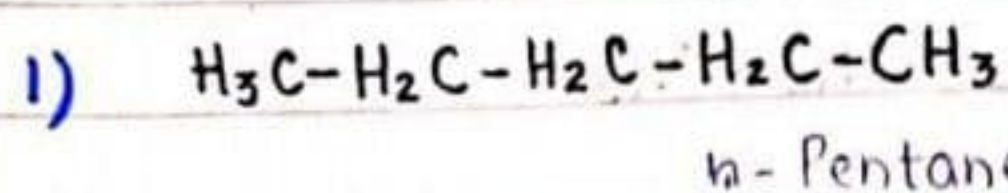


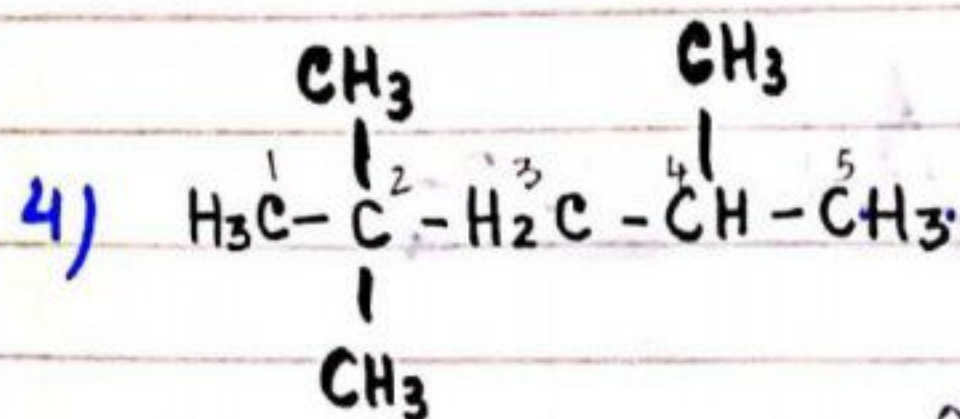
Neo-pentane



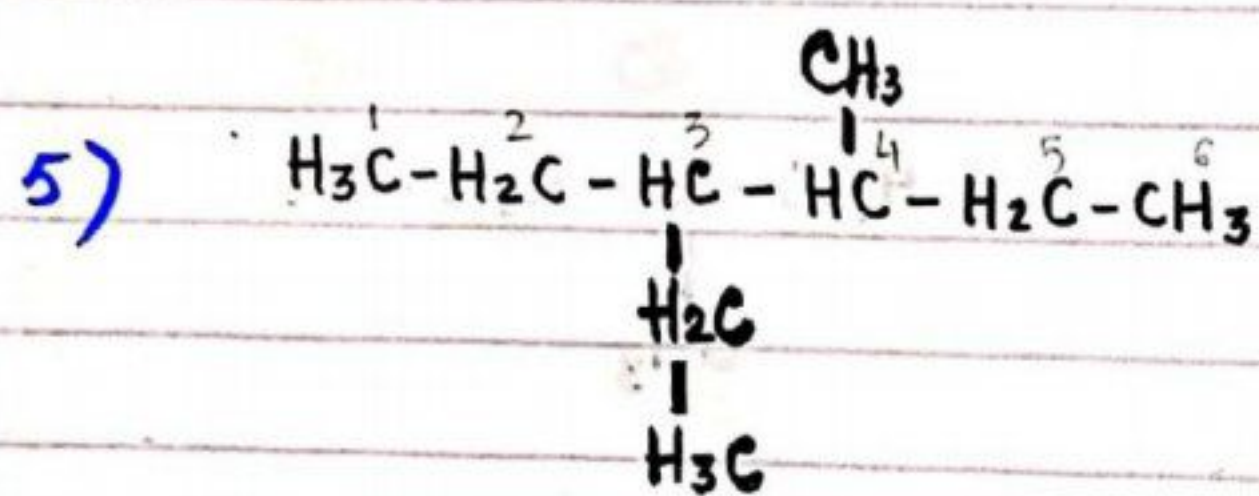
Neo-hexane

IUPAC name :-

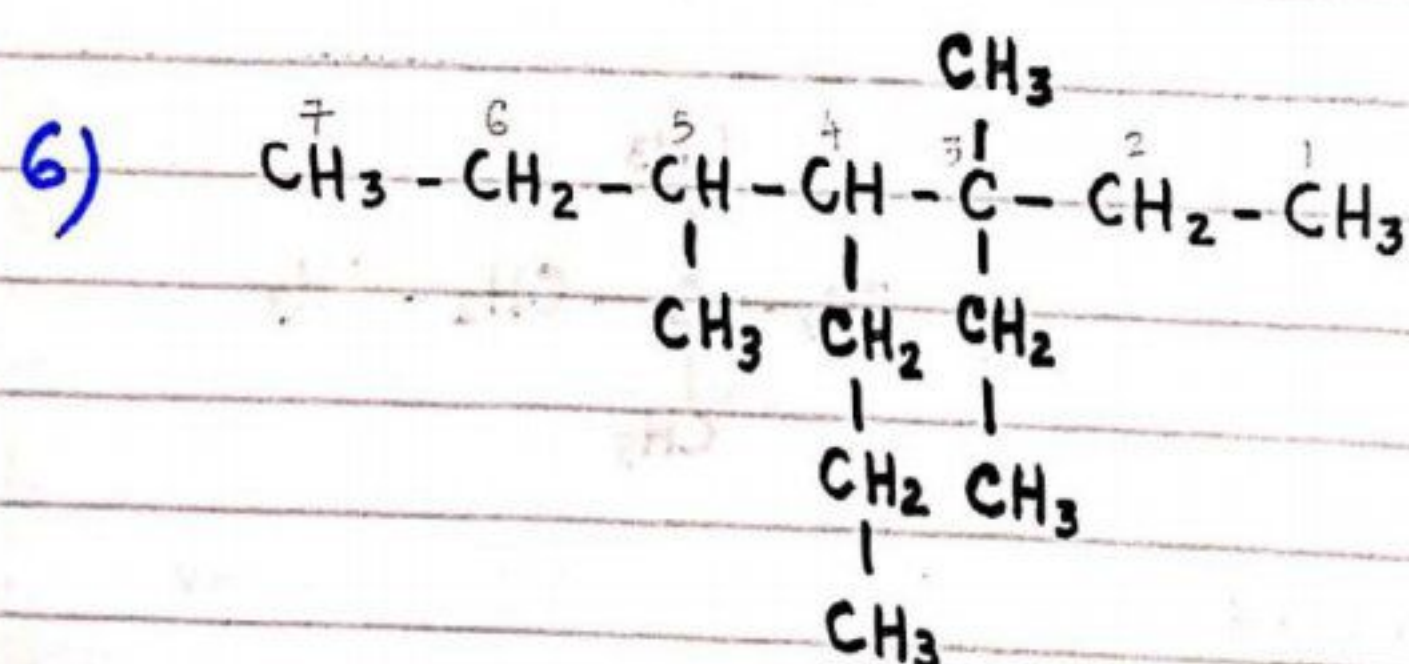




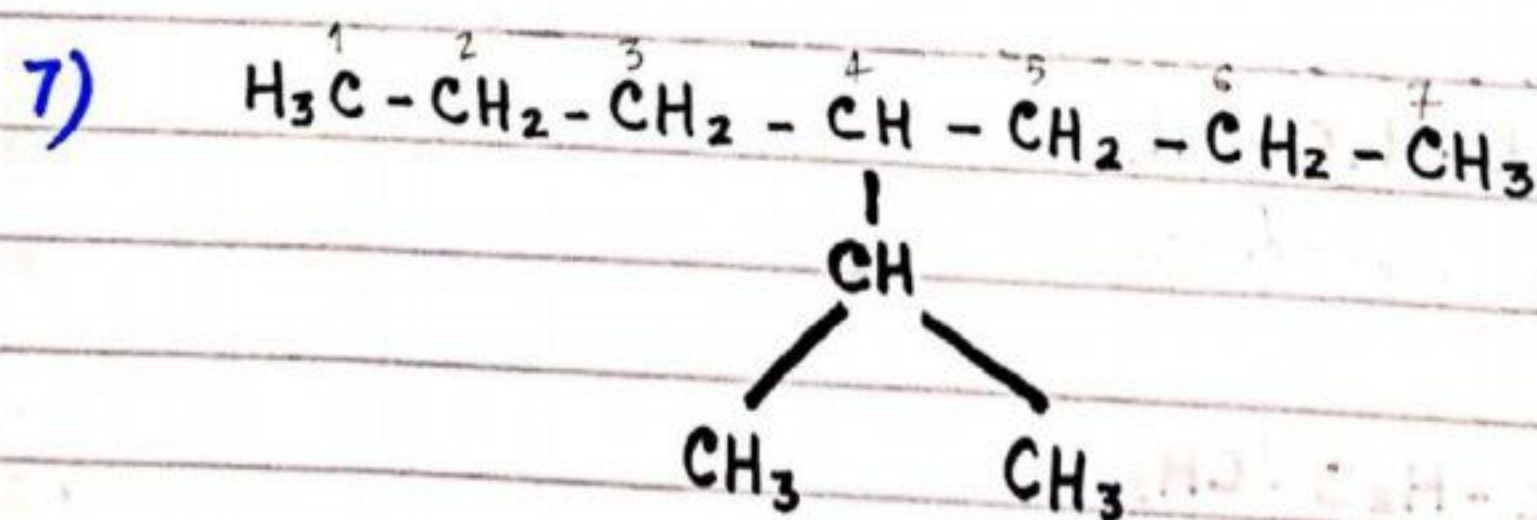
2,2,4-Trimethyl pentane



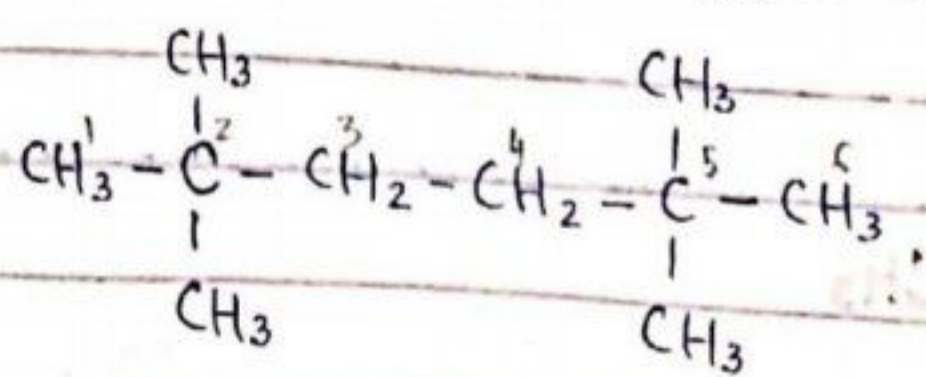
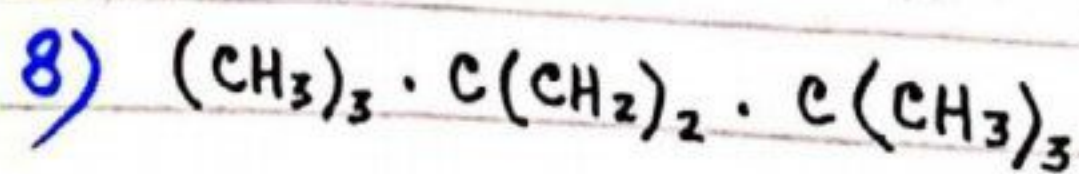
3-Ethyl-4-methyl hexane



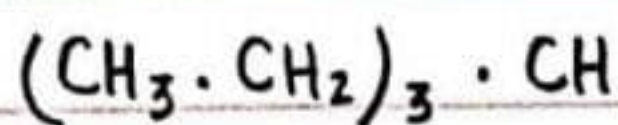
3-Ethyl-3,5-dimethyl-4-n-propyl heptane



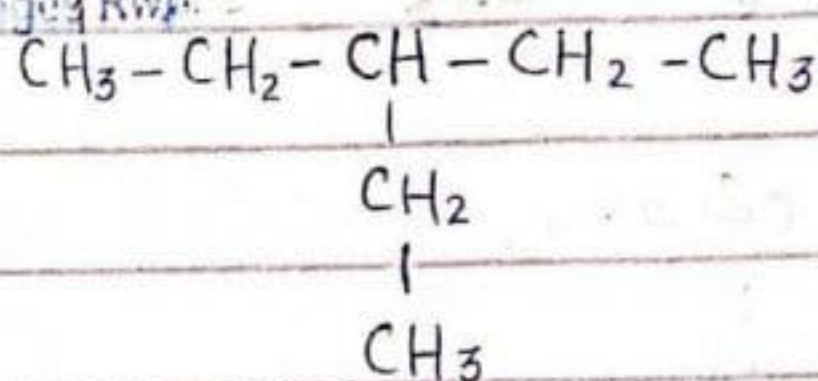
4-Isopropyl heptane



2,2,5,5-Tetramethyl hexane

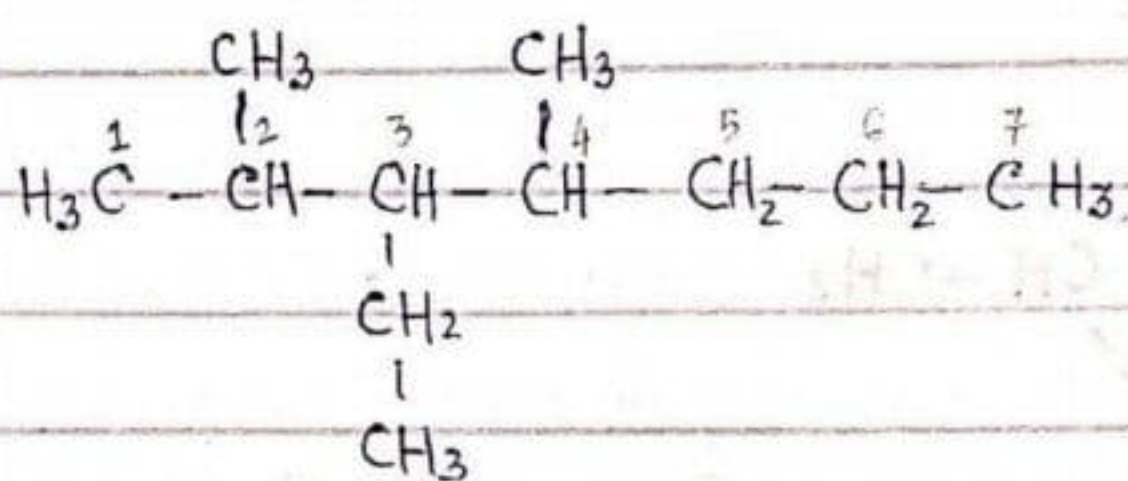


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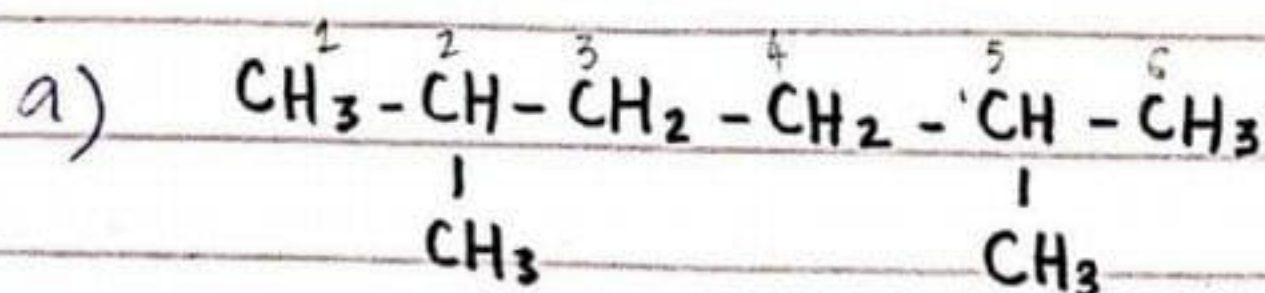


3-Ethyl pentane

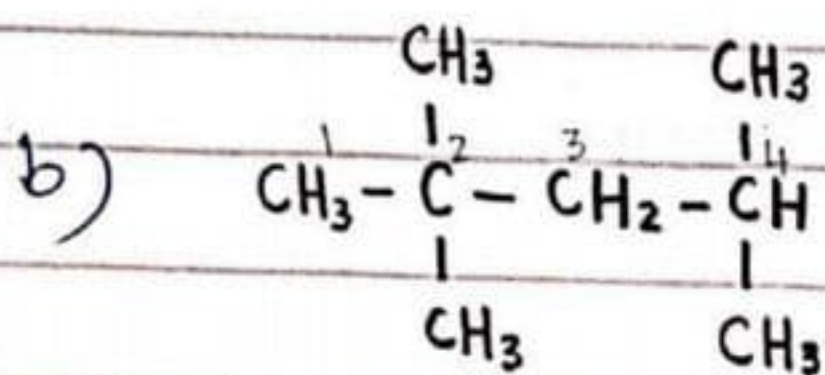
3-Ethyl -2,4-dimethyl heptane

ActivityChapter # 16 HydrocarbonsPg # 123Question - 1

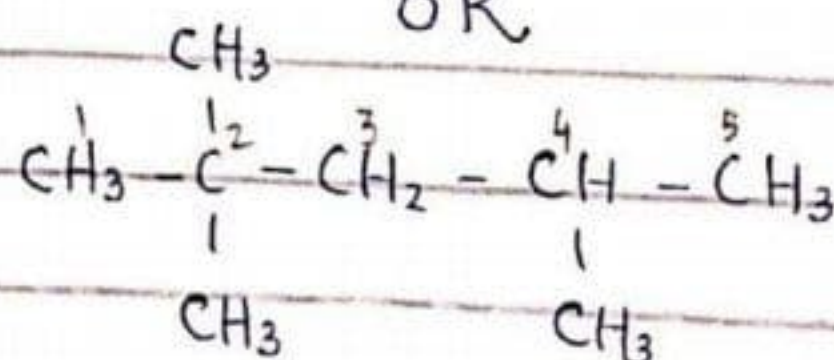
Name each of the following compounds according to IUPAC system.



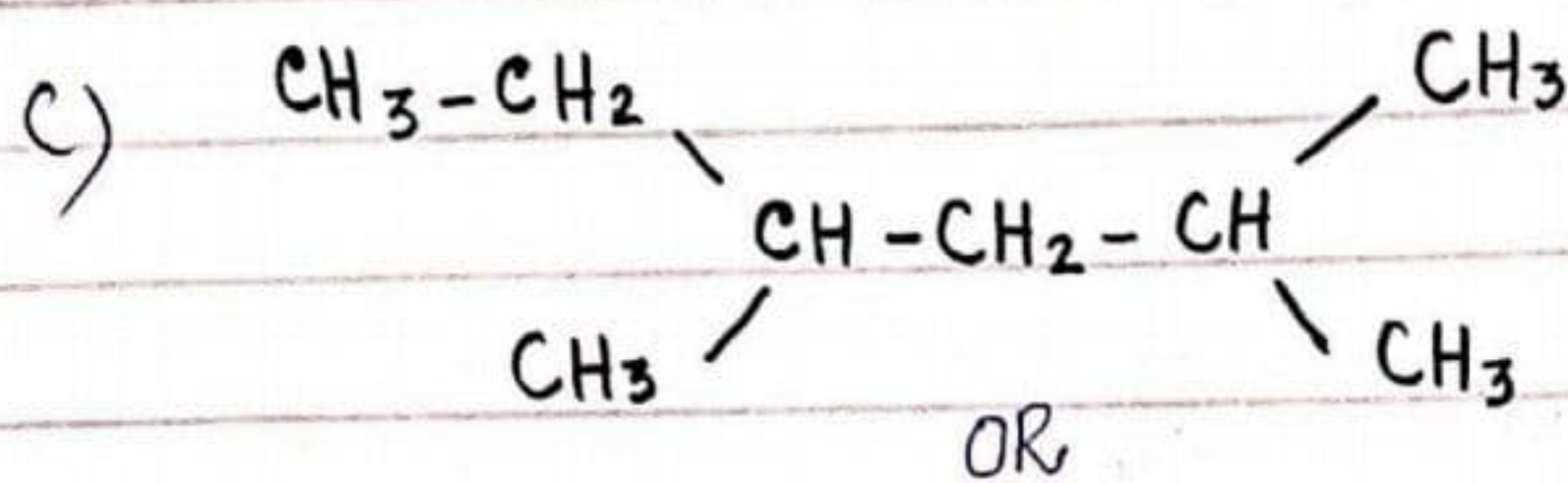
2,5-Dimethyl hexane



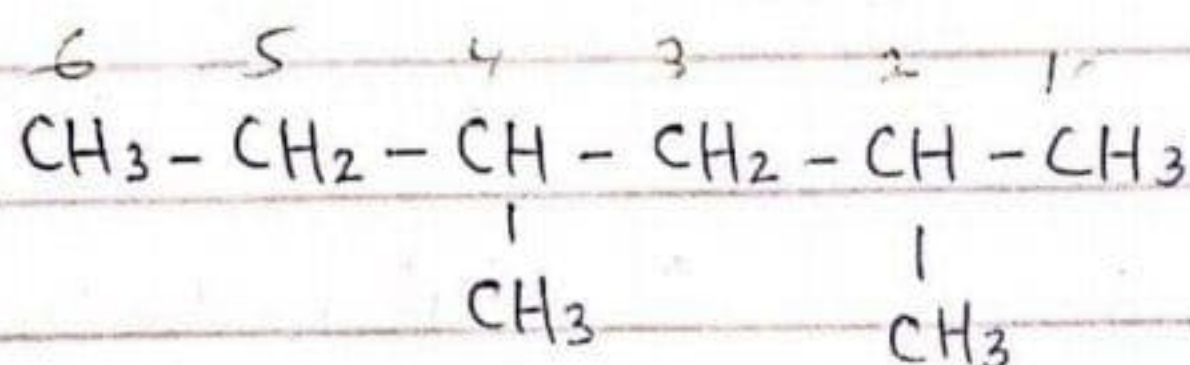
OR



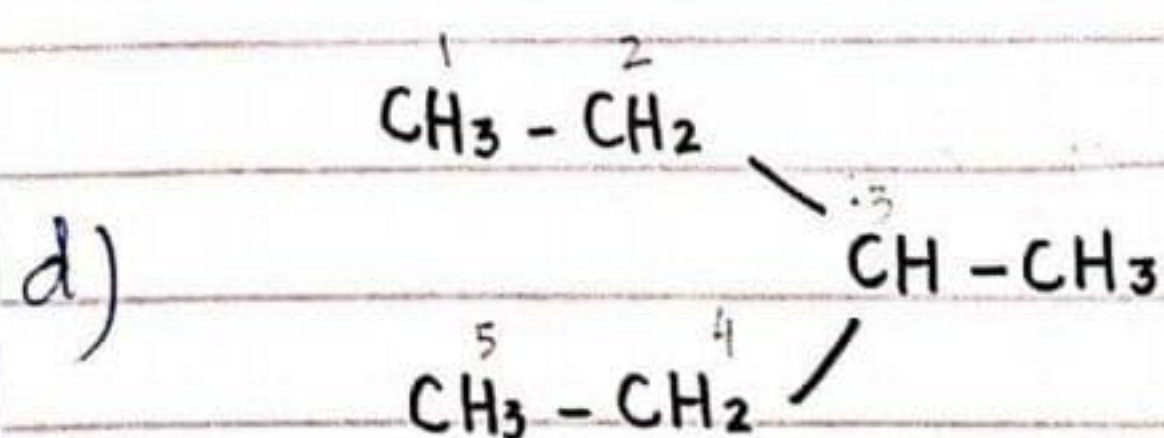
2,2,4-Trimethyl pentane



OR



2,4-Dimethyl hexane

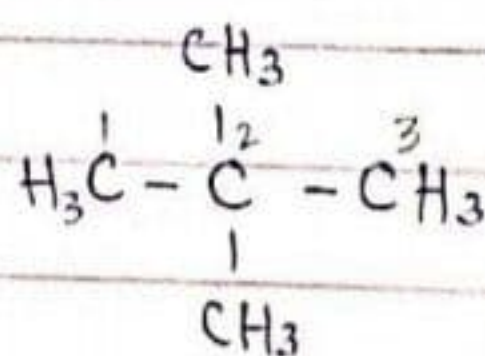


3-Methyl pentane

Question-2

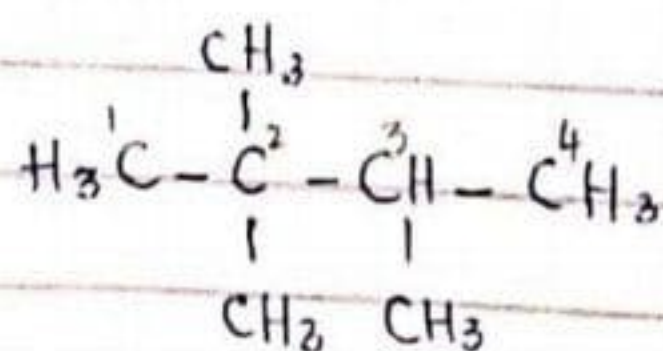
Indicate what is wrong with each of the following names. Give the correct IUPAC name if possible.

a) 2-Dimethyl Propane



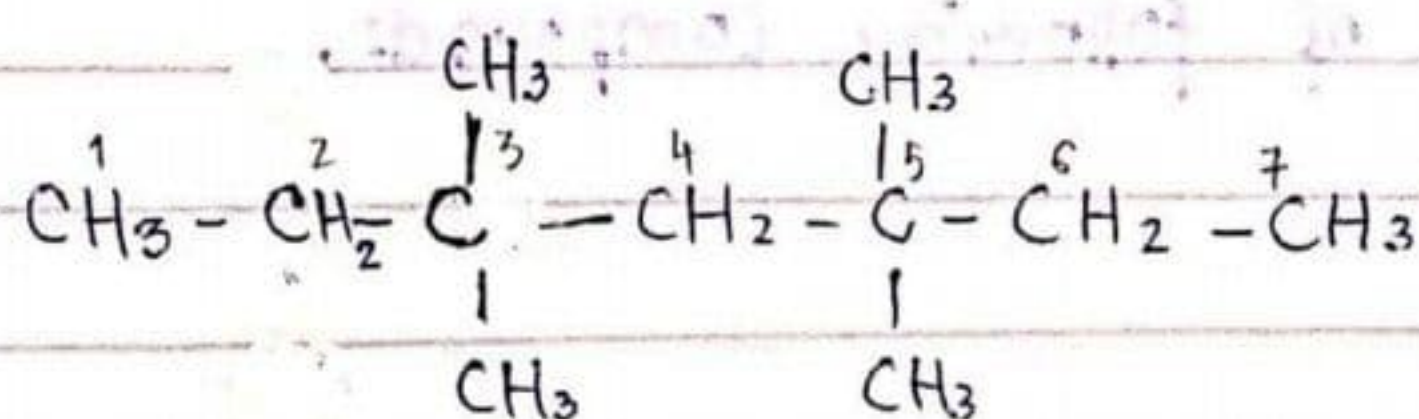
Correct name is 2,2-Dimethyl Propane

b) 2,2,3-Methyl Butane



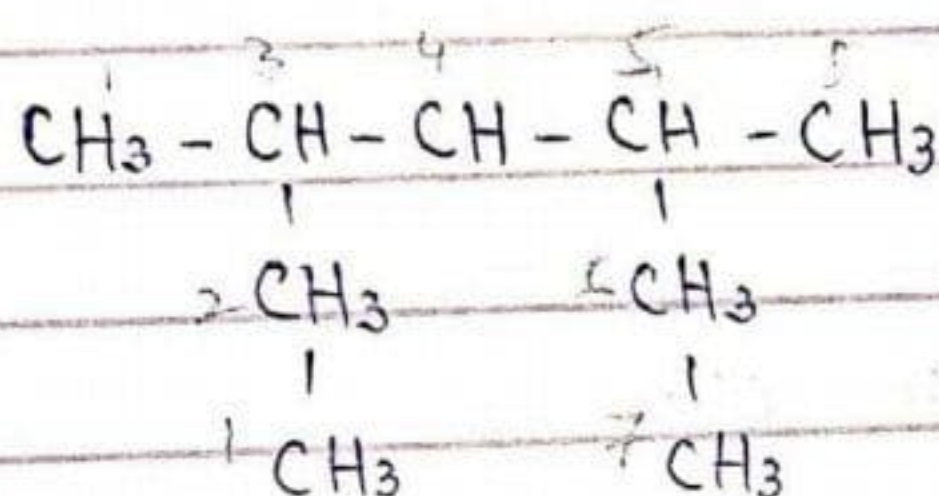
Correct name is 2,2,3 Trimethyl butane

c) 3,3-Dimethyl - 5,5 - Dimethyl Heptane



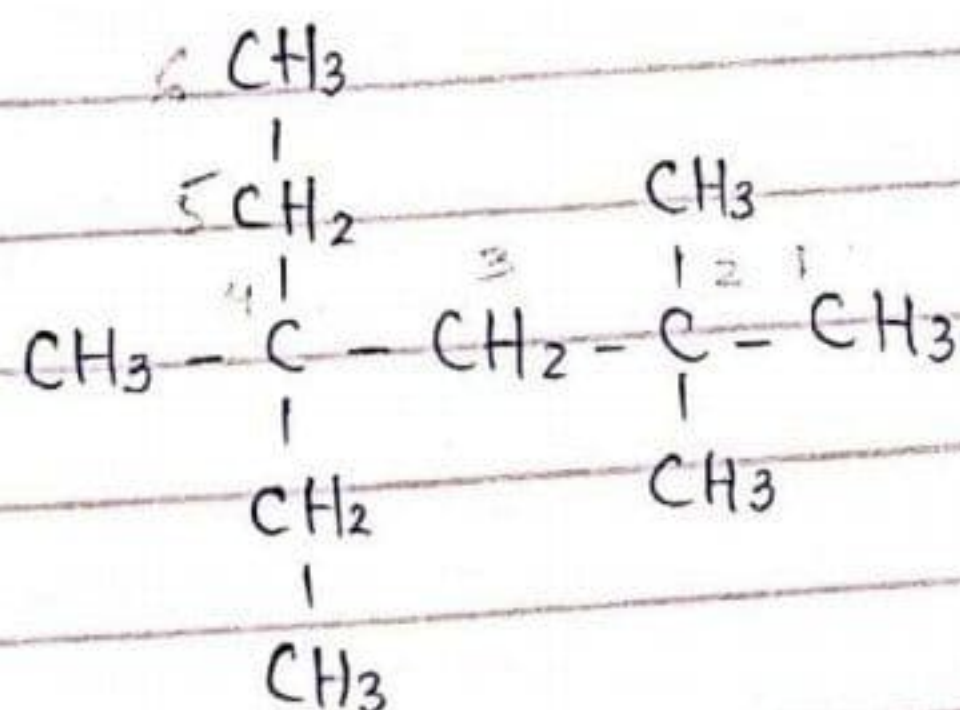
Correct name is 3,3,5,5-Tetramethyl heptane

d) 2,4-Diethyl Pentane



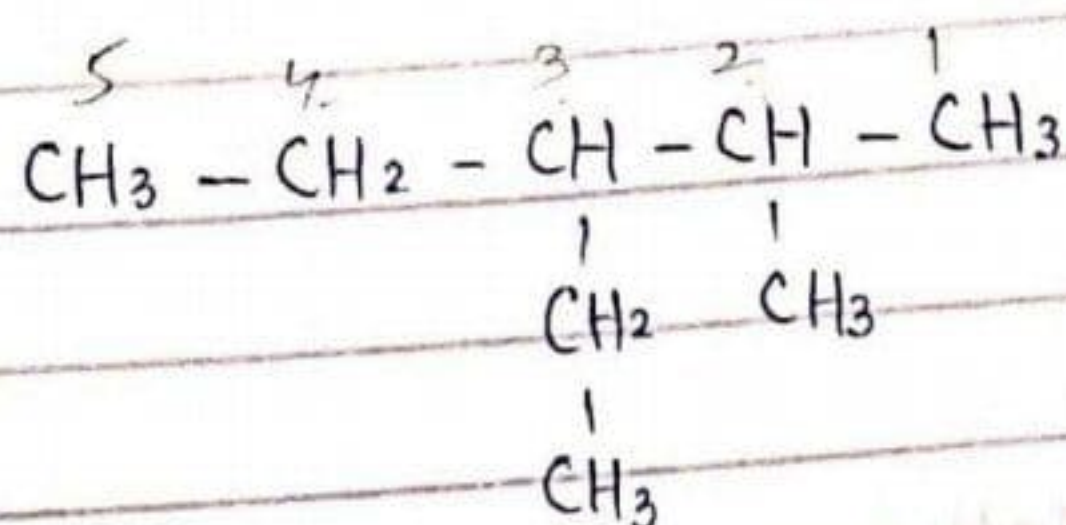
name is correct. 3,5-Dimethyl heptane

e) 2,2,- Diethyl - 4,4 - Dimethyl Pentane.



name is correct. 4-Ethyl - 2,2,4-trimethylhexane

f) 3-Ethyl - 4-Methyl Pentane

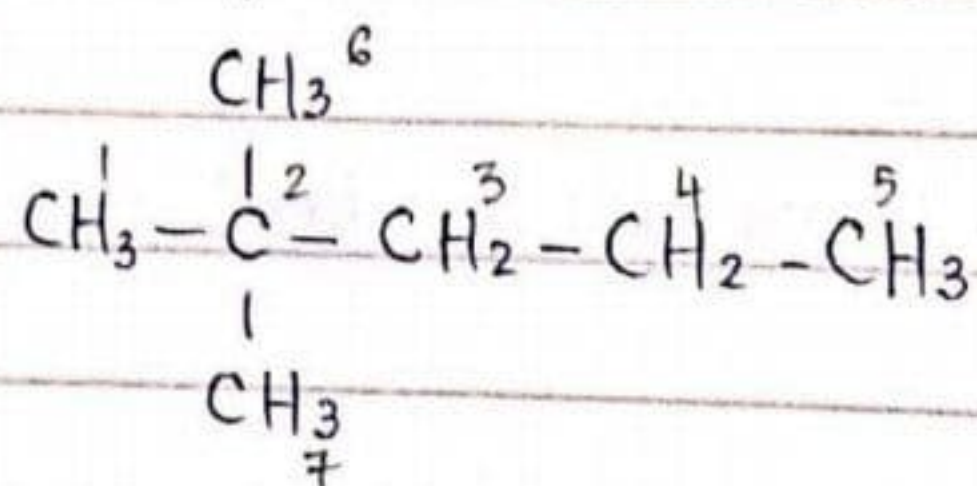


name is correct 3-Ethyl - 2-methylpentane

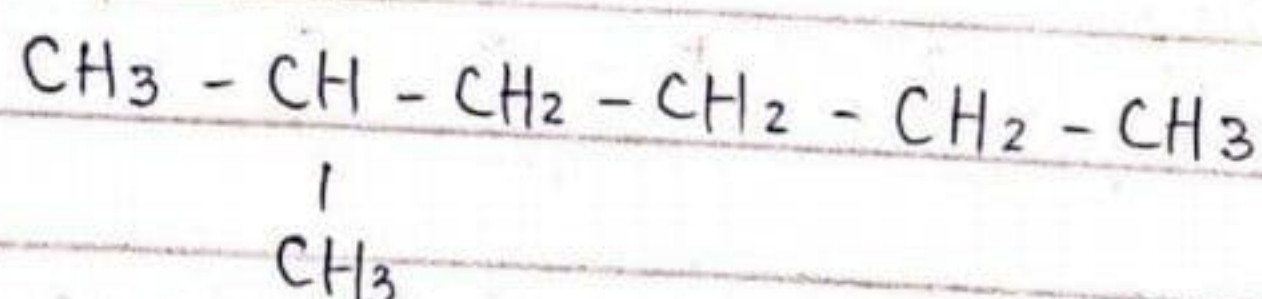
Question - 3

Write the name of following compounds.

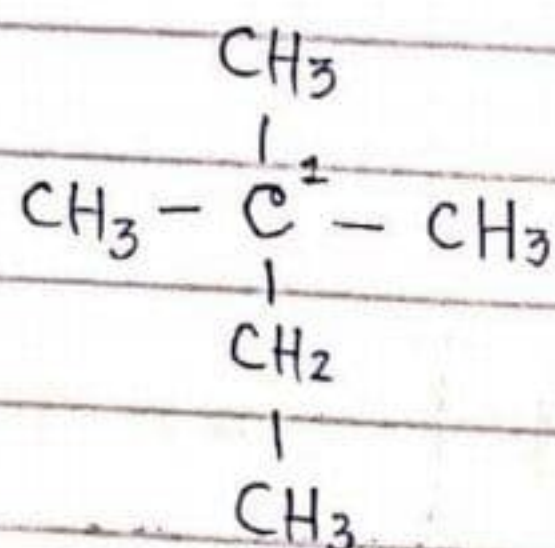
a) Neo-Heptane



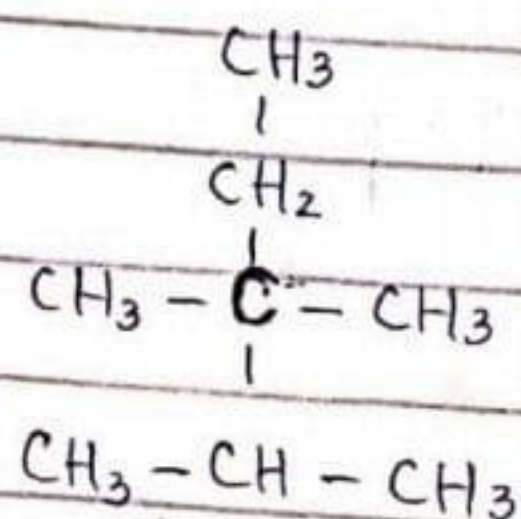
b) Iso Heptane



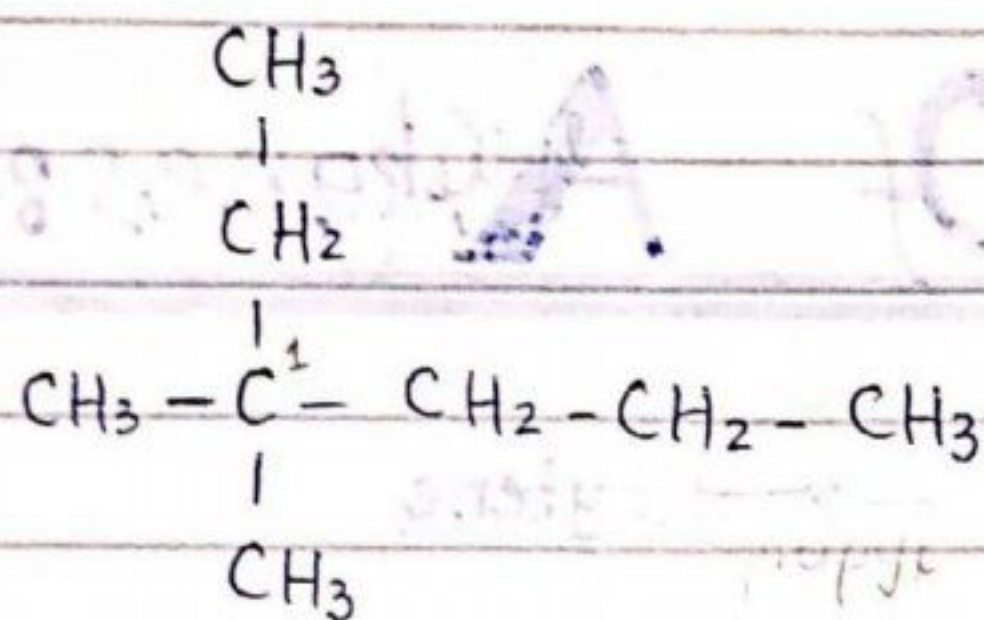
c) Trimethyl Ethyl Methane



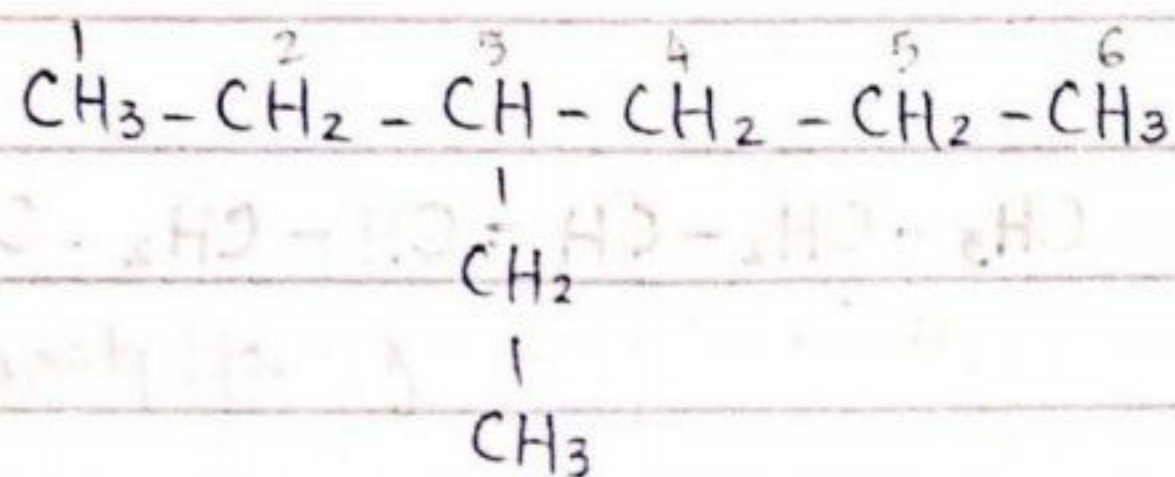
d) Dimethyl Ethyl Isopropyl Methane



e) Dimethyl Propyl Ethyl Methane

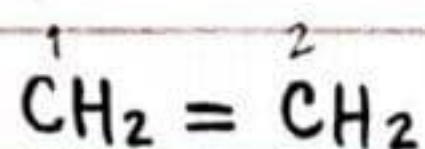


f) 3-Ethyl Hexane

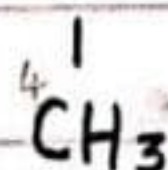
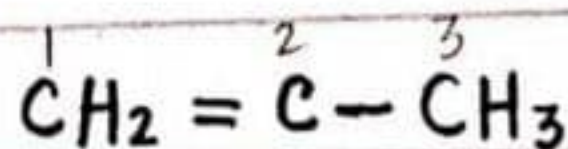


Nomenclature Of Alkenes:-

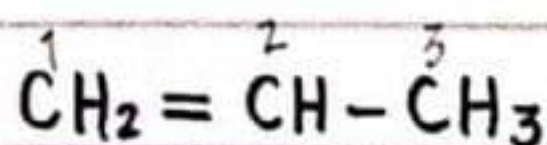
Common Name:- Alkene → Alkylene



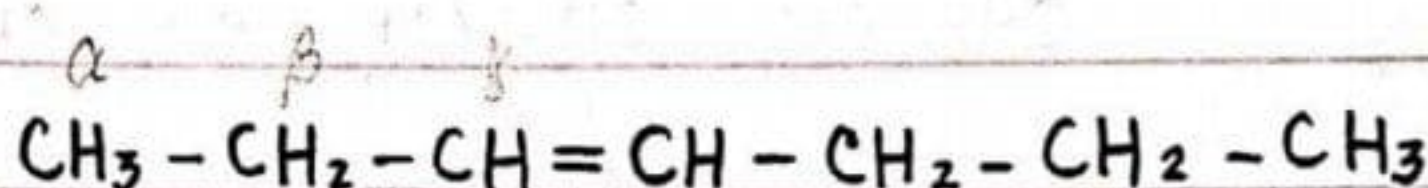
Ethylene



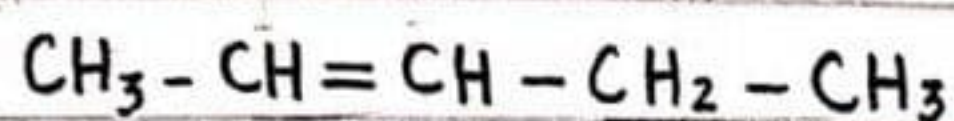
Iso-butylene



propylene



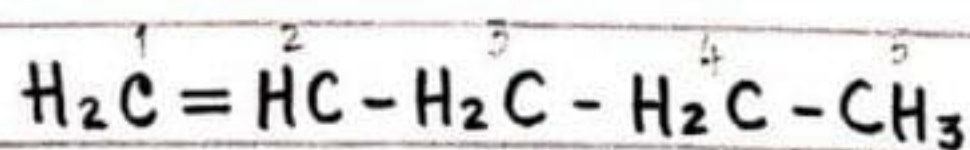
γ-heptylene



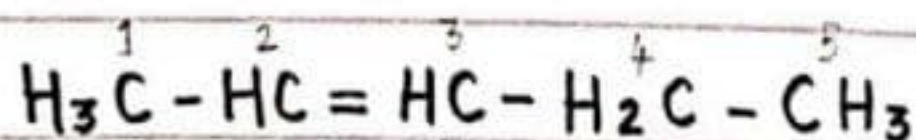
(Derived name)

Ethyl methyl ethylene

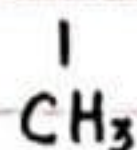
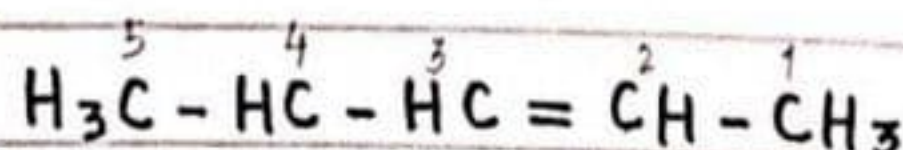
IUPAC Name:-



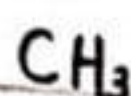
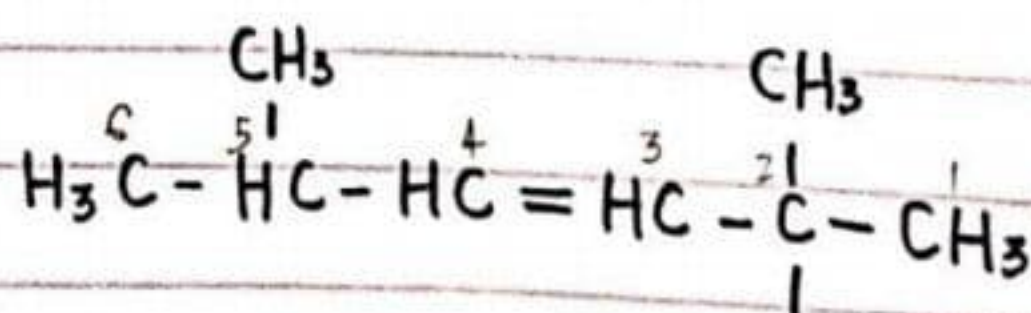
1 - Pentene



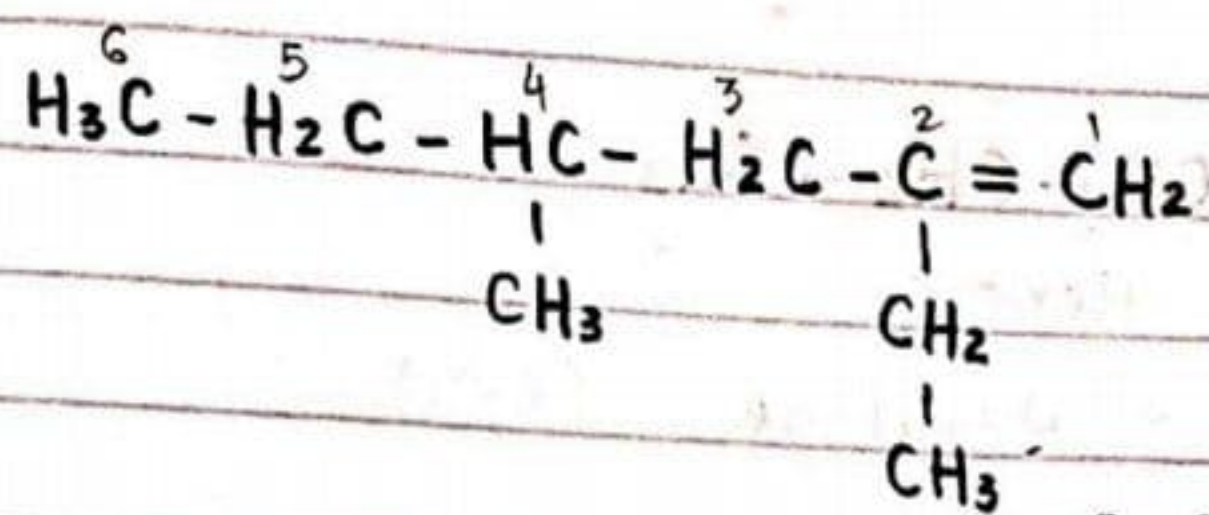
2 - Pentene



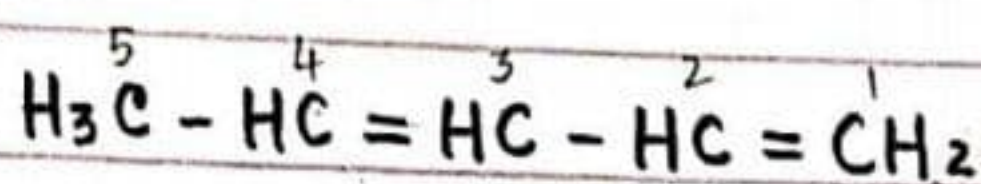
4 - Methyl - 2 - pentene



2, 2, 5 - Trimethyl-3-hexene

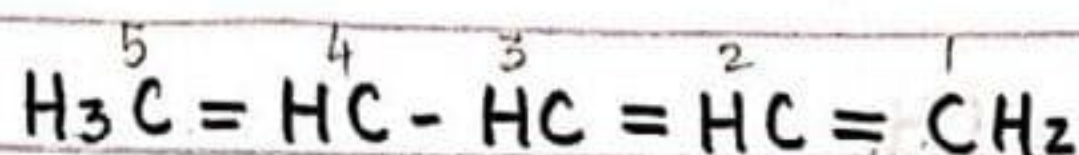


2-Ethyl-4-methyl-1-hexene



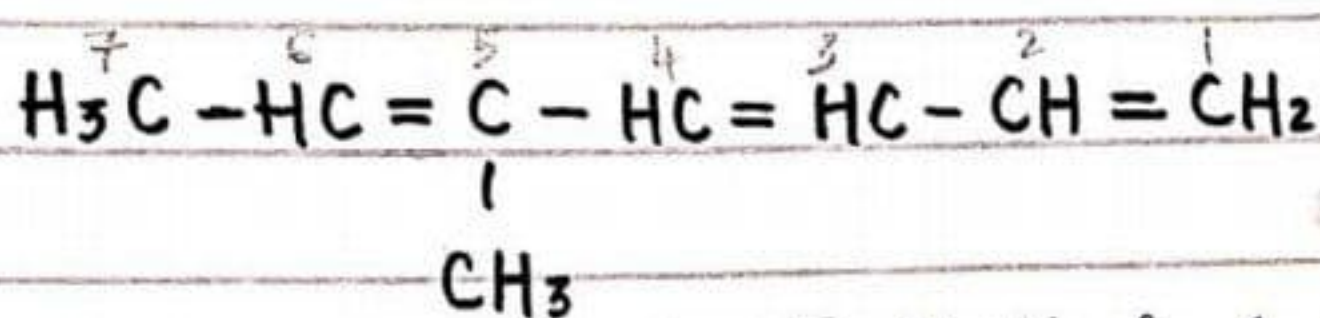
1,3-Pentadiene

or Penta-1,3-diene



1,2,4-Pentatriene

or Penta-1,2,4-triene



5-Methyl-1,3,5-heptatriene

or 5-Methyl-hepta-1,3,5-triene

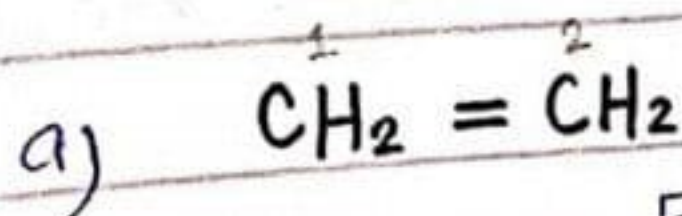
Activity

Chapter # 16 Hydrocarbon

Page

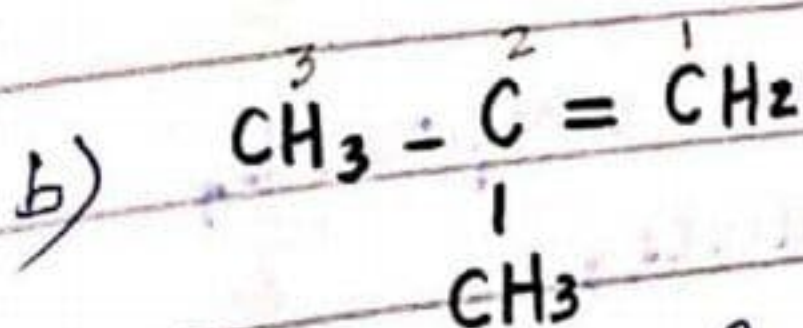
Question 1

Name the following Olefins by the IUPAC System.



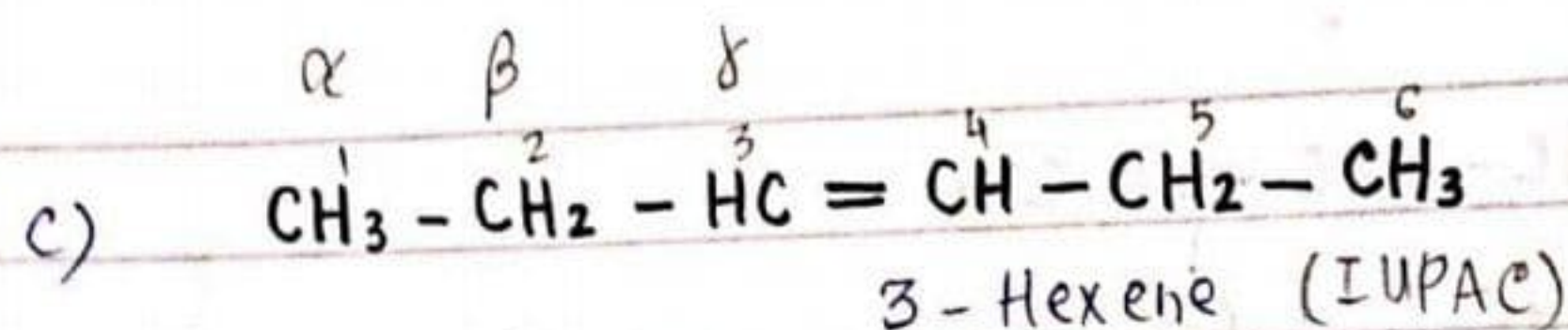
Ethene (IUPAC)

Ethylene (C.N)



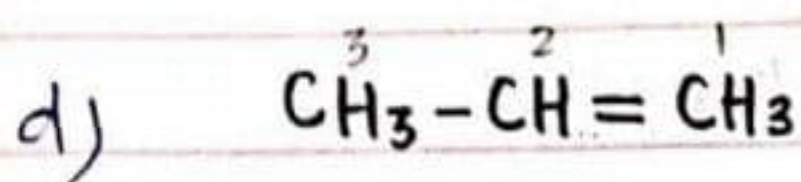
2-Methyl-1-propene (IUPAC)

Iso-butylene (C.N)



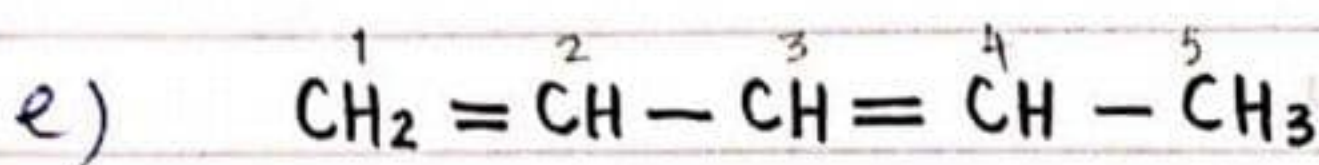
3-Hexene (IUPAC)

γ -Hexylene (C.N)



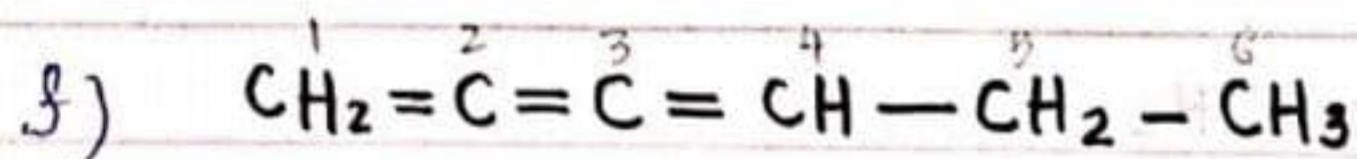
1-Propene (IUPAC)

Iso-propylene (C.N)



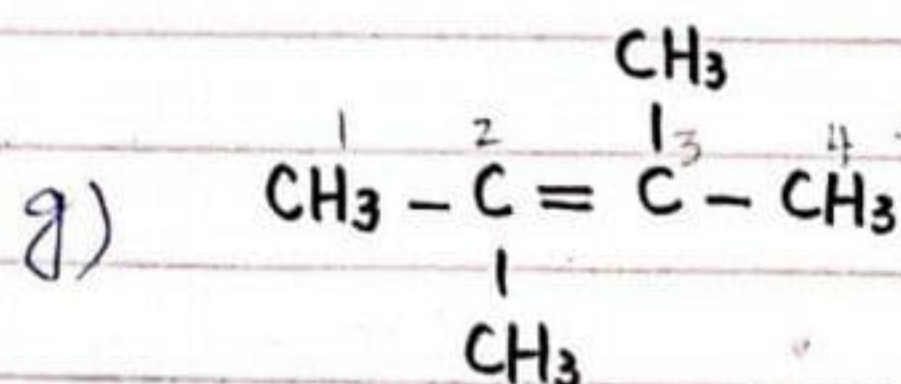
1,3-Pentadiene

or Penta-1,3-diene

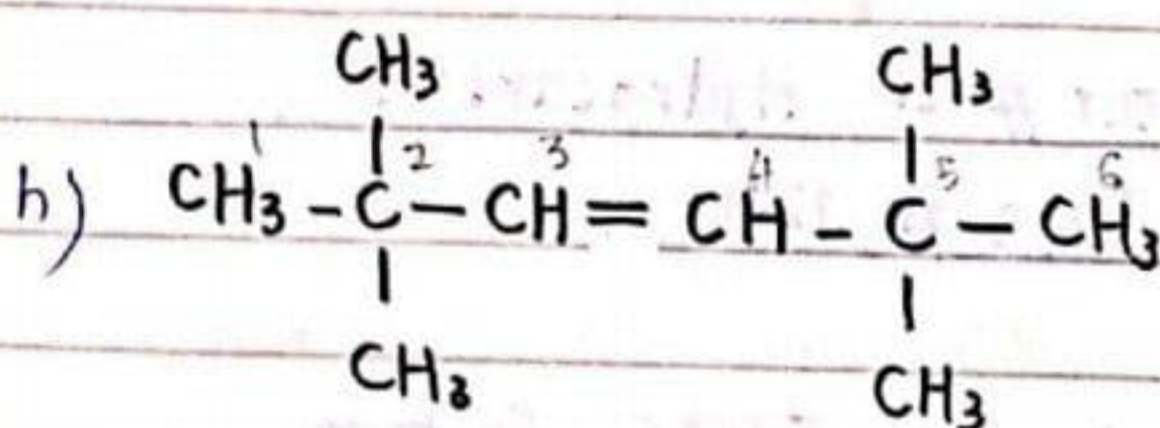


1,2,3-Hexatriene

or Hexa-1,2,3-triene



2,3-Dimethyl-2-Butene

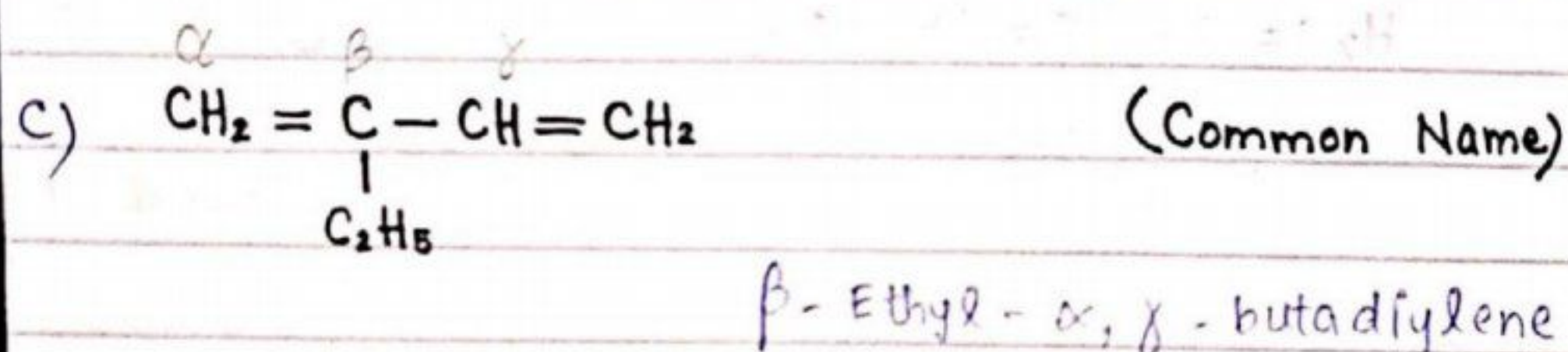
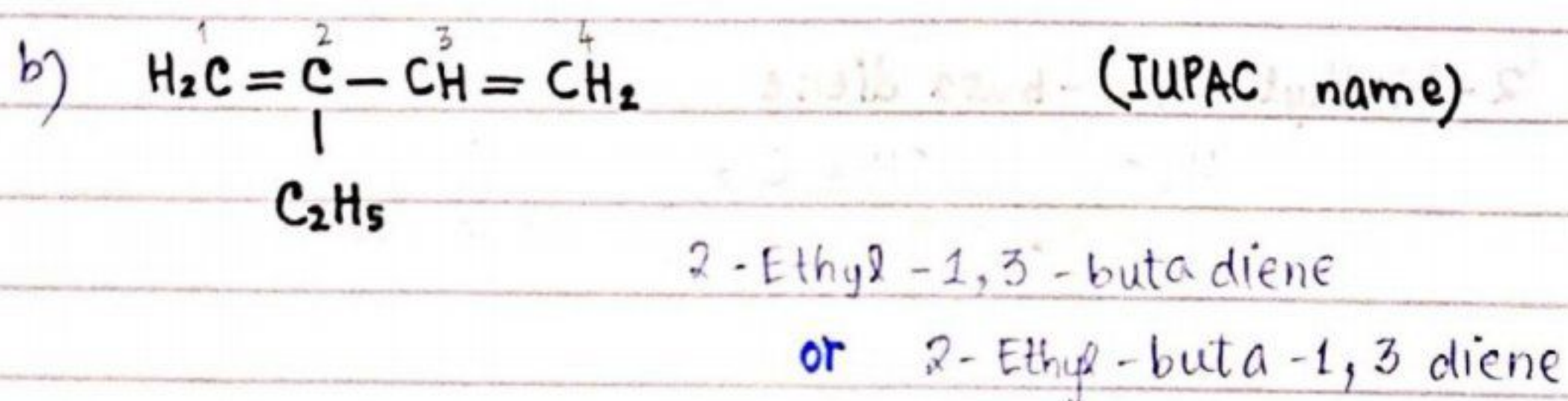
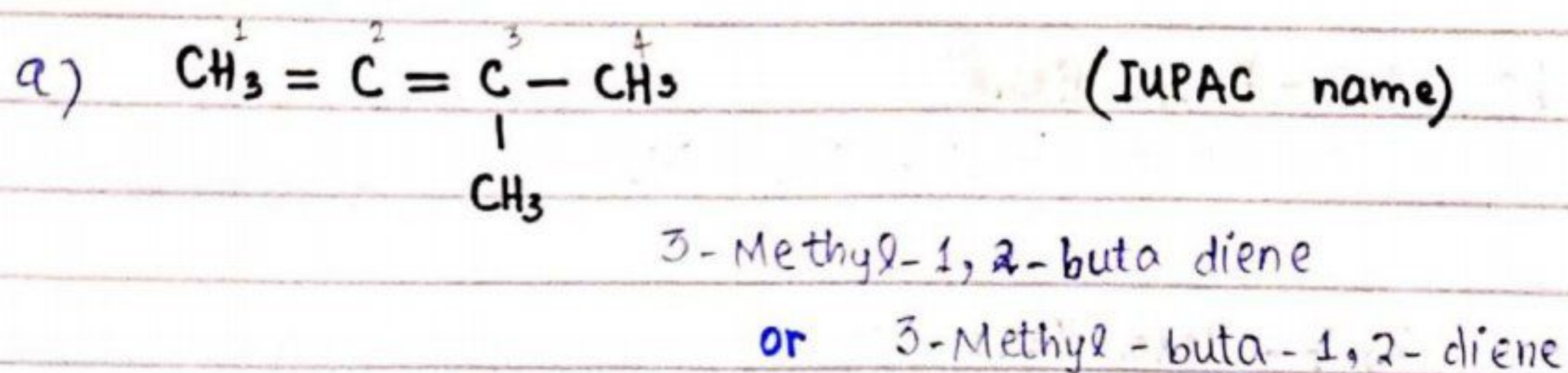


2,2,5,5-Tetramethyl-3-hexene

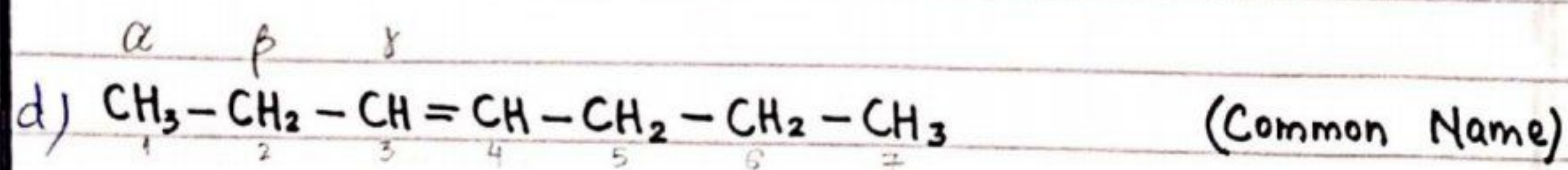
Question 2

Name the compounds:

- (a) & (b) by IUPAC nomenclature and compounds,
- (c) & (d) by their trivial/common names,
- (d) by its derived name.

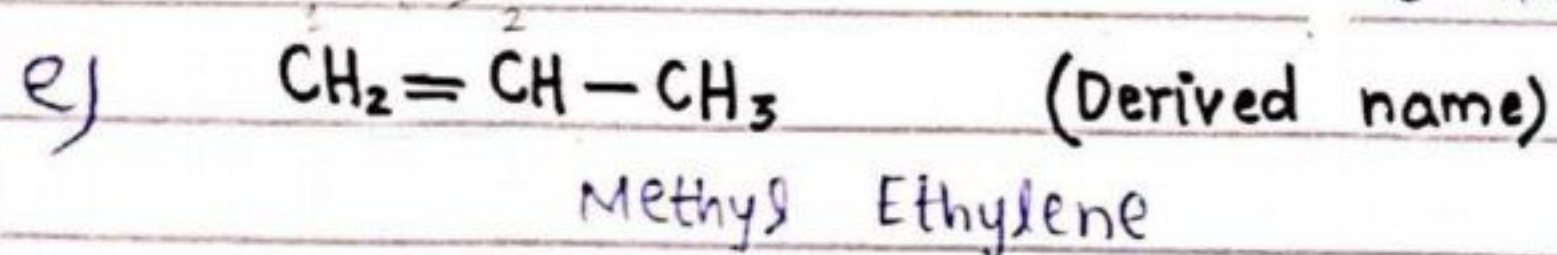


ene $\rightarrow$ ylene



γ -Heptylene (C.N)

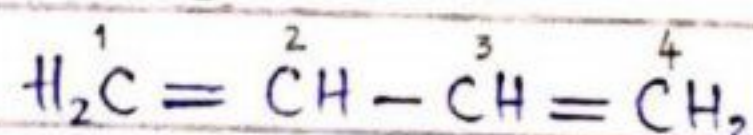
3-Heptene (IUPAC)



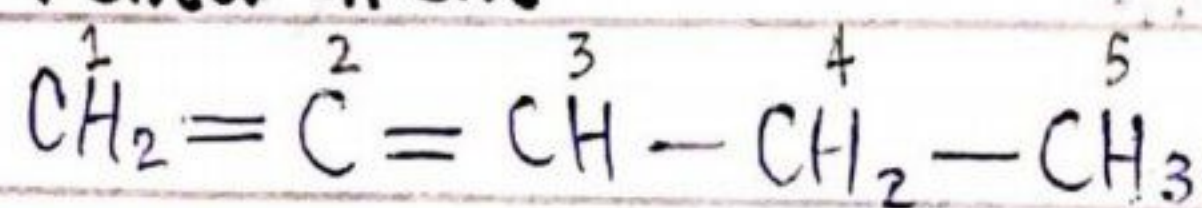
Question 3:-

Write structural formula for the following compounds.

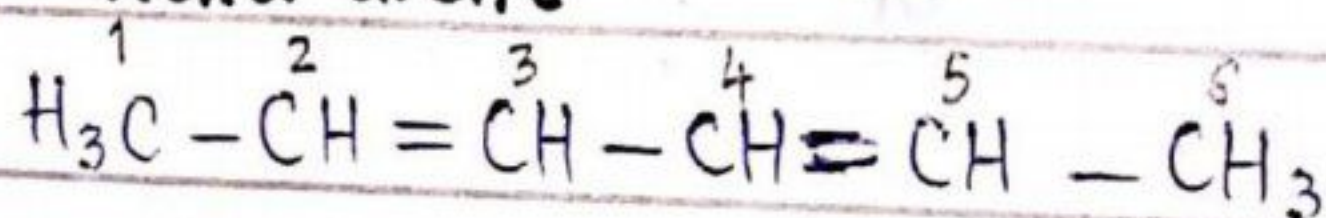
a) 1,3-Butadiene



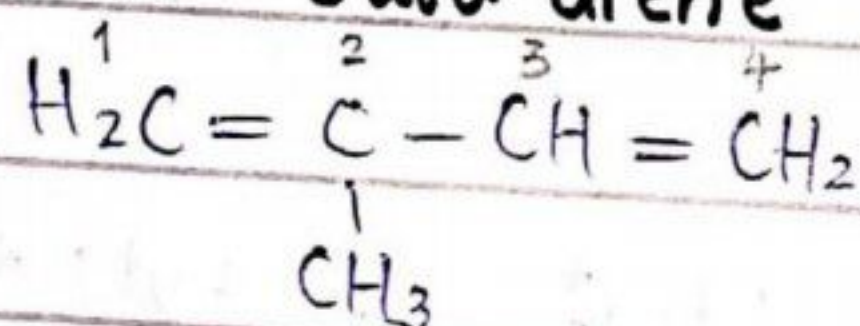
b) 1,2 - Penta diene



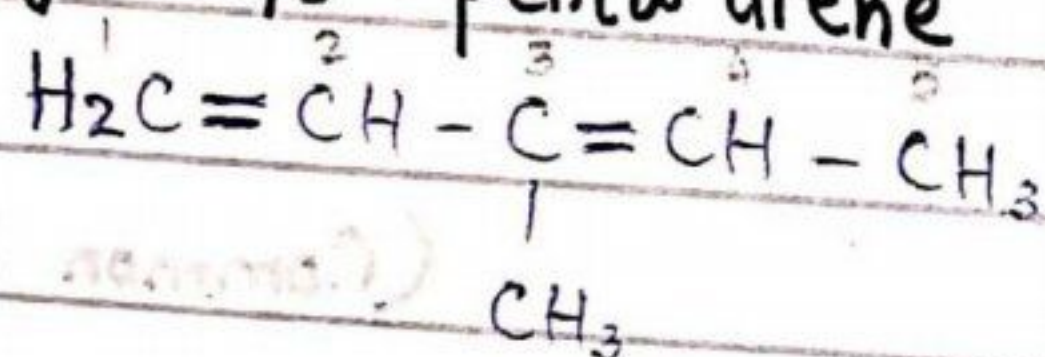
c) 2,4 - Hexa diene



d) 2-Methyl - 1,3 - buta diene

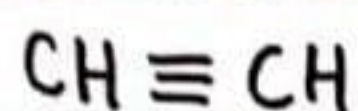


e) 3 - Methyl - 1,3 - penta diene

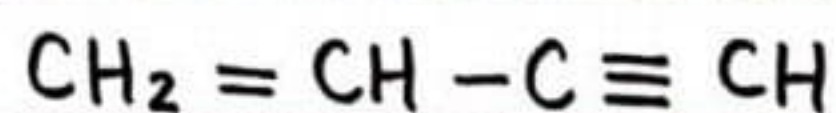


Nomenclature Of Alkynes:-

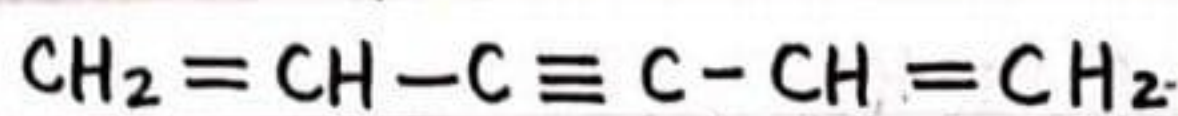
⇒ Common Name:



Acetylene

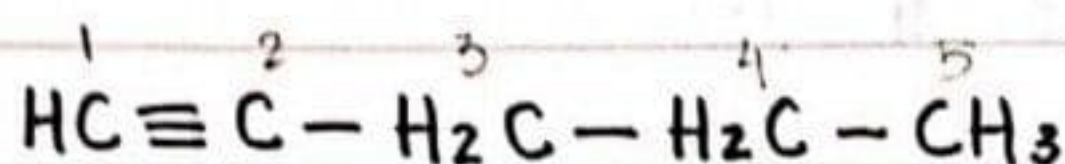


Vinyl acetylene

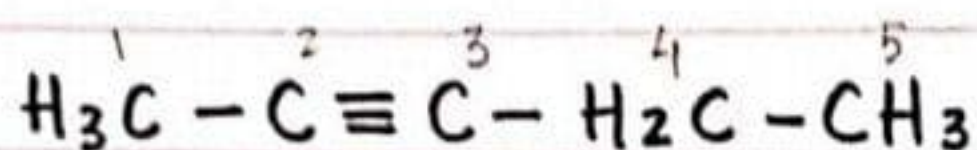


Divinyl acetylene

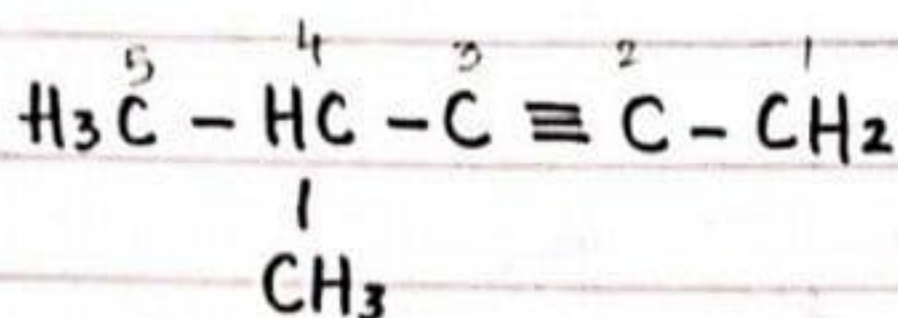
⇒ IUPAC name:-



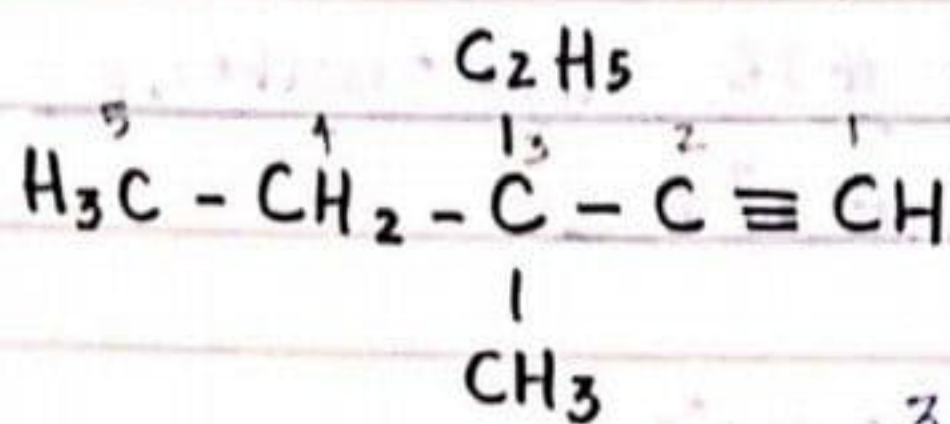
1-Pentyne



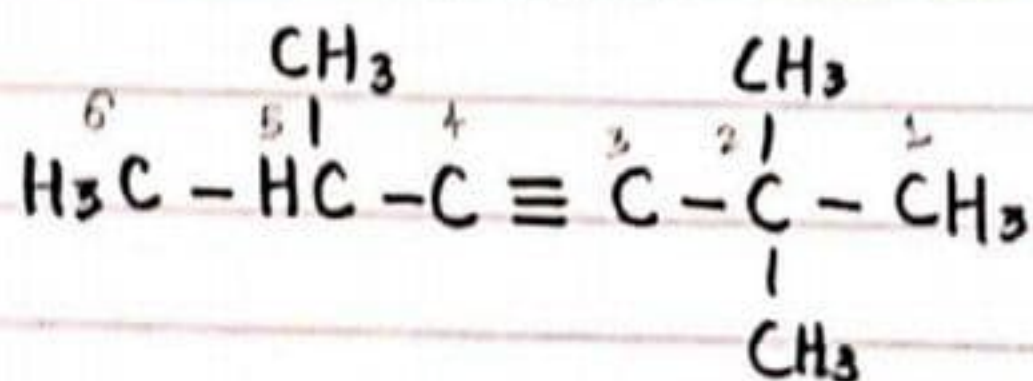
2-Pentyne



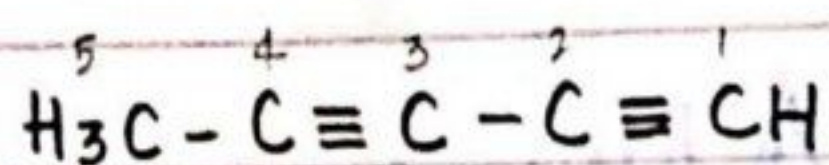
4-Methyl - 2 - pentyne



3-Ethyl - 3 - methyl - 1 - pentyne

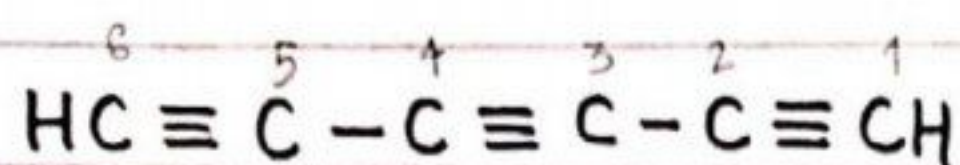


2, 2, 5 - Trimethyl - 3 - heptyne.



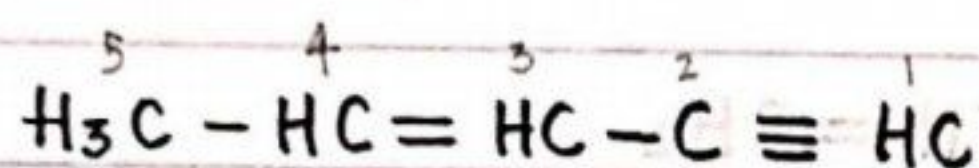
1, 3 - Penta diyne

Penta 1, 3 - diyne

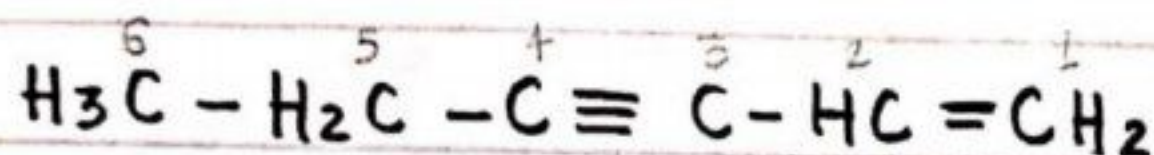


1, 3, 5 - Hexa triyne

Hexa - 1, 3, 5 - triyne

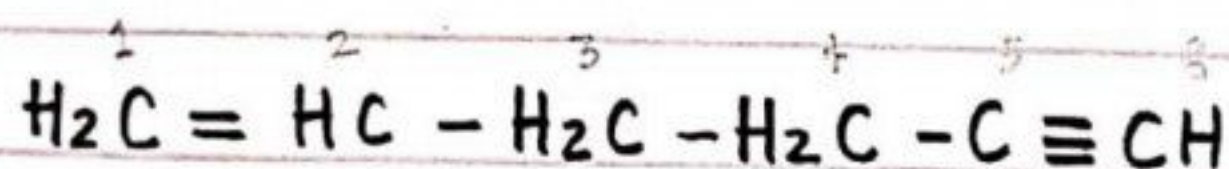


Pent - 3 - ene - 1 - yne



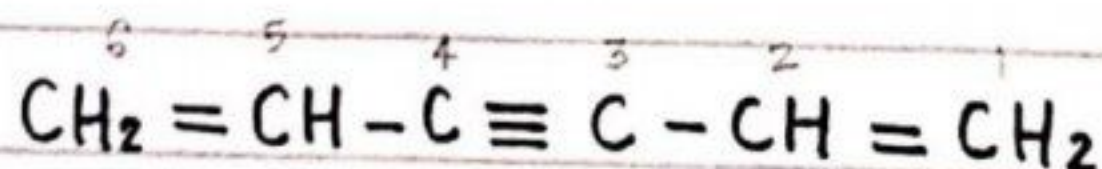
Hex - 1 - ene - 3 - yne

1 - Hexene - 3 - yne



Hex - 1 - ene - 5 - yne

1 - Hexene - 5 - yne



Hex - 1, 5 - diene - 3 - yne

1, 5 - Hexene - 3 - yne

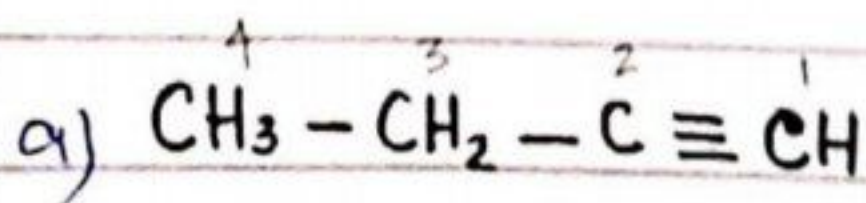
Activity

Chapter # 16 Hydrocarbons

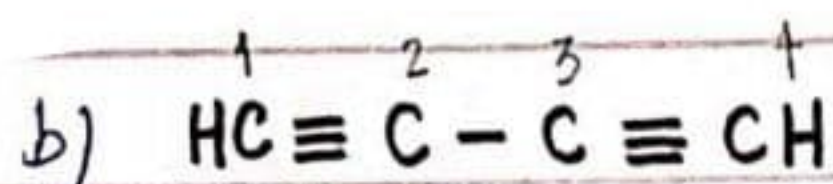
Pg #

Question 1:-

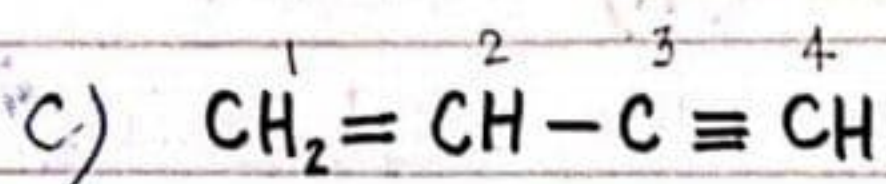
Name the IUPAC name of the following:



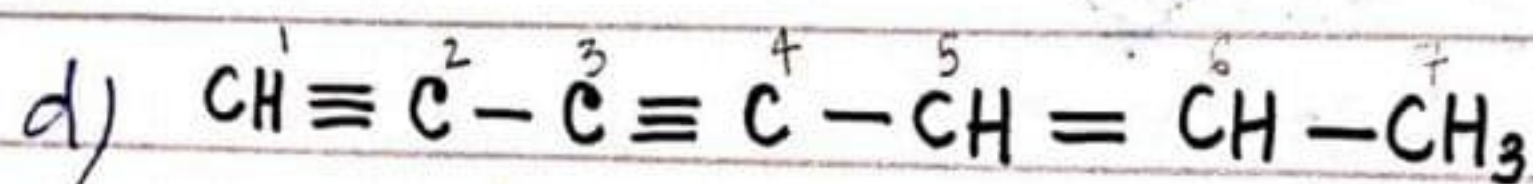
1 - Butyne



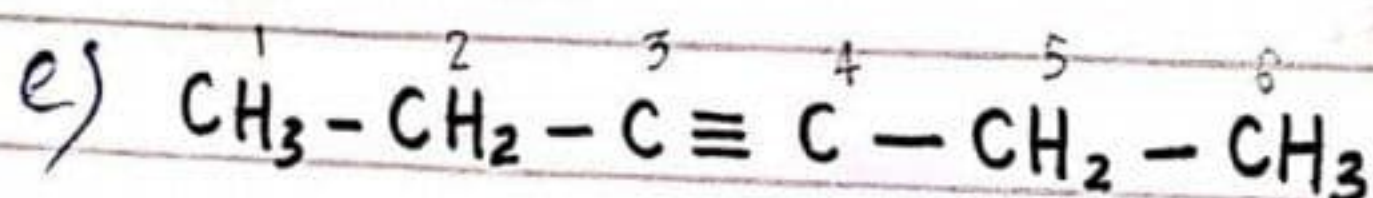
1,3 - Butadiyne or
Buta - 1,3 - diyne



But - 1-ene - 3-yne



Hept - 5-ene - 1,3-diyne



3-Hexyne

Alkyl Halides

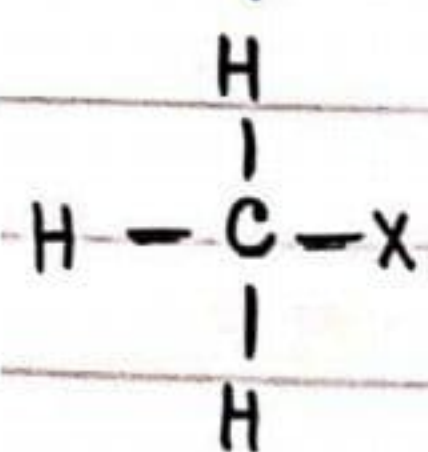
"When H-atom of alkane is replaced by halogen atom (-X) compound form are called Alkyl halides."

They are denoted by -X.

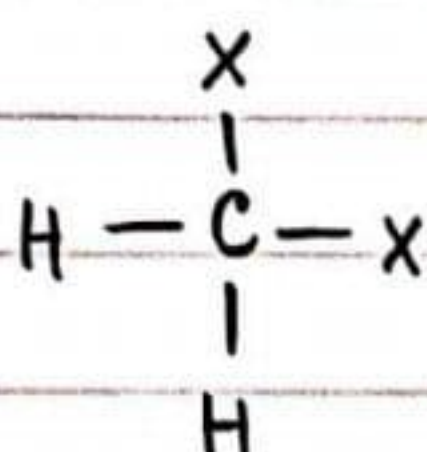
They are also called haloalkanes.

They may be mono, di, tri and tetra haloalkanes depending on the no. of 'X' - atoms.

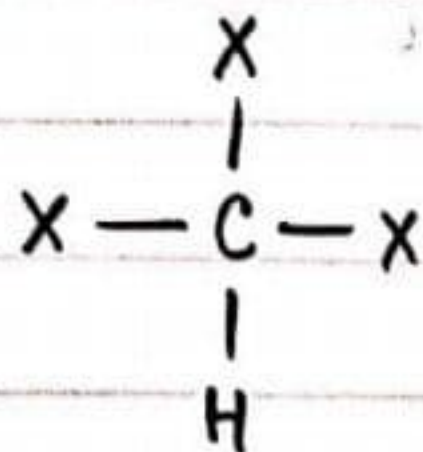
Example:



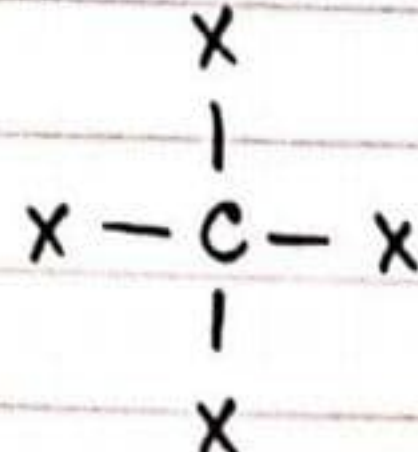
Mono -
haloalkanes



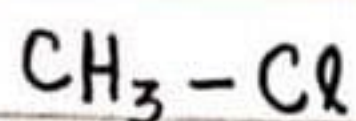
Di -
haloalkanes



Tri -
haloalkanes

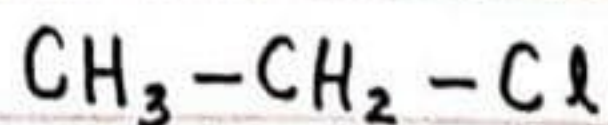


Tetra -
haloalkanes.



Methyl Chloride (C.N)

or Chloromethane (IUPAC)



Ethyl chloride (C.N)

or Chloro ethane (IUPAC)

Classification of Alkyl Halides :-

They are classified into 3 types :-

Primary alkyl halides ($\overset{1}{\text{C}} - \text{R} - \text{X}$)

Secondary alkyl halides ($\overset{2}{\text{C}} - \text{R} - \text{X}$)

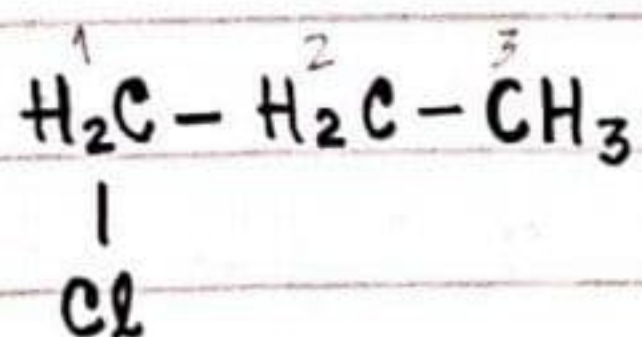
Tertiary alkyl halides ($\overset{3}{\text{C}} - \text{R} - \text{X}$)

* Primary Alkyl Halides:

Alkyl halide in which halogen atom is bonded with primary carbon.

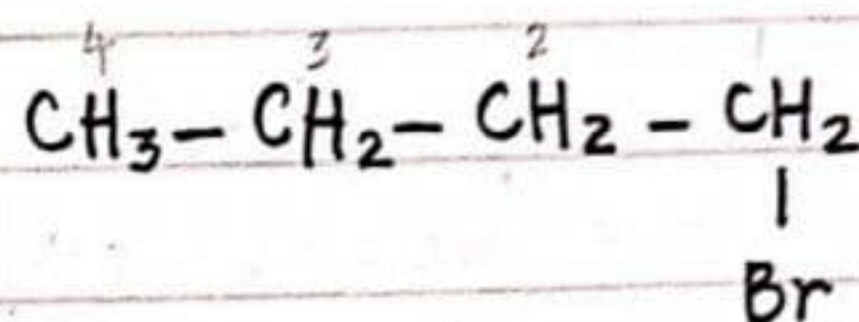
Primary Carbon:

Carbon atom which is directly bonded with only one other carbon and no other carbon atom is called Primary carbon.



Pri-propyl chloride (C.N)

1-Chloro propane (IUPAC)



Pri-butyl bromide (C.N)

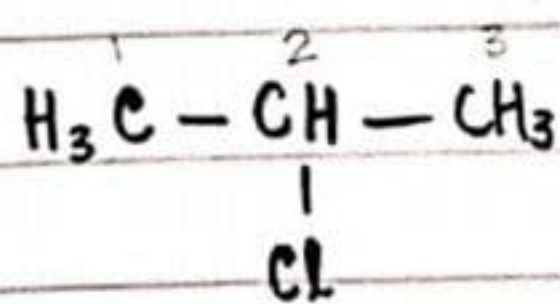
1-Bromo butane (IUPAC)

* Secondary Alkyl Halides:

Alkyl halide in which halogen atom is bonded with secondary carbon.

Secondary Carbon:

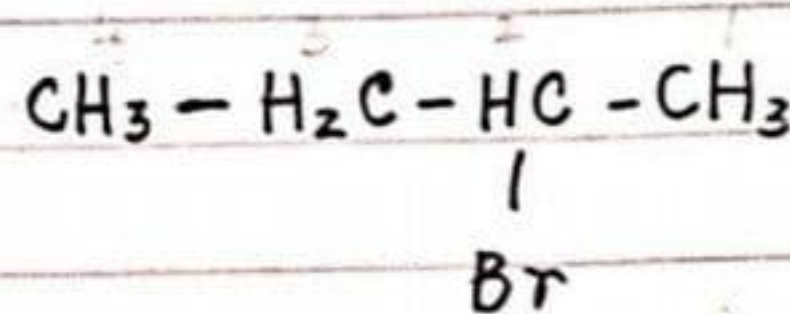
Carbon atom which is directly bonded with two other C-atom is called secondary carbon.



Sec-propyl chloride (C.N)

or Iso-propyl chloride

2-Chloropropane (IUPAC)



Sec-butyl bromide (C.N)

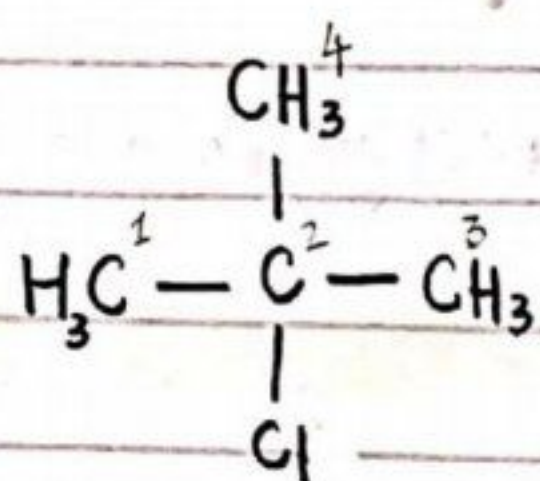
2-Bromo butane (IUPAC)

* Tertiary Alkyl Halides:

Alkyl halide in which halogen atom is bonded with tertiary carbon.

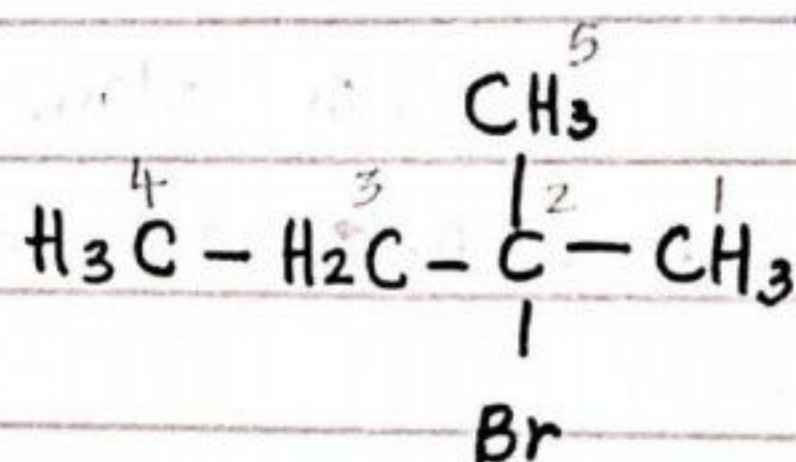
Tertiary Carbon:

Carbon atom which is directly bonded with 3 other C-atoms is called tertiary carbon.



Ter-butyl chloride (C.N)

2-Chloro-2-methyl propane (IUPAC)

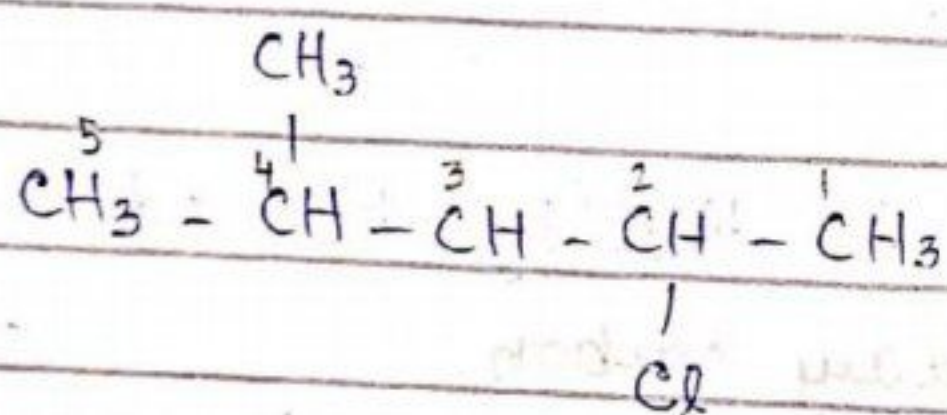
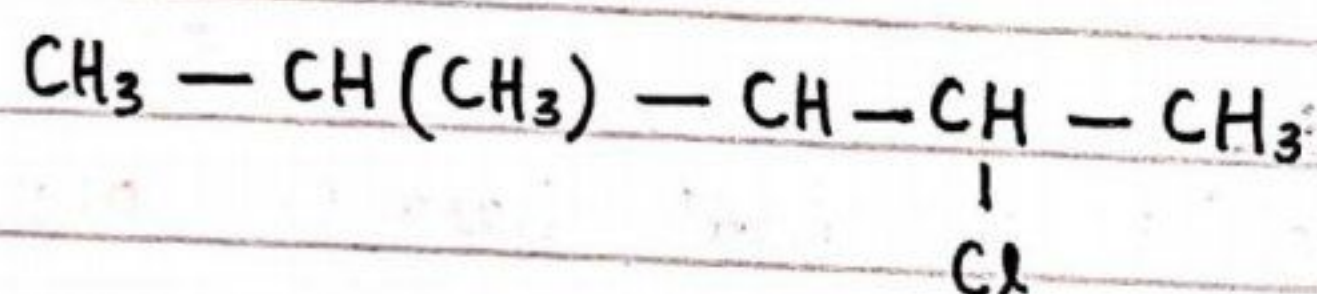


Ter-pentyl bromide (C.N)

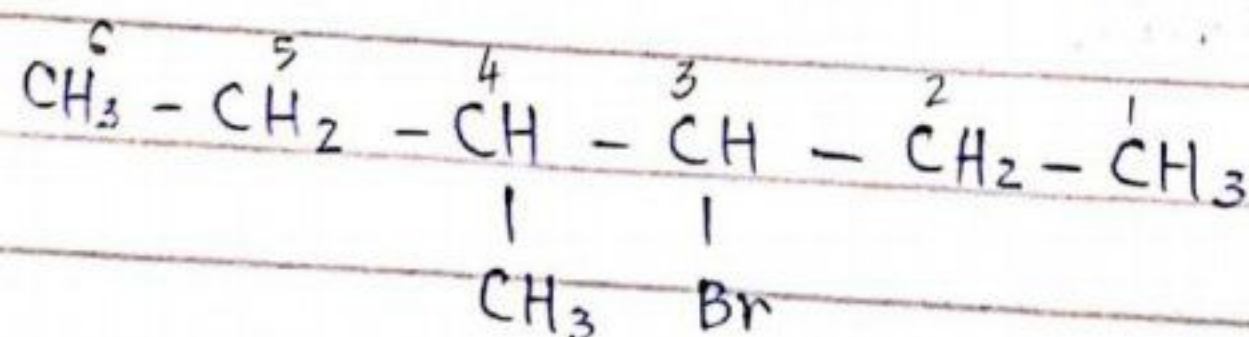
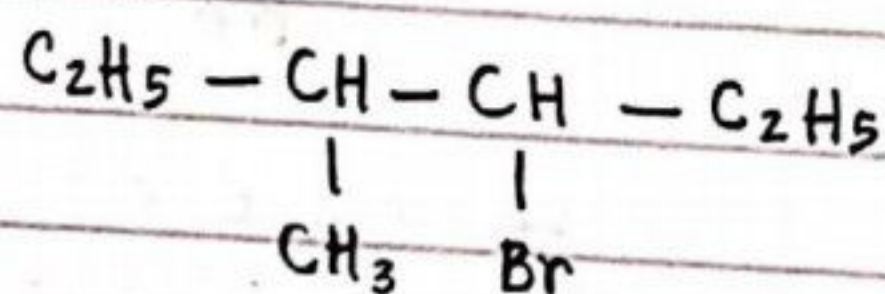
2-Bromo-2-methyl butane

Question-1

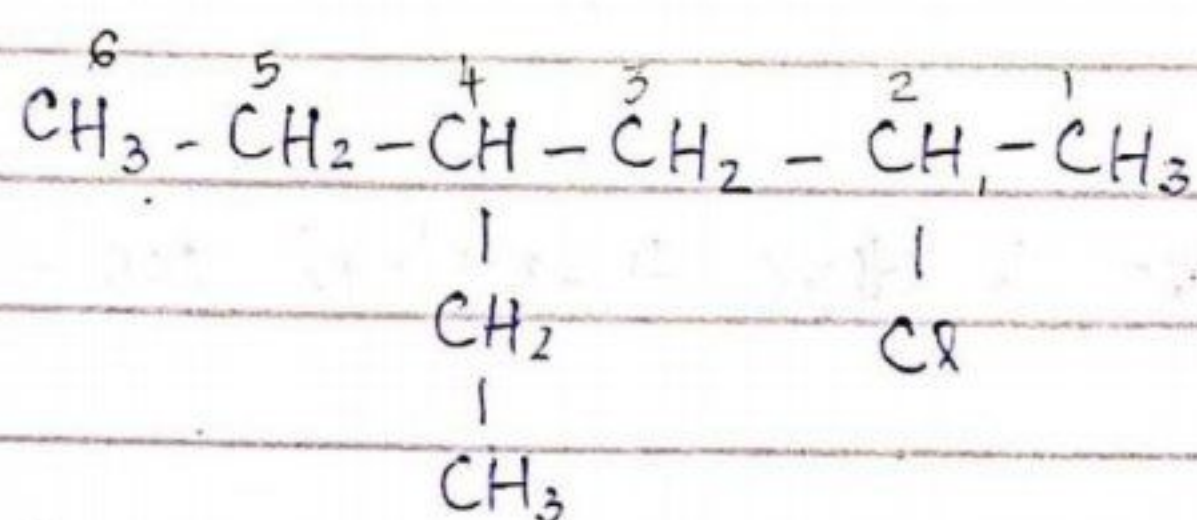
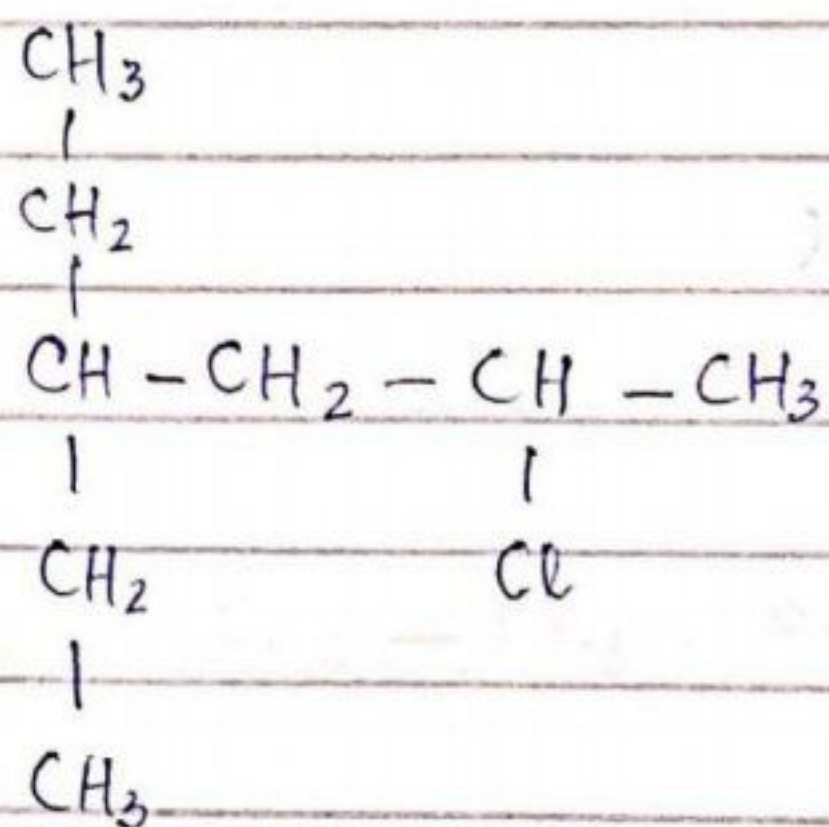
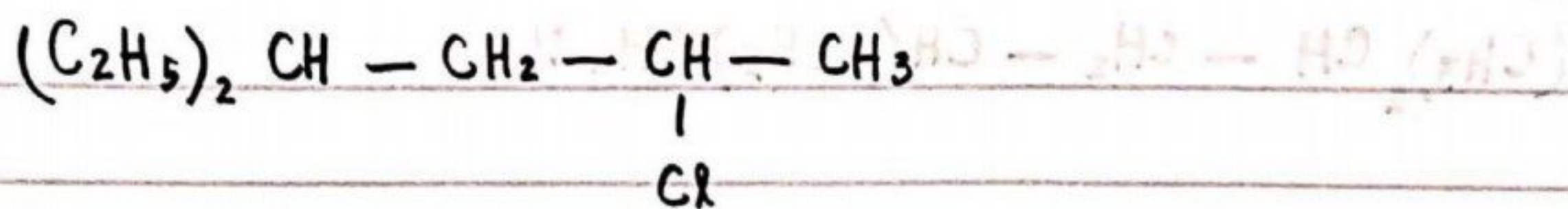
Give IUPAC name to the following compounds.



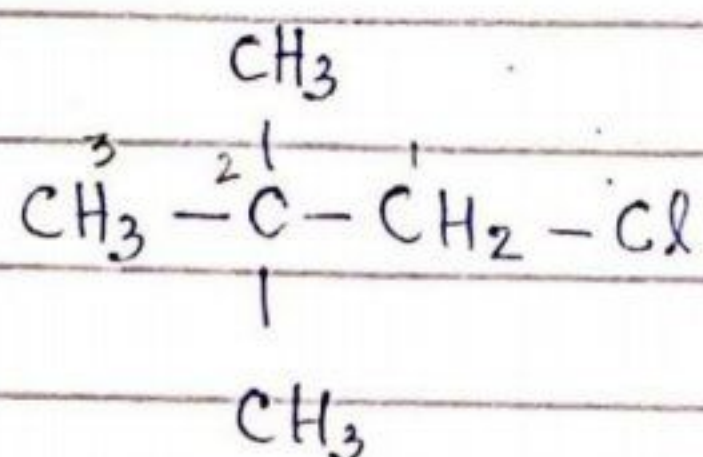
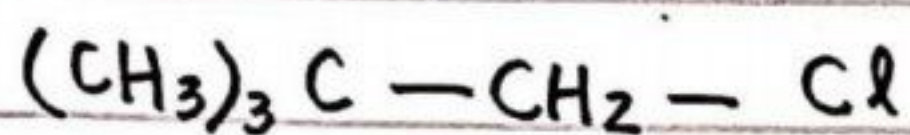
2-Chloro-4-methyl pentane (IUPAC)



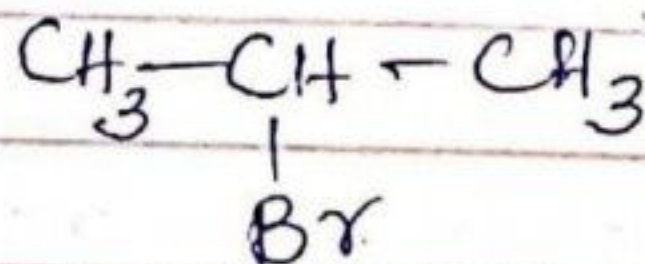
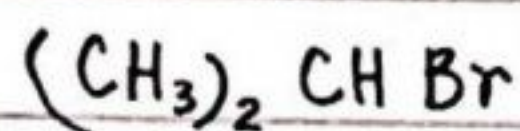
5-Bromo-4-methyl hexane (IUPAC)



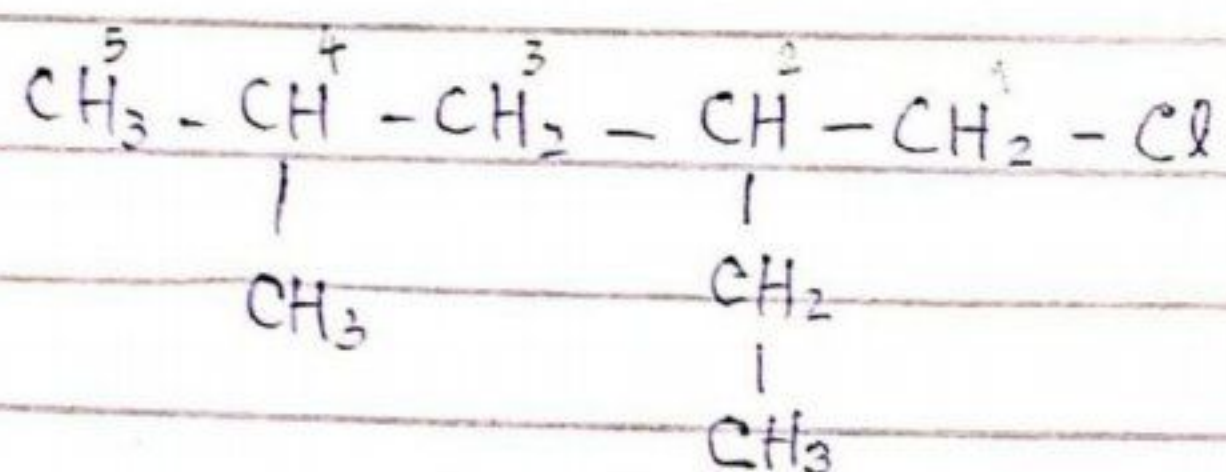
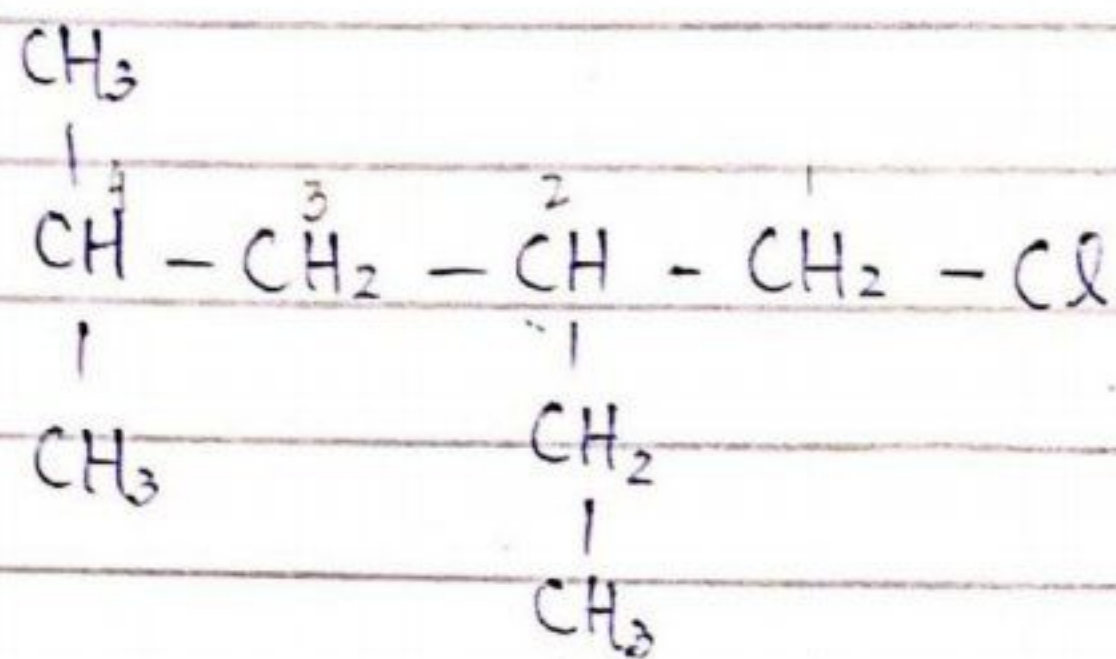
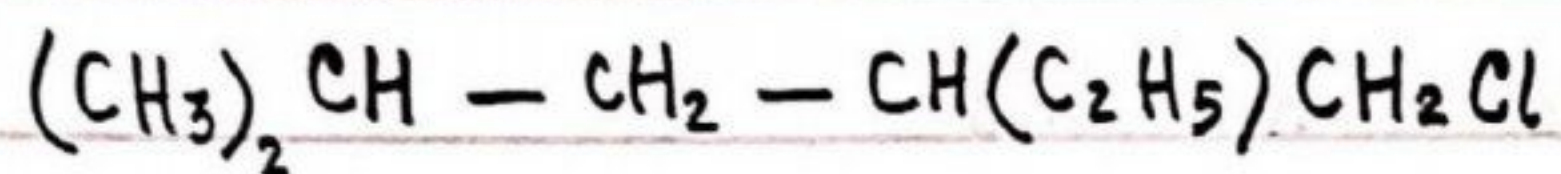
2-Chloro-4 ethyl hexane (IUPAC)



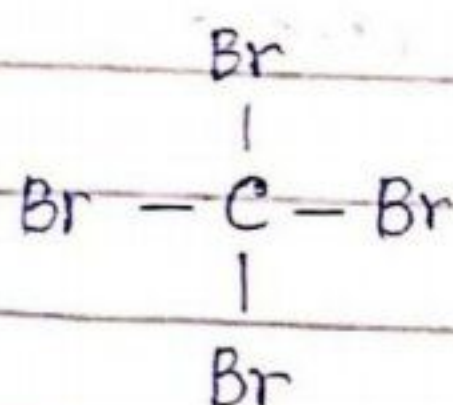
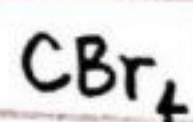
1-Chloro-2,2-Dimethyl propane (IUPAC)



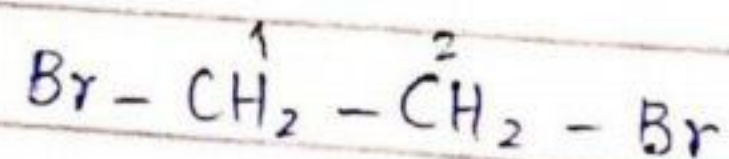
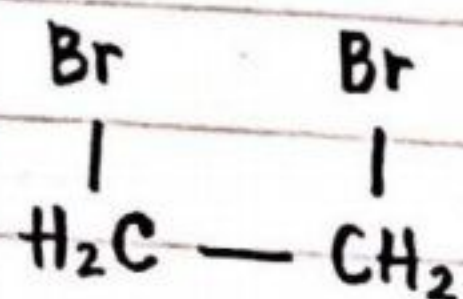
2-Bromopropane



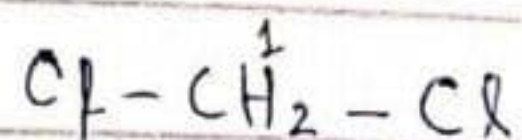
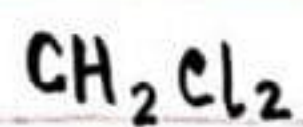
1-Chloro-2-ethyl-4-methyl pentane



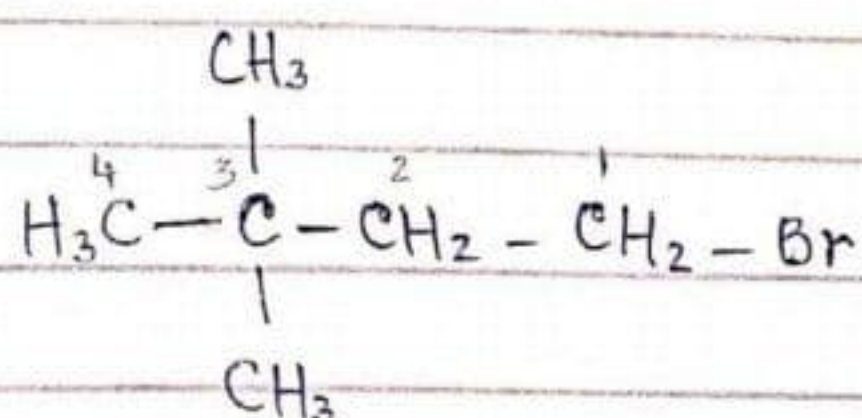
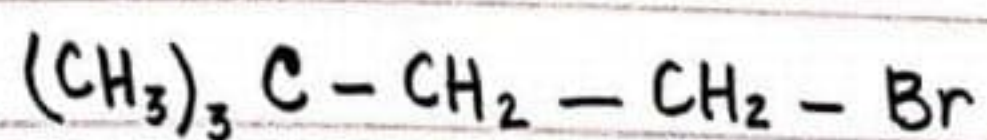
Tetra bromo Methane



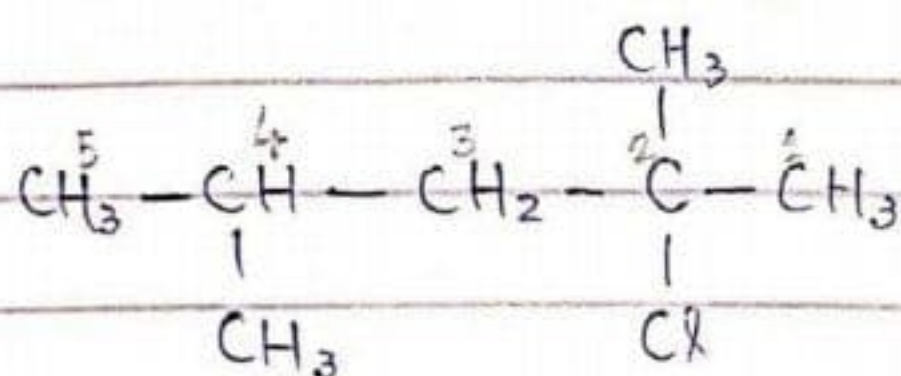
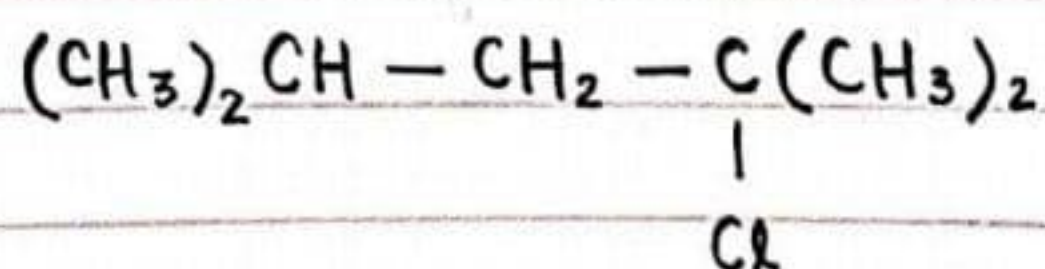
1,2-Dibromo ethane



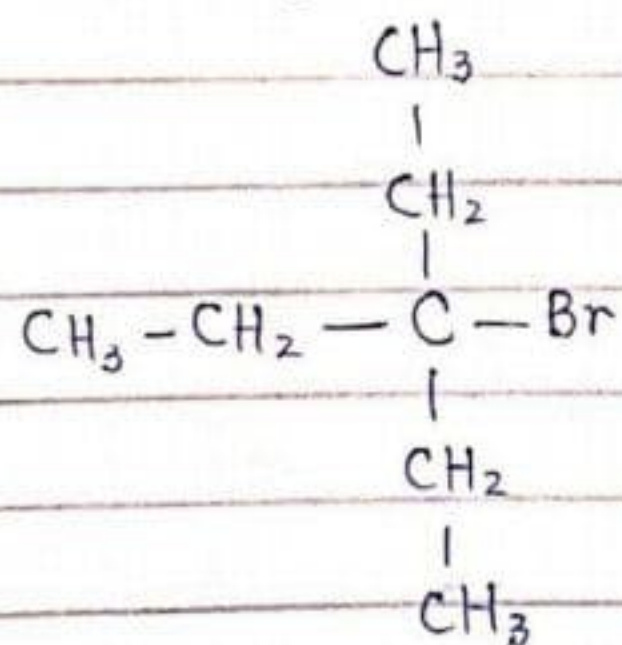
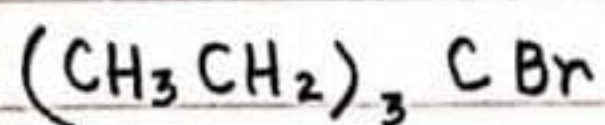
1,1-Dichloro methane
or Dichloro methane

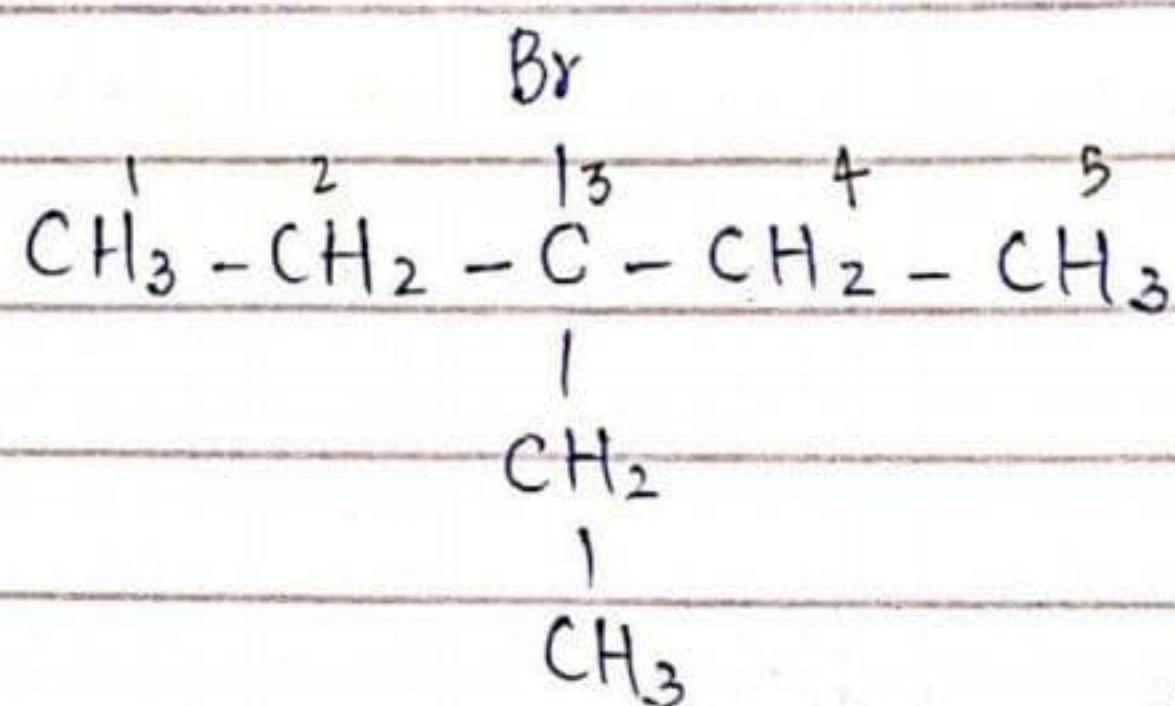


1-Bromo-3,3-Dimethyl butane

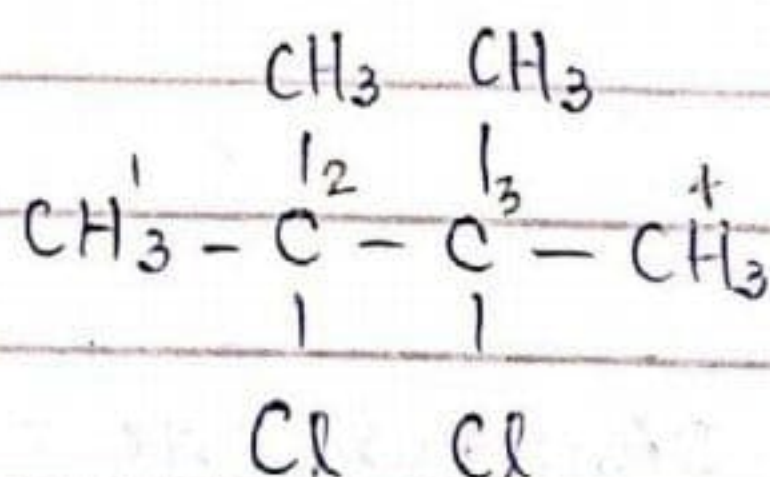
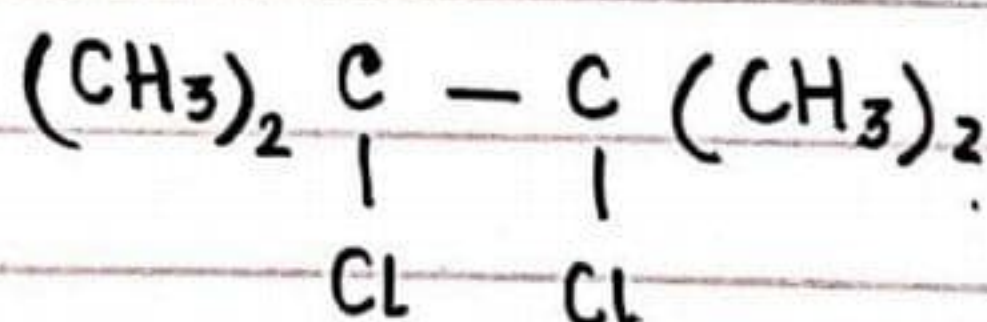


2-Chloro-2,4 Dimethyl Pentane





3-Bromo-3-ethyl pentane



2,3-Dichloro-2,3-Dimethyl butane

Alcohols

"When H-atom of alkane is replaced by hydroxyl group (-OH)."

OR

"When H-atom of water is replaced by alkyl group."

They are denoted by (R-OH).

where -R = Alkyl group = (-CH₃, -C₂H₅, -C₃H₇, ...)

General formula (C_nH_{2n+1}OH)

Classification of Alcohol:-

They are classified into 2 types.

* Monohydric alcohols.

* Polyhydric alcohols.



* Monohydric Alcohol:-

"Alcohols containing only one -OH group is called Monohydric alcohols."

It is further classified into 3 types.

Primary Alcohols

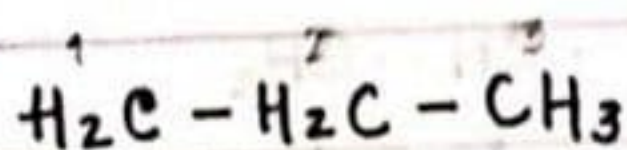
Secondary Alcohols

Tertiary Alcohols

Primary Alcohols:-

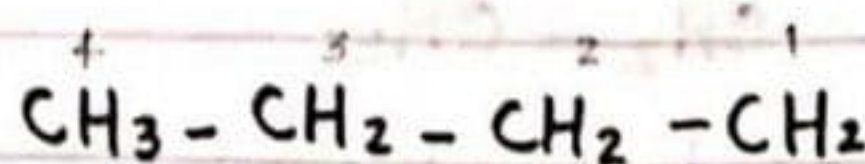
Alcohol in which -OH group is bonded with primary carbon are called primary alcohols.

* It is denoted as (1°-R-OH).



Pri-propyl alcohol (C.N)

1-Propanol (IUPAC)



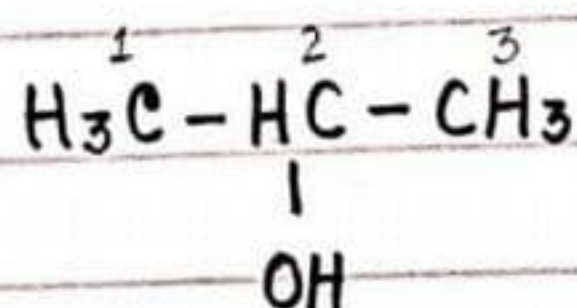
Pri-butyl alcohol (C.N)

1-Butanol (IUPAC)

Secondary Alcohol:-

Alcohol in which -OH group is bonded with secondary carbon are called secondary alcohol.

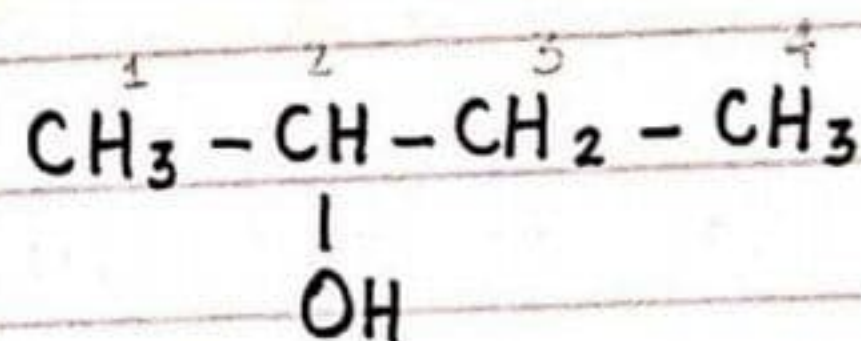
*- It is denoted by (2° -R-H)



Sec-propyl alcohol (C.N)

Isopropyl alcohol

2-Propanol (IUPAC)



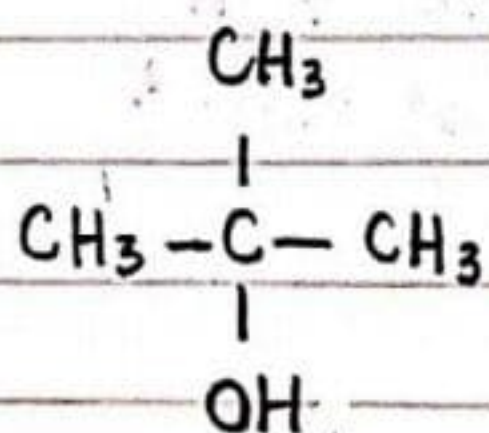
Sec-butyl alcohol (C.N)

2-Butanol (IUPAC)

Tertiary Alcohol:-

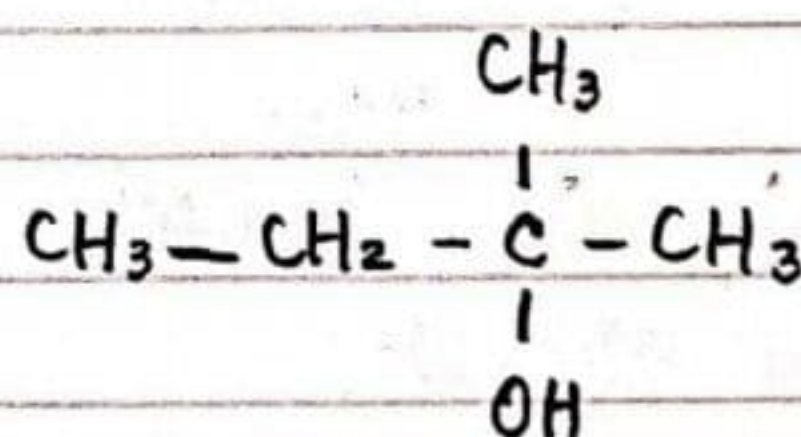
Alcohol in which -OH group is bonded with tertiary carbon is called tertiary alcohol.

*- It is denoted by (3° -R-H)



Ter-butyl alcohol (C.N)

2-Methyl-2-propanol (IUPAC)

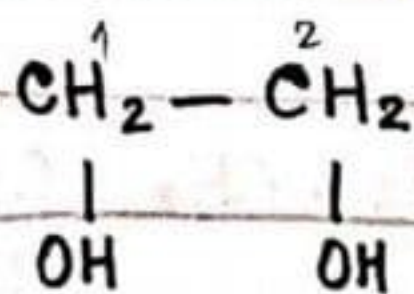


Ter-pentyl alcohol (C.N)

3-Methyl-3-butanol (IUPAC)

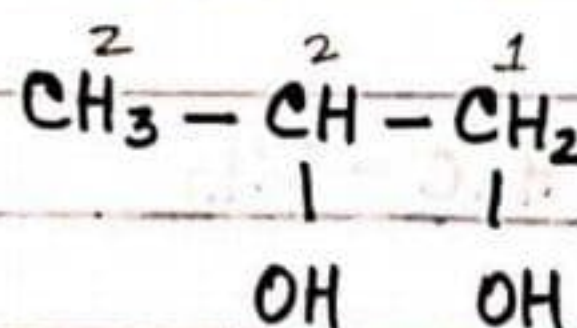
*- Polyhydric Alcohol:-

"Alcohol containing more than one -OH group are called Polyhydric alcohol."



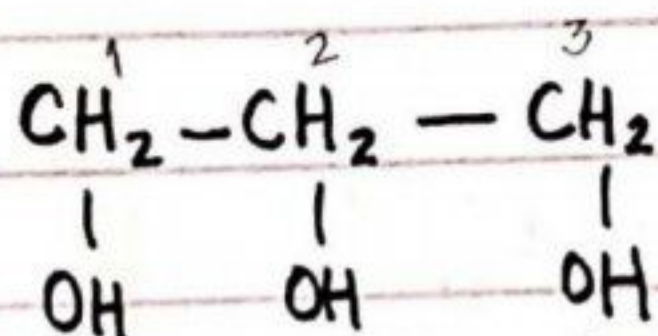
Ethylene glycol (C.N)

Ethane-1,2-diol (IUPAC)



Propylene glycol (C.N)

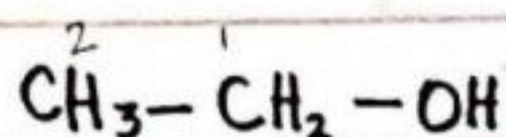
Propane-1,2-diol (IUPAC)



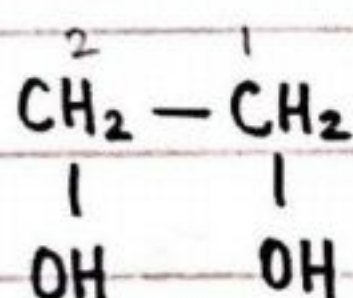
Glycerol or Glycerine (C.N)
Propane-1,2,3-triol (IUPAC)

Activity

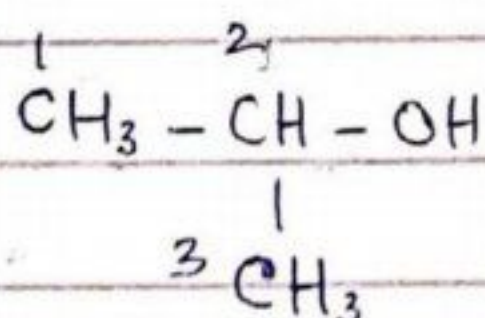
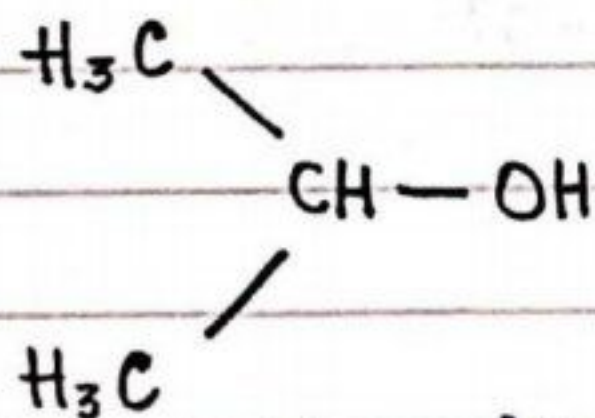
Chapter #18 Alcohols, Phenols & Ether



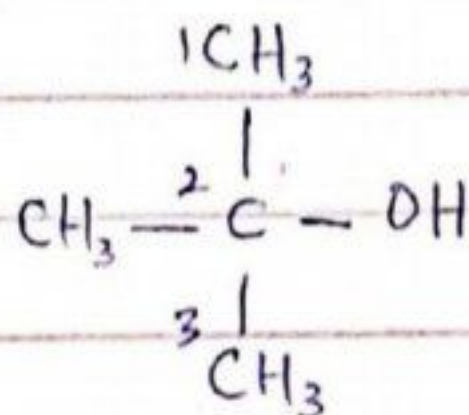
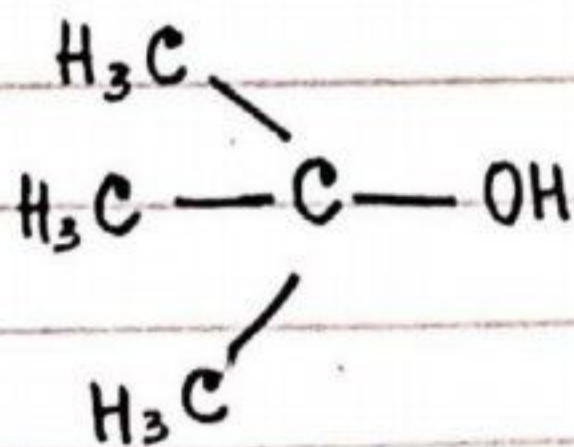
Pri-ethyl alcohol (Monohydric alcohol) (C.N)
Ethanol (IUPAC)



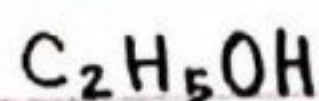
Ethylene glycol (Polyhydric alcohol) (C.N)
Ethane-1,2-diol (IUPAC)
or 1,2-Ethane diol



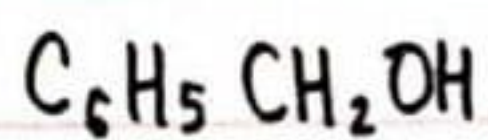
2-Propanol



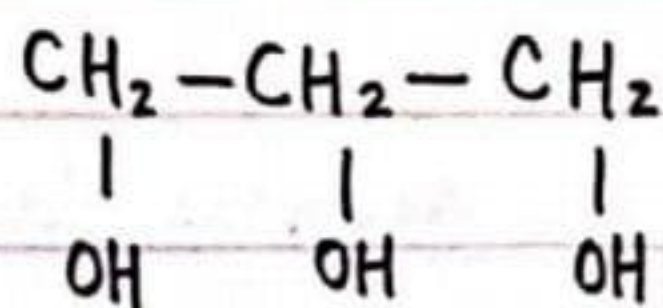
2-Methyl-2-Propanol



Pri-ethyl alcohol (Monohydric alcohol) (C.N)
Ethanol (IUPAC)



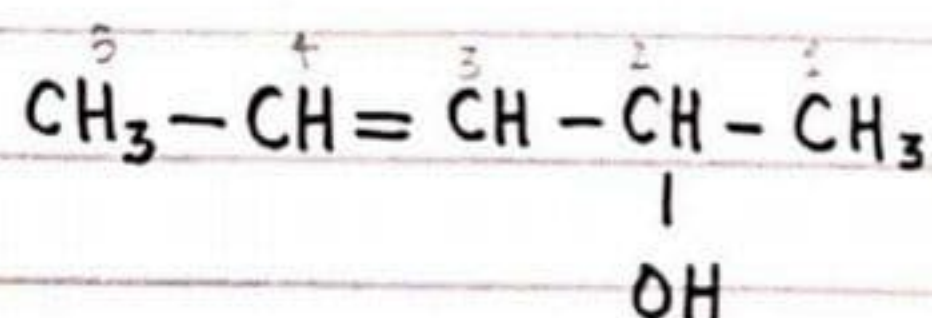
Benzyl alcohol (C.N)



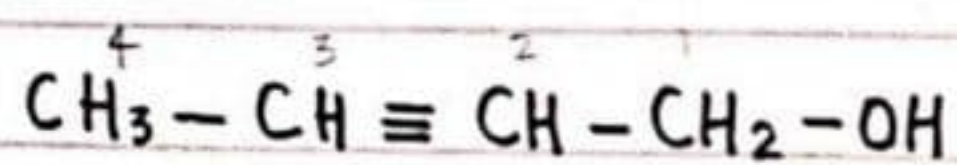
Glycerine or Glycerol (C.N)

Propane - 1, 2, 3 - triol

1, 2, 3 - Propanetriol (IUPAC)



3 - Pentene - 2 - ol (IUPAC)



2 - Butyne - 1 - ol (IUPAC)

Ethers

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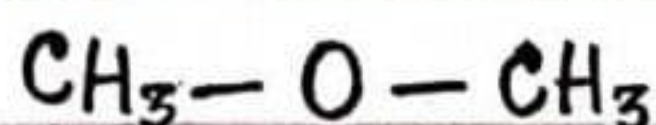
"When oxygen is directly bonded with two alkyl groups, compound formed are called Ether."

It is denoted by $(R-O-R)$.

If two alkyl groups are same, it is called symmetrical ether.

If two alkyl groups are different, it is called unsymmetrical ether.

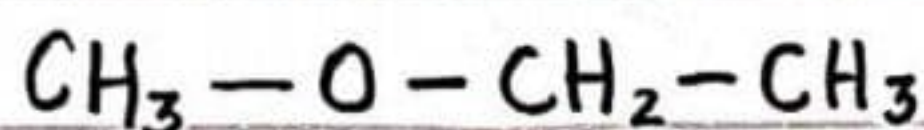
Examples:-



symmetrical ether

Dimethyl ether (C.N)

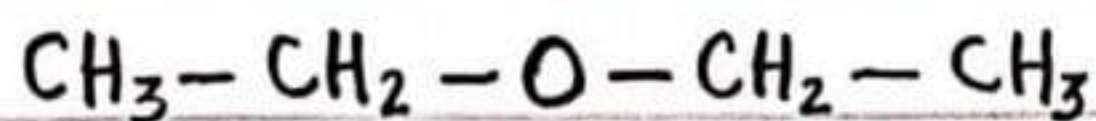
Methoxy methane (IUPAC)



unsymmetrical ether

Ethyl methyl ether (C.N)

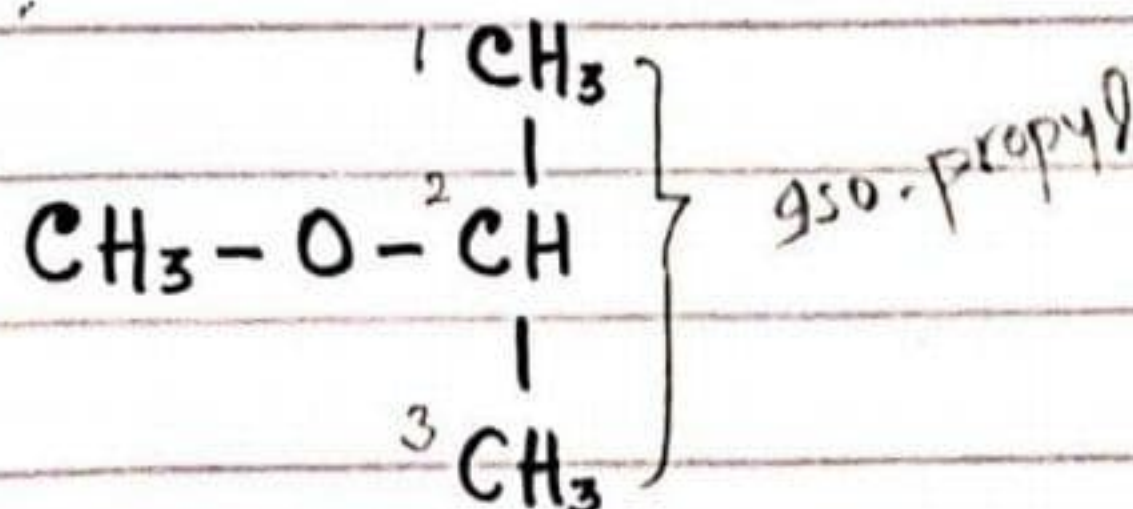
Methoxy ethane (IUPAC)



symmetrical ether

Diethyl ether (C.N)

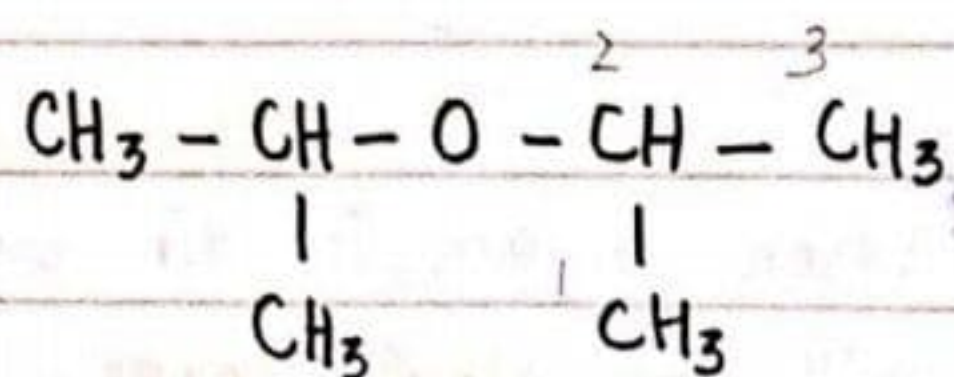
Ethoxy ethane (IUPAC)



iso-propyl

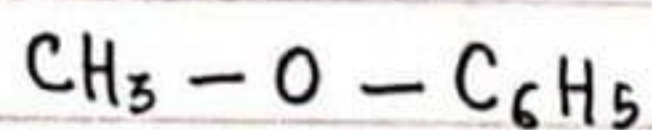
Methyl isopropyl ether

2-Methoxy propane



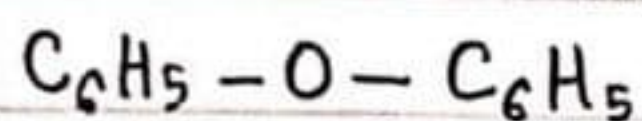
Di-isopropyl ether (C.N)

2-isopropoxy propane (IUPAC)



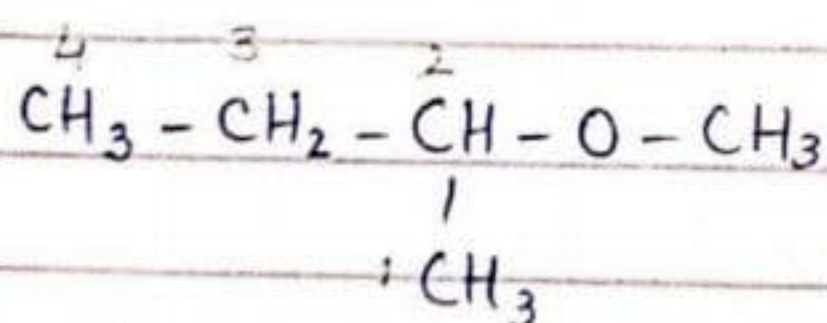
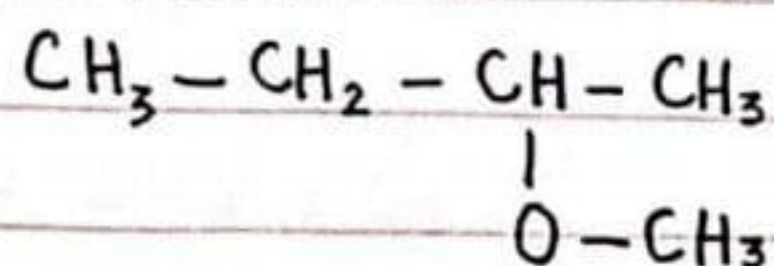
Methyl phenyl ether / Anisol (C.N)

Methoxy benzene (IUPAC)



Diphenyl ether (C.N)

Phenoxy benzene (IUPAC)



Methyl sec-butyl ether (C.N)

2-Methoxy butane (IUPAC)

Benzene ring → 

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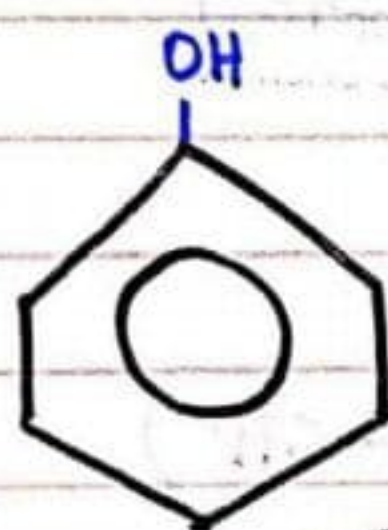
Old name of benzene is phenol

→ Phenol become Alcohol containing OH-group also called (Carbolic Acid)

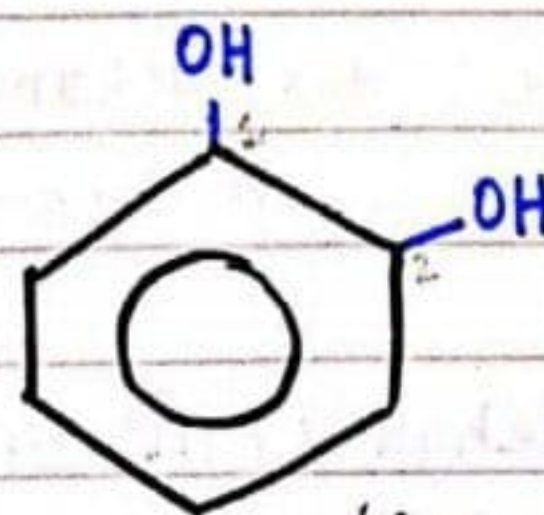
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Phenols

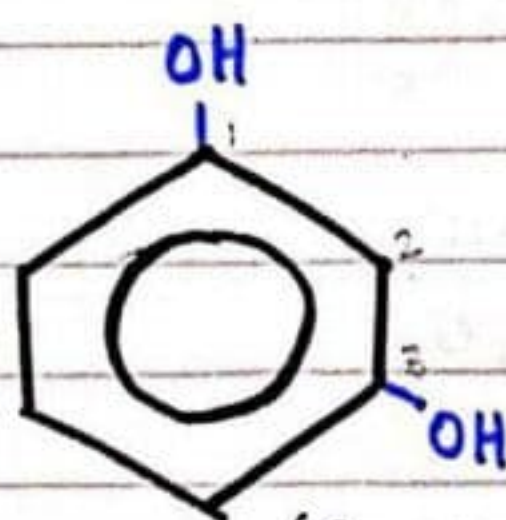
Aromatic compounds containing one or more than one -OH group directly attached with the carbon of benzene ring



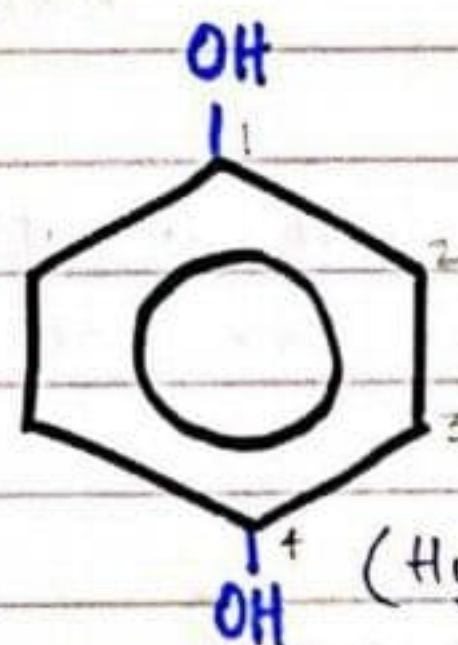
Phenol
(Carbolic acid)



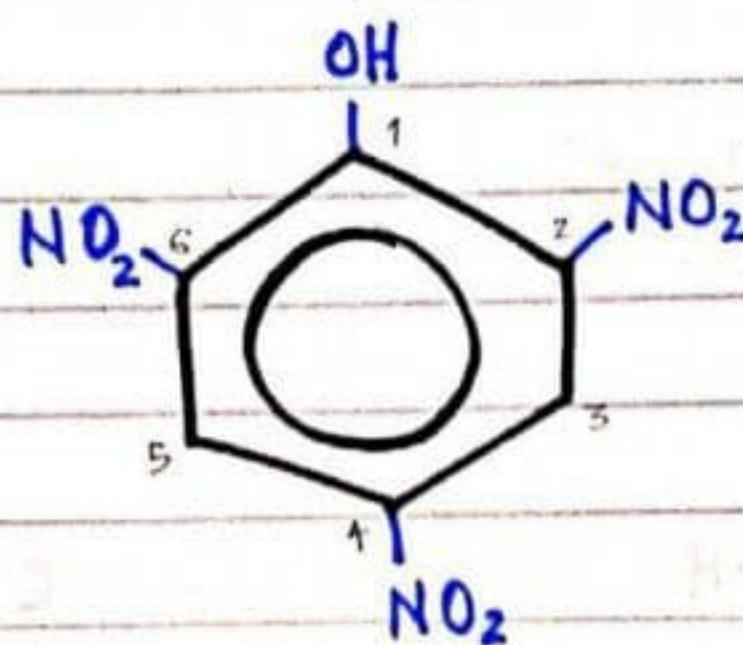
(Catechol) (C.N)
1,2-Dihydroxy benzene
(IUPAC)



(Resorcinol) (C.N)
1,3-Dihydroxy benzene (IUPAC)



(C.N)
(Hydroquinone)
1,4-Dihydroxy-
benzene
(IUPAC)

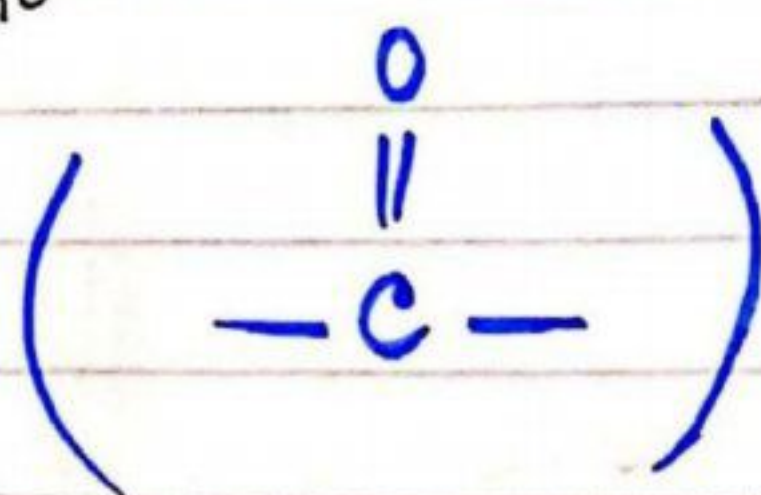


(Picric acid) (C.N)
2,4,6-Trinitrophenol (IUPAC)

(C.N) = Common name

Carbonyl Group

Denoted by:



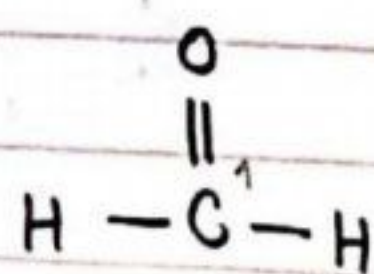
There are two types of carbonyl compounds
Aldehydes / Alkanals
Ketones / Alkanones

*- Aldehydes / Alkanals :- $\left(\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{H} \end{array} / -\text{CHO} \right)$

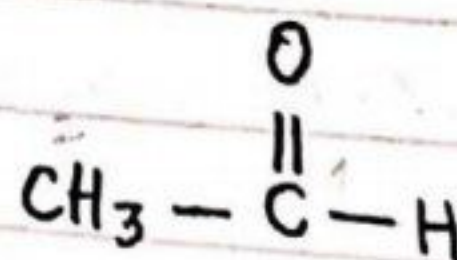
"When carbonyl group is directly bonded with at least one H-atom compound formed are called Aldehydes."

*- They are denoted by $\left(\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}-\text{H} \end{array} / -\text{CHO} \right)$

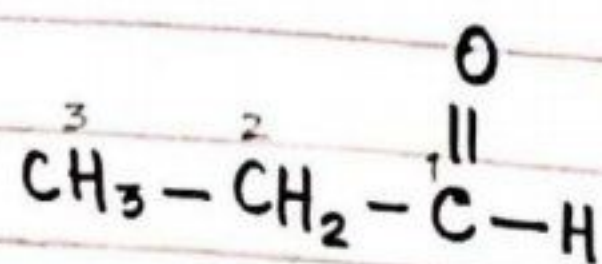
*- They have general formula $\text{C}_n\text{H}_{2n}\text{O}$



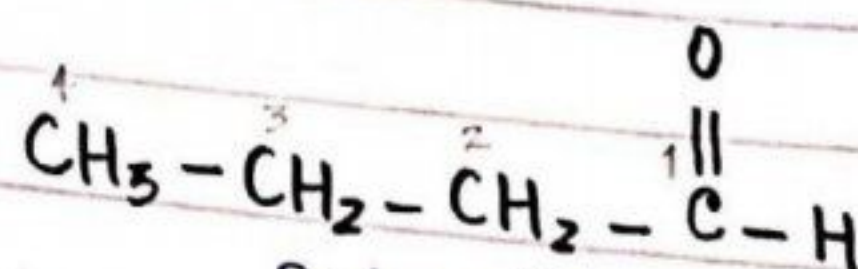
Formaldehyde (C.N)
Methanal (IUPAC)



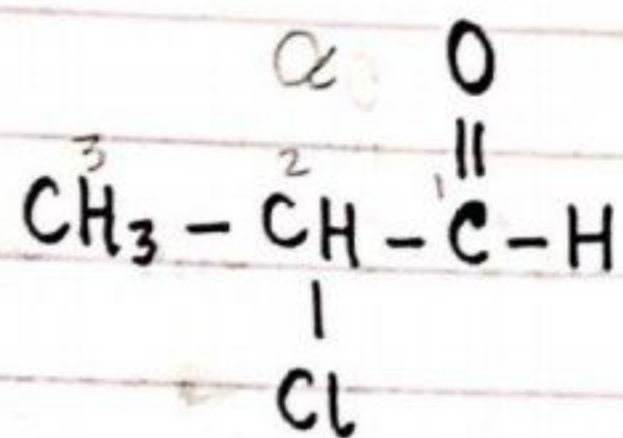
Acetaldehyde (C.N)
Ethanal (IUPAC)



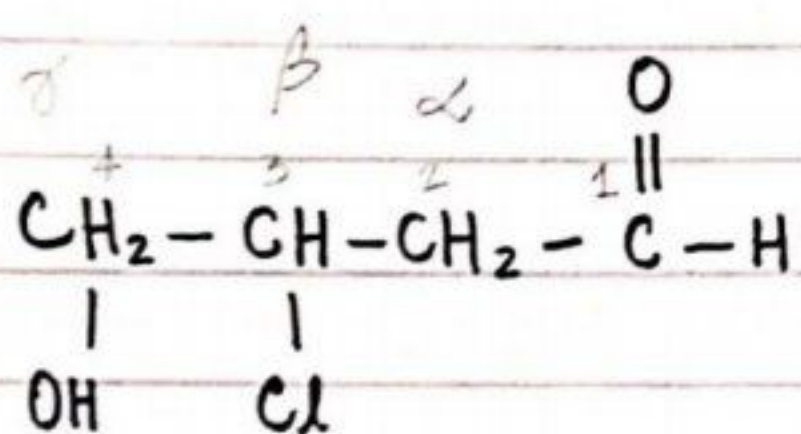
Propionaldehyde (C.N)
Propanal (IUPAC)



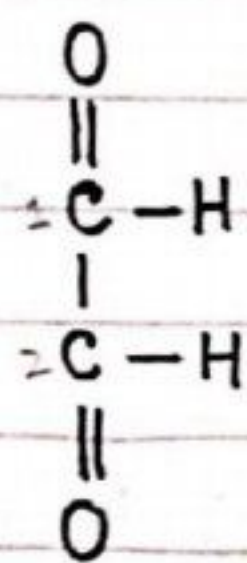
Butyraldehyde (C.N)
Butanal (IUPAC)



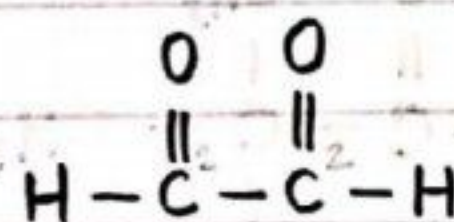
α -Chloropropionaldehyde (C.N)
2-Chloropropanal (IUPAC)



β -Chloro- γ -hydroxy butyraldehyde (C.N)
3-Chloro-4-hydroxy butanal (IUPAC)



OR

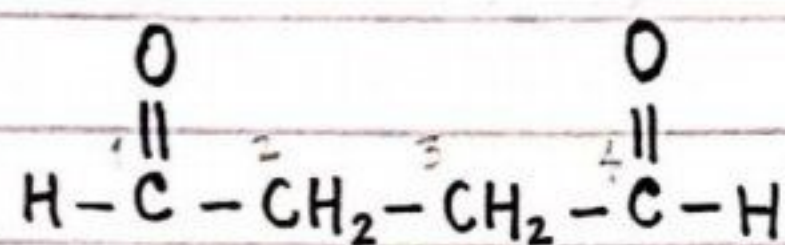


(Glyoxal) (C.N)

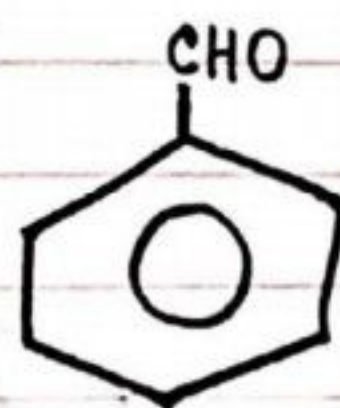
Ethane dial

OR
Ethane-1,2-dial

(IUPAC)



(only IUPAC) Butane-1,4-dial



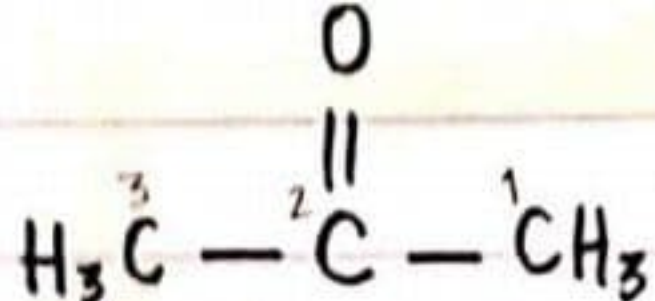
Benzaldehyde (C.N/IUPAC)

* Ketones / Alkanones:- $(\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R})$

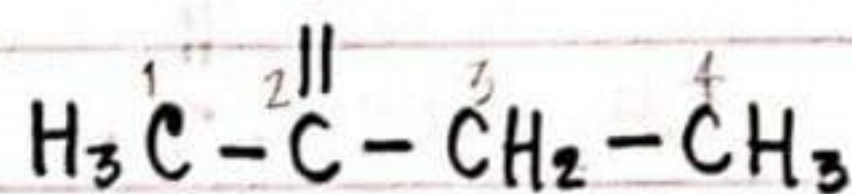
"When carbonyl group is directly bonded with two Alkyl group, compound formed are called Ketones, they are also called Alkanones."

* They are denoted by $(\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R})$.

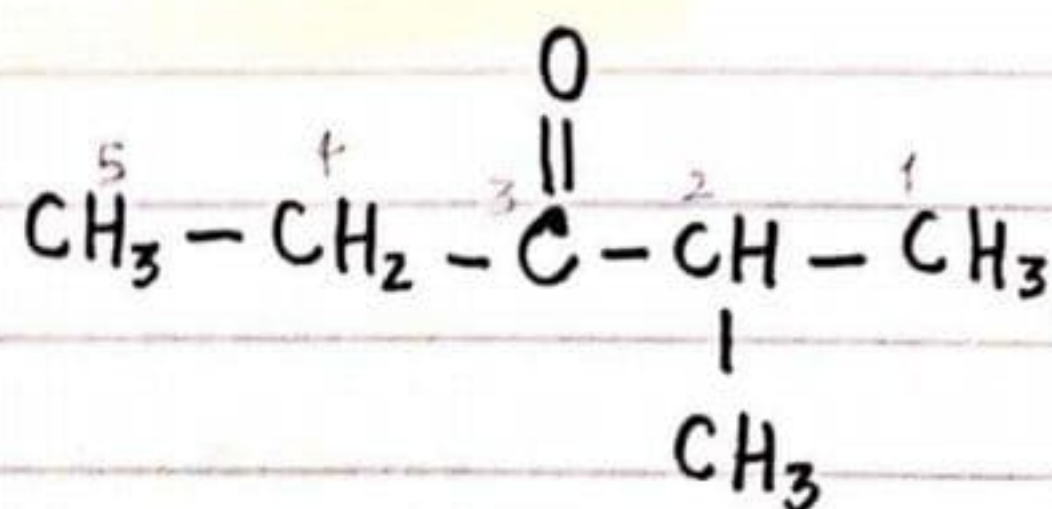
* They have general formula $\text{C}_n\text{H}_{2n}\text{O}$.



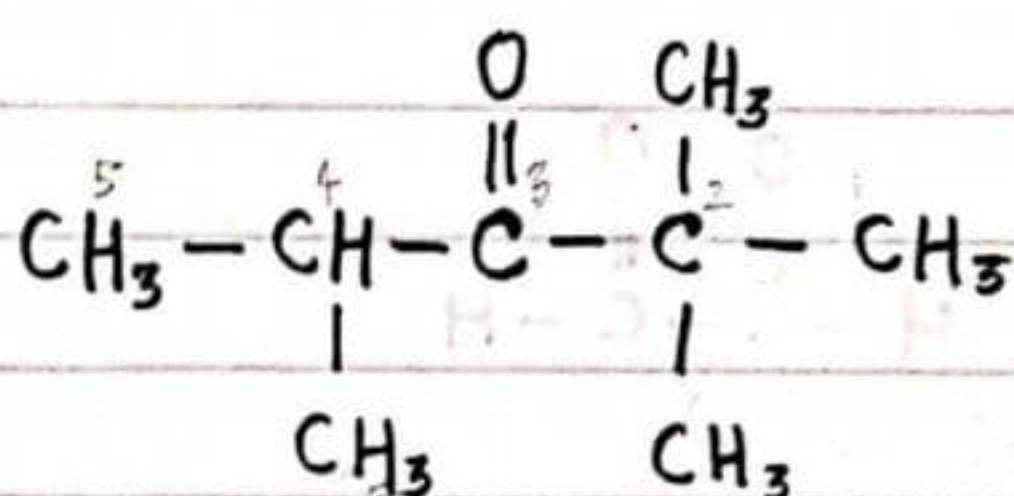
Acetone or Dimethyl Ketone (C.N)
2-propanone (IUPAC)



Ethyl Methyl Ketone (C.N)
2-Butanone (IUPAC)

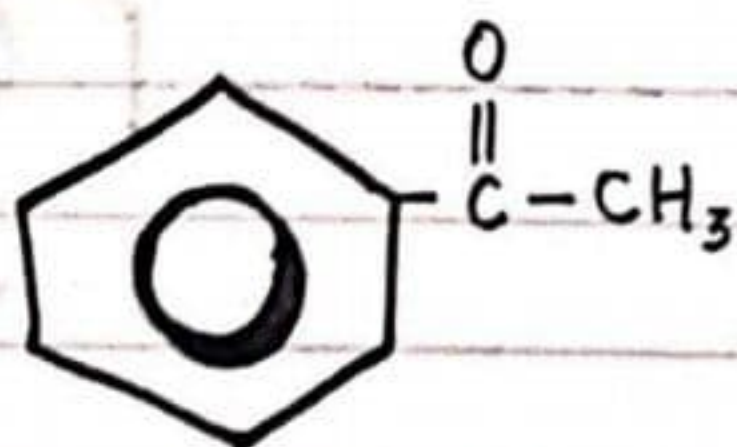


Ethyl isopropyl ketone (C.N)
2-Methyl-3-pentanone (IUPAC)

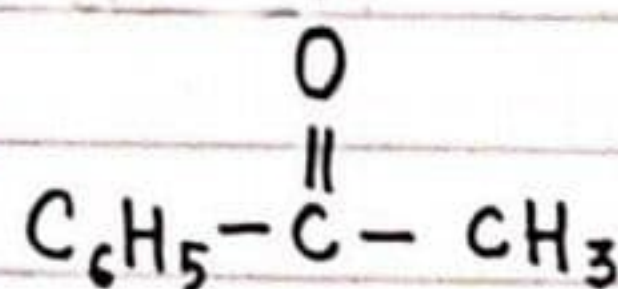


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Isopropyl ter-butyl ketone (C.N)
2,2,4-Trimethyl-3-pentanone (IUPAC)

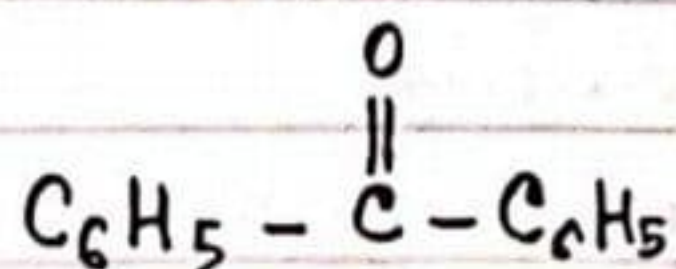


OR



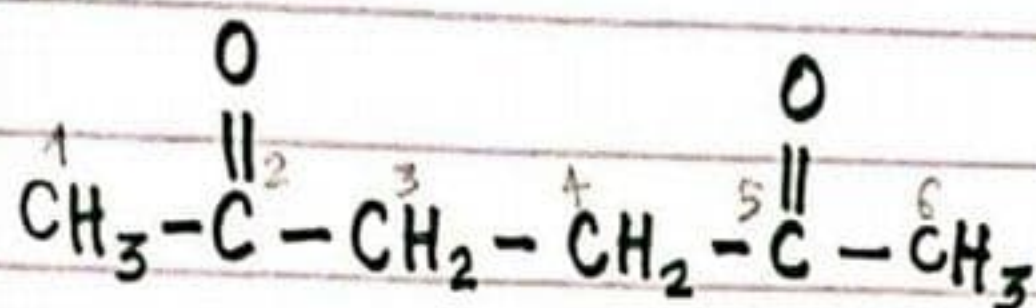
Methyl phenyl ketone (C.N)

Acetophenone (IUPAC / also use as C.N)



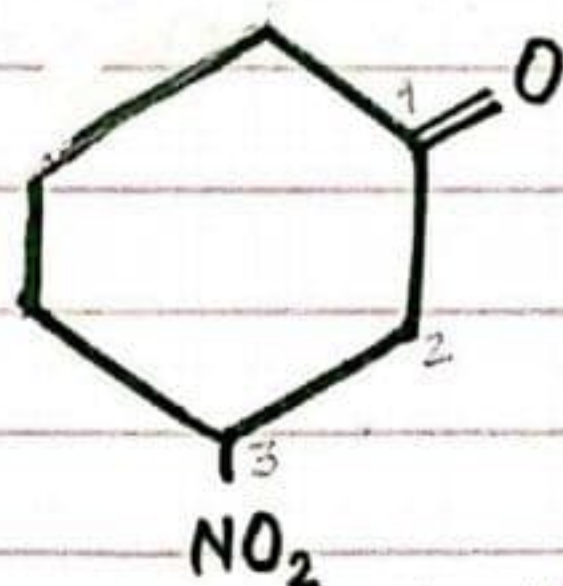
Diphenyl ketone (C.N)

Benzophenone (IUPAC / also use as C.N)



Hexane - 2,5-dione (IUPAC only)

(no common Name)



3-Nitrocyclohexanone

in benzene ring, phenol or cyclohexane counting starts from the first functional group on the top or either left or right side. & in case of many close chain, its outside where 2 f. group starts are adjacent or close.

Quick Quiz Chapter # 19 Aldehydes & Ketones

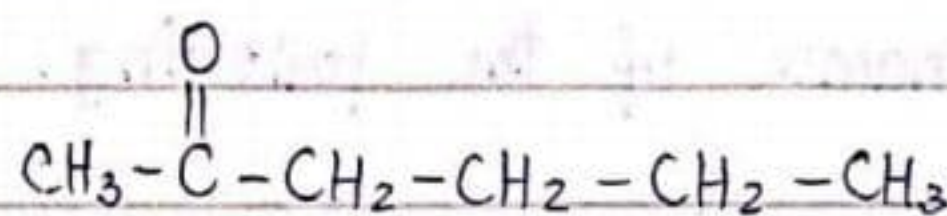
Page no. XXXX

Question - 1



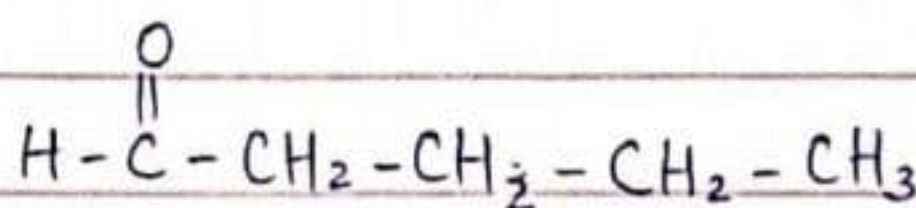
Write the structures of the following compounds.

2-hexanone (ketone)
(IUPAC)

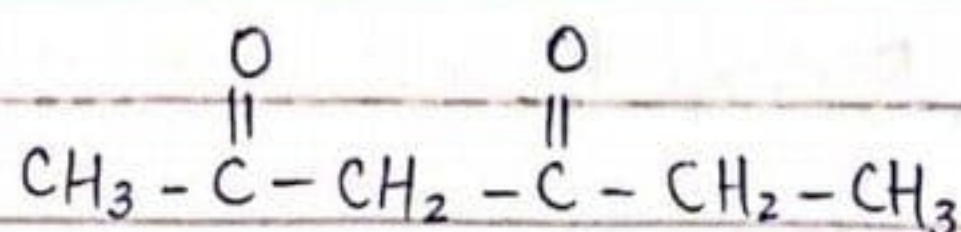


Butyl methyl ketone (C.N)

Pentanal (aldehyde)



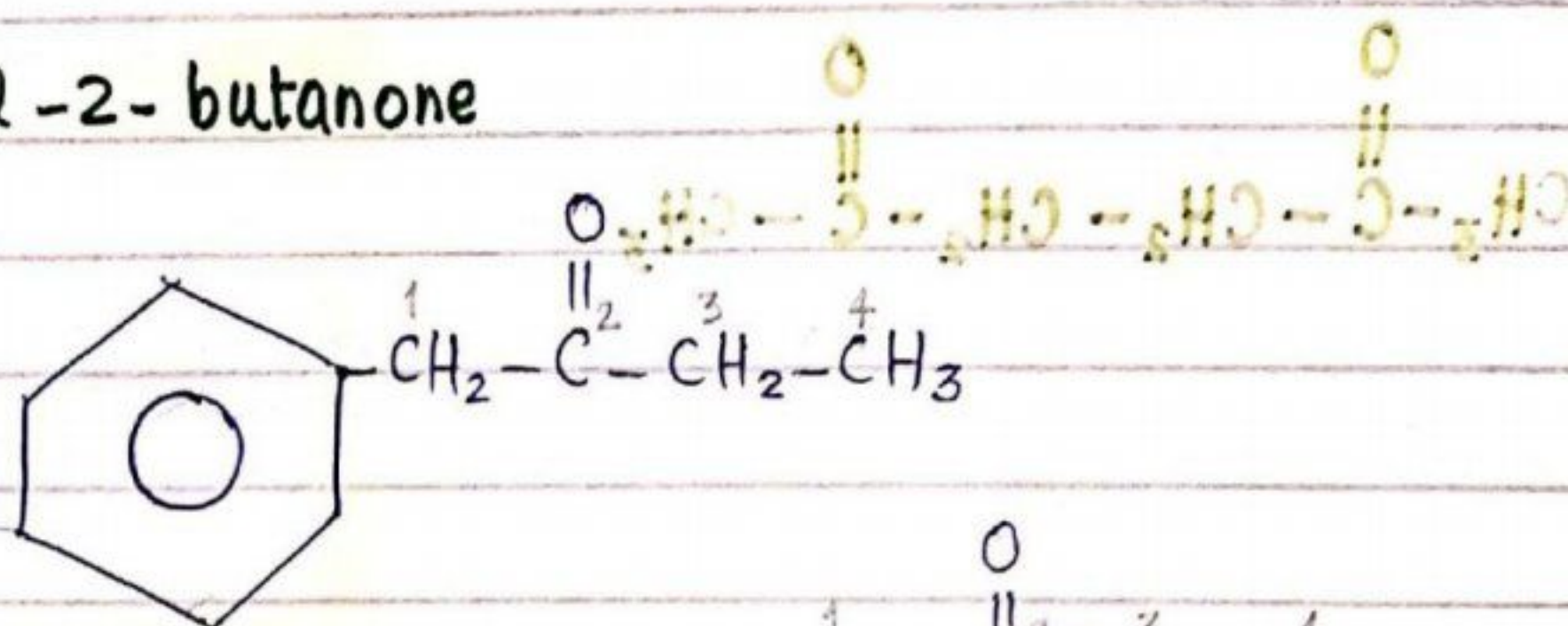
2,4-Hexanedione



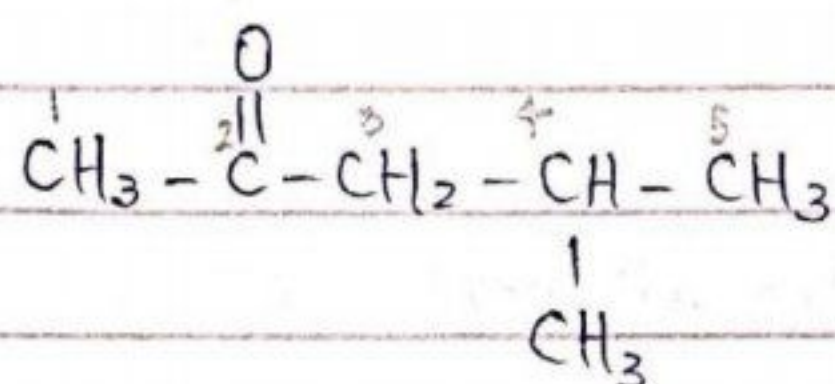
Hexane-2,4-dione (IUPAC)

(no C.Name)

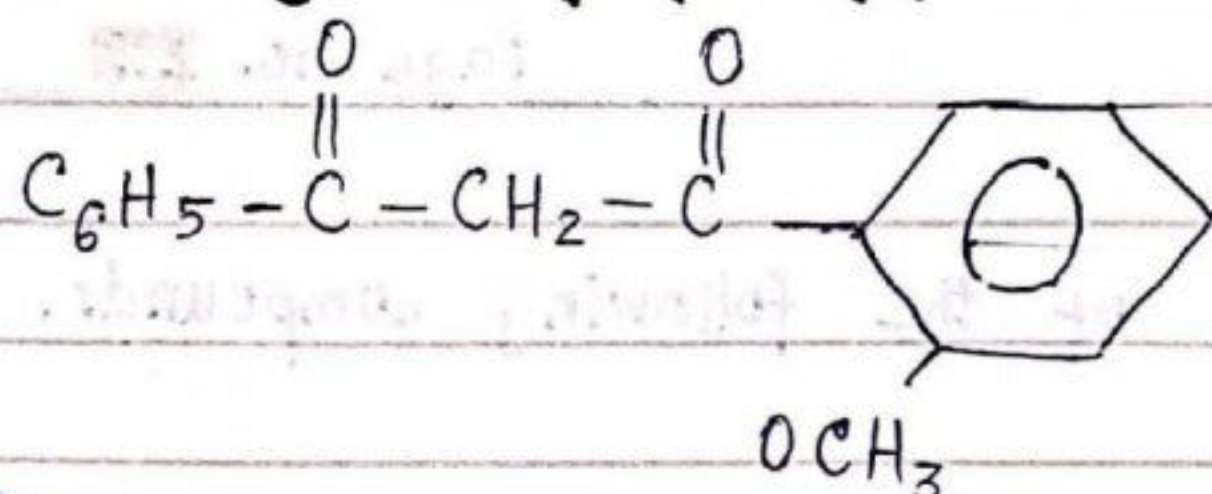
1-phenyl-2-butanone



4-Methyl-2-pentanone

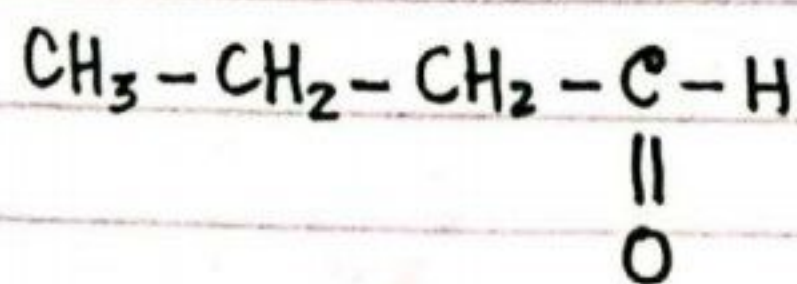


1-phenyl-3-(2-methoxyphenyl)-1,3-propanedione



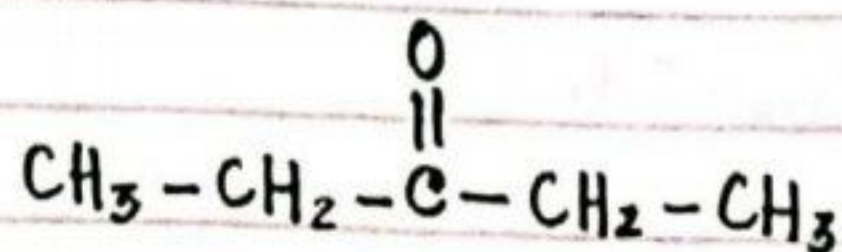
Question 2:-

Give the IUPAC names of the following.



Butanal (IUPAC)

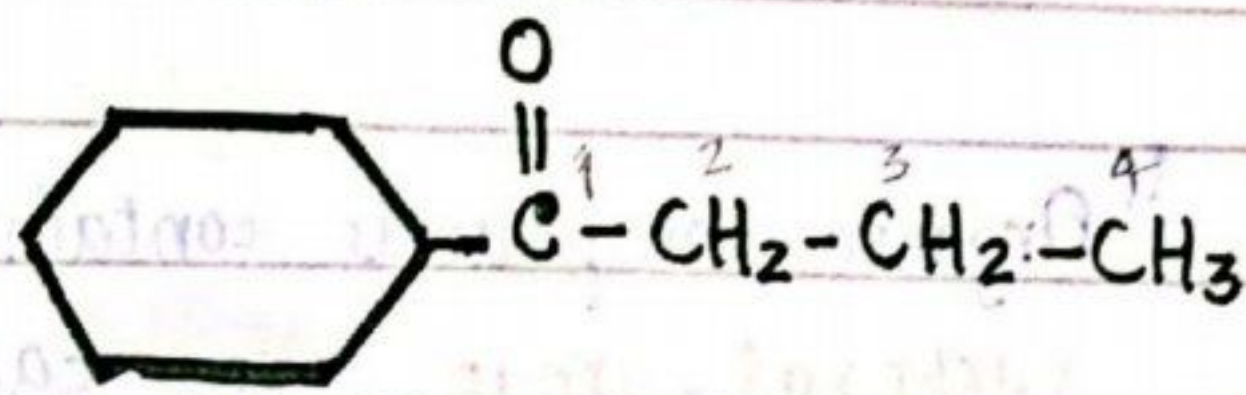
Butyraldehyde (C.N)



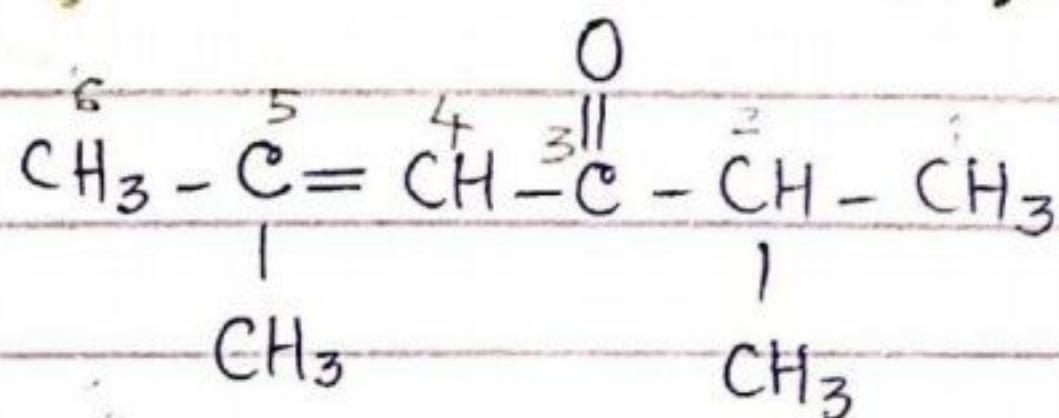
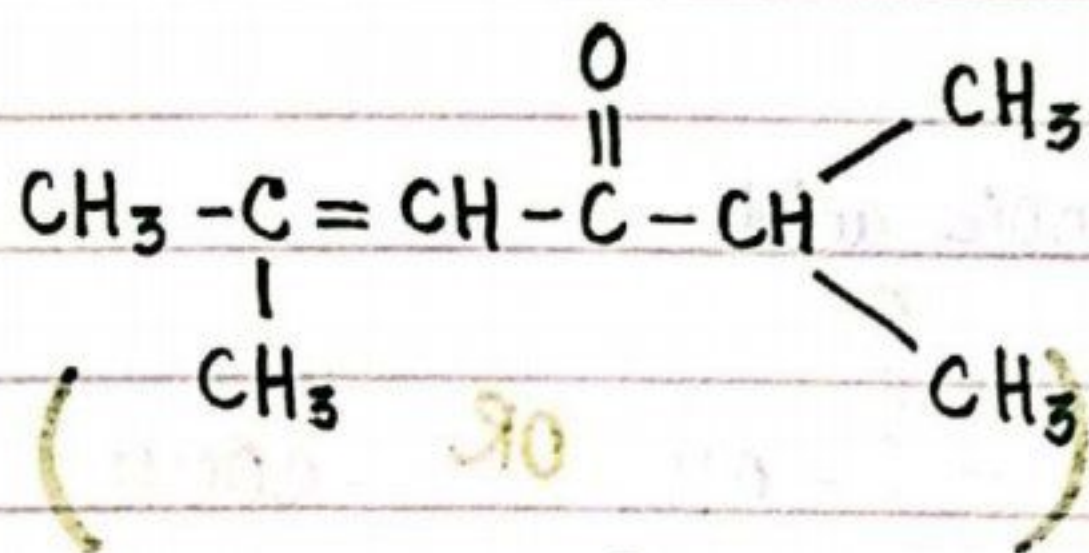
3-Pentanone (IUPAC)

Diethyl ketone (C.N)

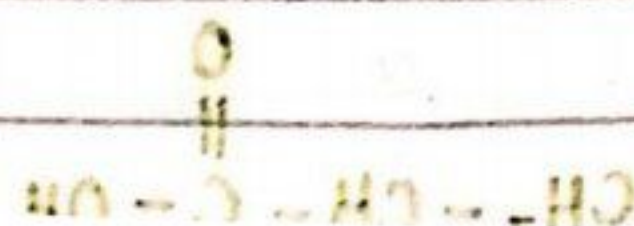
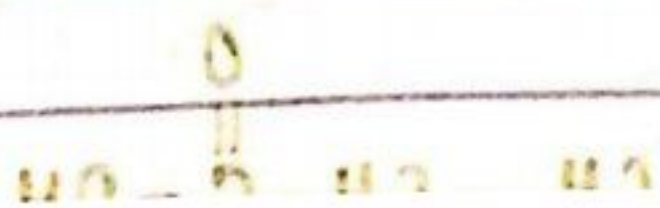
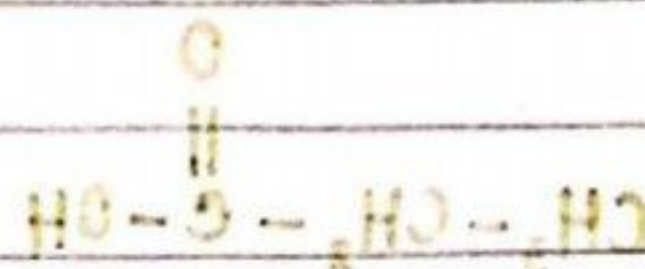
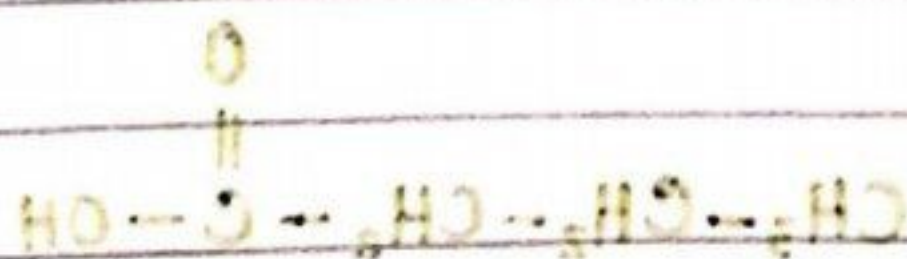
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1-Cyclohexyl butanone (IUPAC)



2,5-Dimethyl-hex-4-ene-3-one (IUPAC)

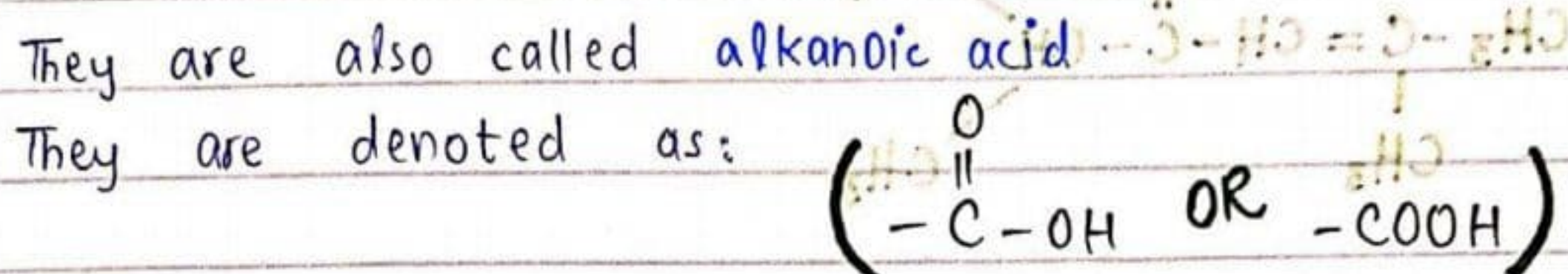


Carboxylic Group

"Organic compounds containing carboxyl-group are called carboxylic acid."

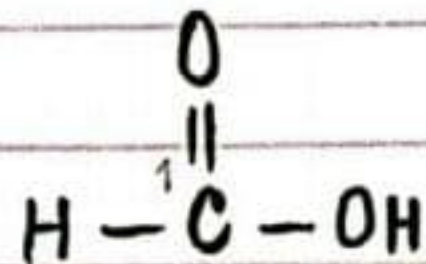
They are also called alkanoic acid

They are denoted as:

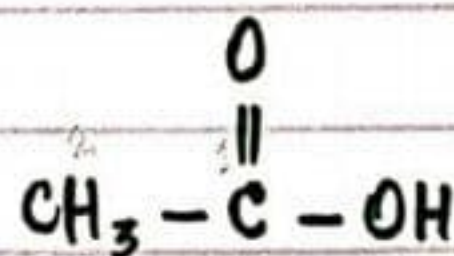


Types:

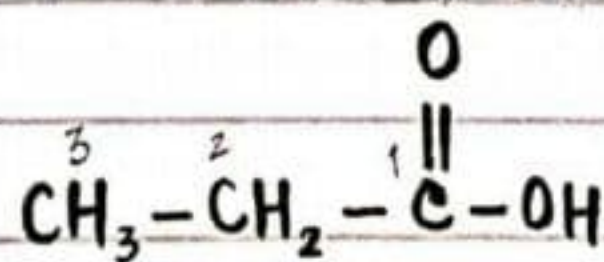
- *- Aliphatic carboxylic acid
- *- Aromatic carboxylic acid



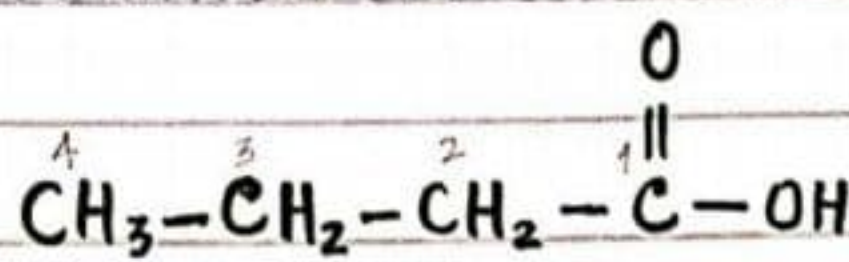
Formic acid (C.N)
Methanoic acid (IUPAC)



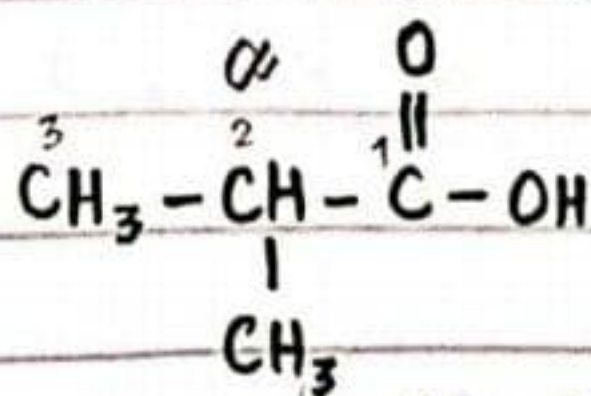
Acetic acid (C.N)
Ethanoic acid (IUPAC)



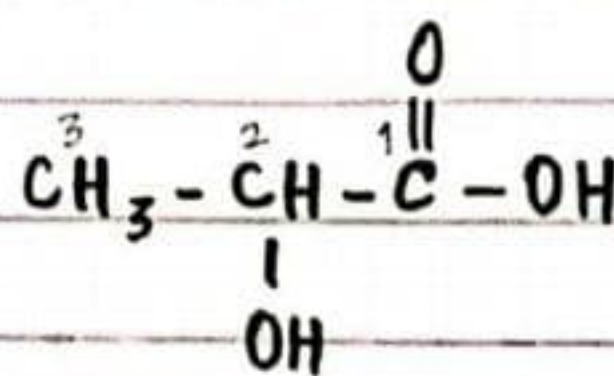
Propionic acid (C.N)
Propanoic acid (IUPAC)



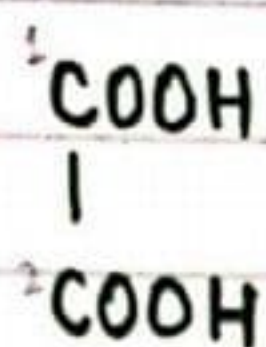
Butyric acid (C.N)
Butanoic acid (IUPAC)



iso-butyric acid
α-Methyl propionic acid (C.N)
2-Methyl propanoic acid (IUPAC)



Lactic acid (C.N)
2-Hydroxy propanoic acid (IUPAC)

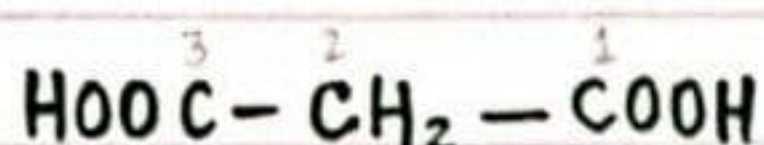


OR



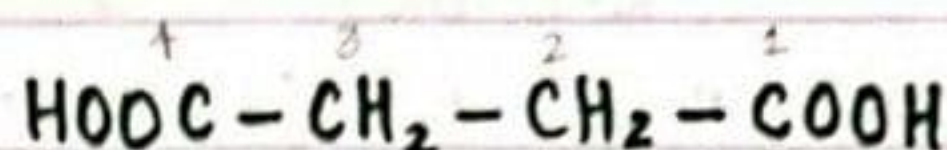
Oxalic acid (C.N)

1,2-Ethane dioic acid (IUPAC)



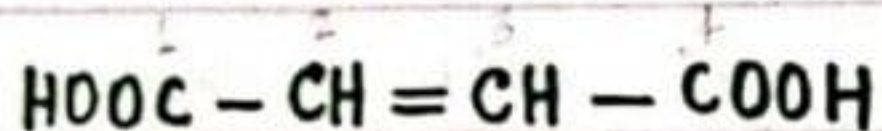
(Malonic acid)

Propane - 1,3-dioic acid



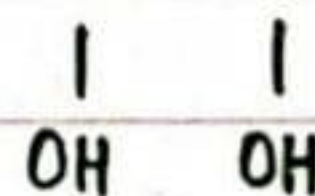
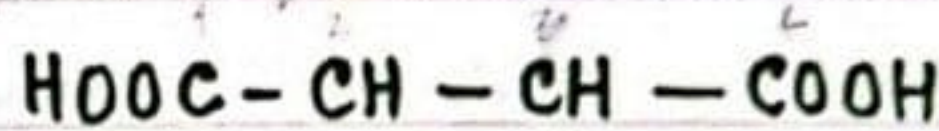
(Succinic acid) (C.N)

Butane - 1,4-dioic acid (IUPAC)



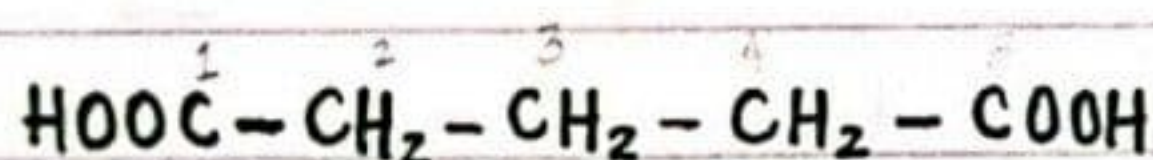
Maleic acid (C.N)

2-Butene - 1,4-dioic acid (IUPAC)



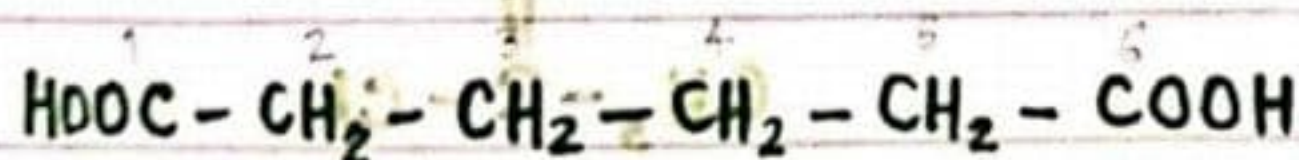
(Tartaric acid) (C.N)

2,3-Dihydroxy butane - 1,4 dioic acid



Glutaric acid (C.N)

Pentane - 1,5-dioic acid (IUPAC)

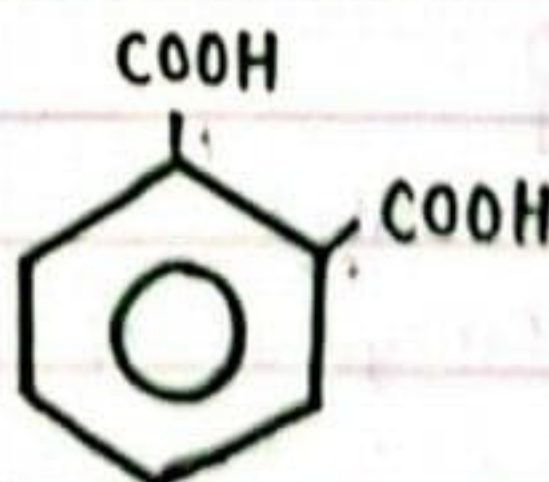


Adipic acid (C.N)

Hexane - 1,6-dioic acid (IUPAC)

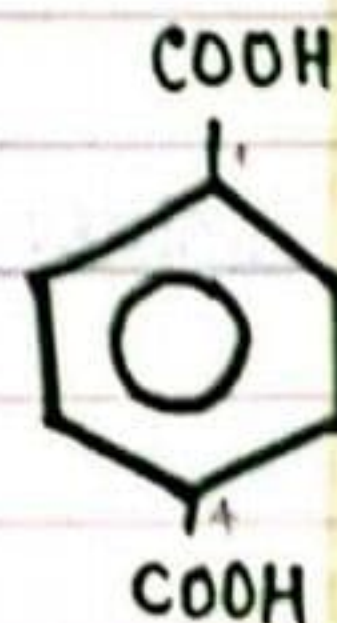


Benzoic acid (C.N)



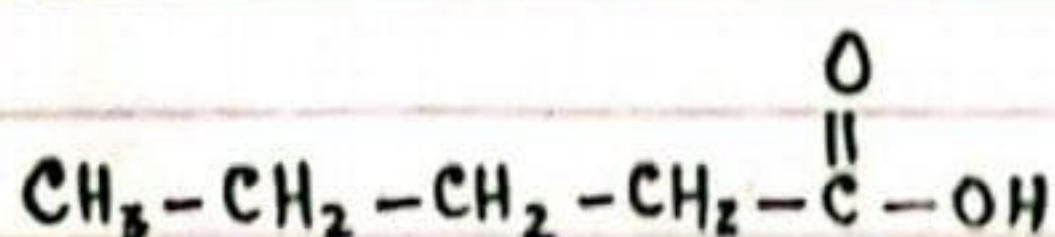
Phthalic acid (C.N)

1,2-Benzene dicarboxylic acid (IUPAC)



Tere-Phthalic acid (C.N)

or
Benzene - 1,4-dicarboxylic acid



Valeric acid (C.N)

Pentanoic acid (IUPAC)

Derivatives Of Carboxylic Acids:-

There are 4 derivatives of Carboxylic acids:-

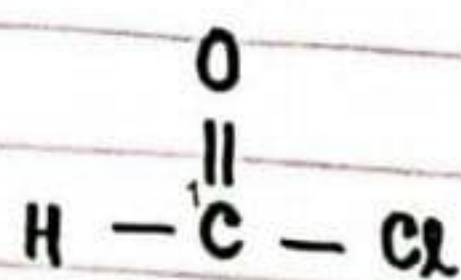
- *- Acid Halides or Acyl halides ($R-\overset{\overset{O}{\parallel}}{C}-X$)
- *- Amides ($R-\overset{\overset{O}{\parallel}}{C}-NH_2$)
- *- Esters ($R-\overset{\overset{O}{\parallel}}{C}-OR$)
- *- Acid anhydrides ($R-\overset{\overset{O}{\parallel}}{C}-O-\overset{\overset{O}{\parallel}}{C}-R$)

*- Acid Halides: ($R-\overset{\overset{O}{\parallel}}{C}-X$)

When OH-group of carboxylic group is replaced by halogen atom (-X) compound formed are called Acid Halides.

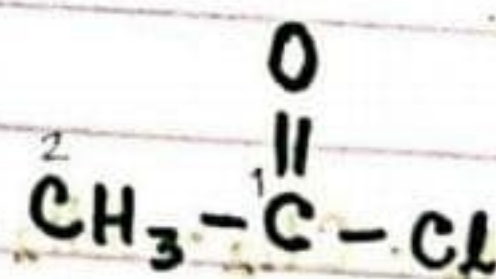
Rule:

carboxyl ic acid $\rightarrow$ yl halide



Formylchloride (C.N)

Methanoylchloride (IUPAC)



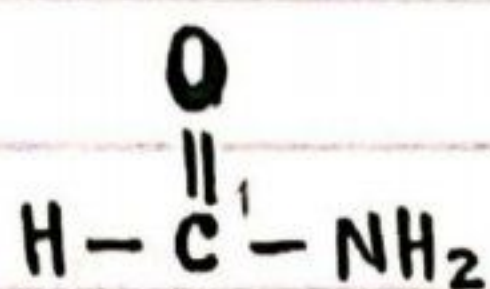
Acetylchloride (C.N)

Ethanoylchloride (IUPAC)

*- Amides:- ($R-\overset{\overset{O}{\parallel}}{C}-NH_2$)

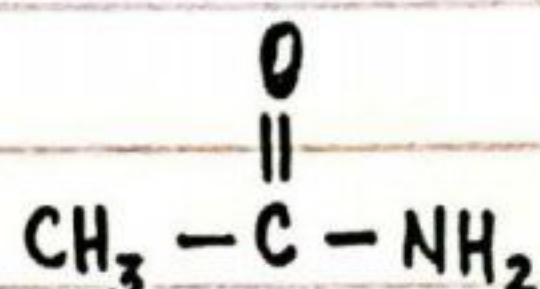
When OH-group of carboxyl group is replaced by amino group (-NH₂) compound formed are called, Amide.

Rule:- (C.N) ic acid $\rightarrow$ amide (For common name)
(IUPAC) oic acid $\rightarrow$ amide (For IUPAC Name)



Formamide (C-N)

Methanamide (IUPAC)

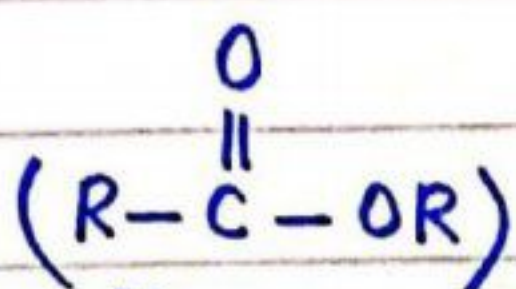


Acetamide (C-N)

Ethanamide (IUPAC)

*-

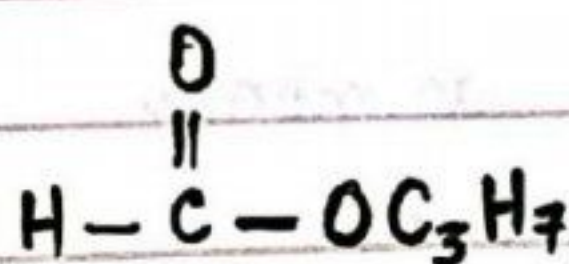
Esters:-



"When H-atom of carboxylic group is replaced by alkyl group (-R), compound formed are called Esters."

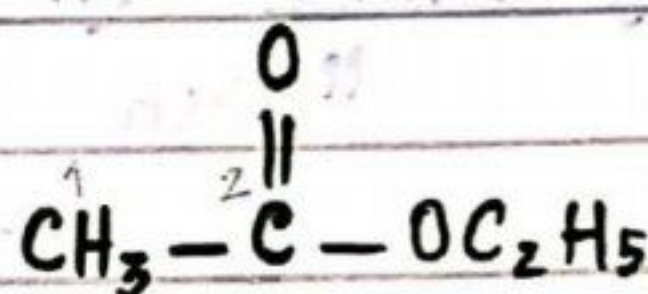
Rule:

carboxylic acid $\rightarrow$ ate



Propyl formate (C-N)

Propyl methanoate (IUPAC)

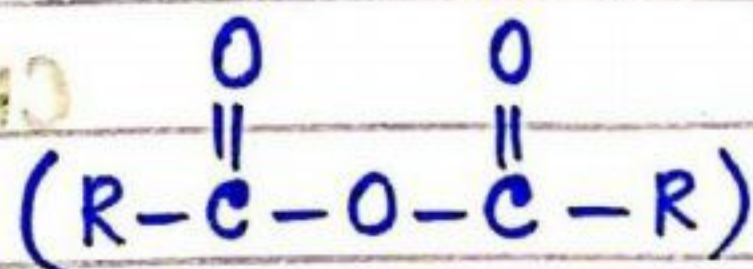


Ethyl ethanoate (C-N)

Ethyl ethanoate (IUPAC)

*-

Acid Anhydrides:-



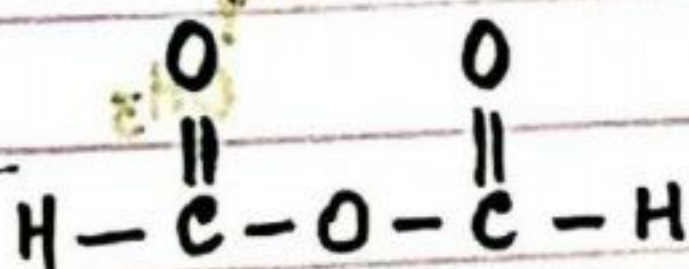
"When two same molecules of carboxyl group is heated, it lose water and form acid anhydrides."

Rule:

Rule:

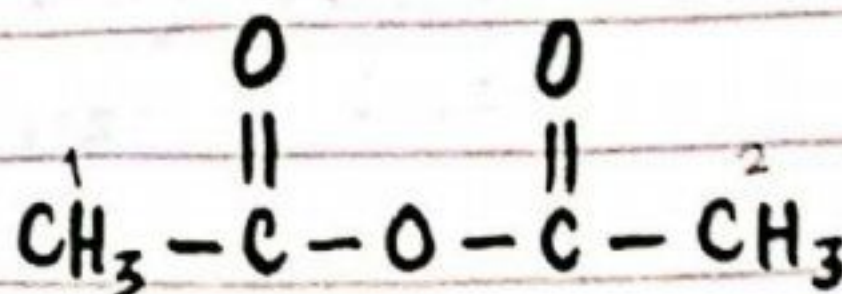
acid

$\rightarrow$ anhydride



Formic anhydride (C-N)

Methanoic anhydride (IUPAC)



Acetic anhydride (C-N)

Ethanoic anhydride

(IUPAC)

Amines

"When H-atom of ammonia (NH_3) is replaced by alkyl group, compound formed are called amines."



Types:

There are 3 types of amines.

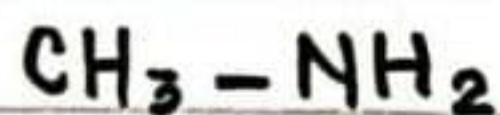
Primary amine

Secondary amine

Tertiary amine

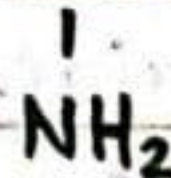
Primary amine ($\text{R}-\text{NH}_2$) :-

"When one H-atom of ammonia is replaced by alkyl group, compound formed are called primary amine."



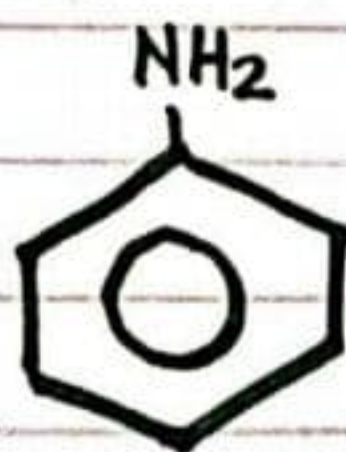
Methyl amine (C.N)

Aminomethane (IUPAC)



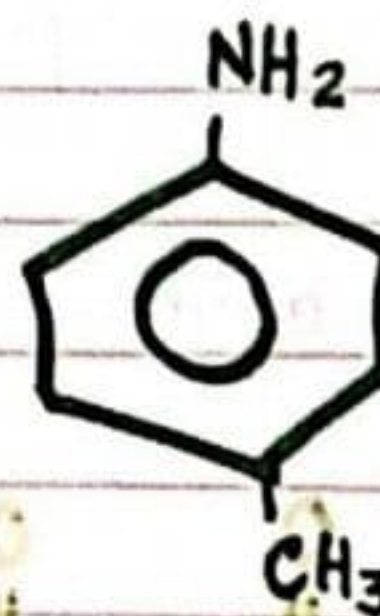
(C.N) Sec-butyl amine

2-Amino butane (IUPAC)



Aniline (C.N)

Amino benzene (IUPAC)

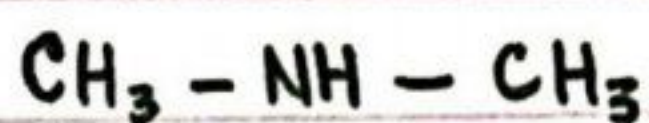


p-Toluidine

(C.N/IUPAC)

Secondary amine :- ($\text{R}-\text{NH}-\text{R}$)

"When 2 H-atom of ammonia is replaced by alkyl group, compound formed are called secondary amine."



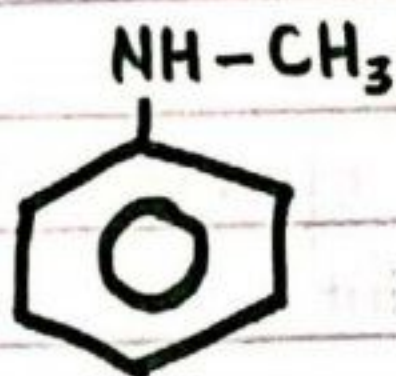
Dimethyl amine (C.N)

N-Methyl amino methane



Ethyl methyl amine (C.N)

N-Methyl aminoethane



Methyl phenyl amine (C.N) ∴

N-Methyl aniline or IUPAC

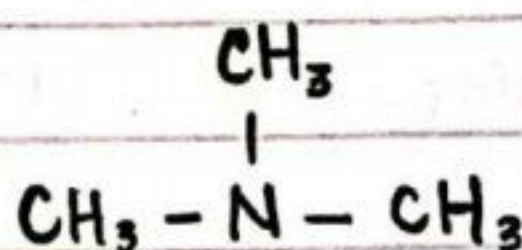
N-Methyl aminobenzene

*-

Tertiary Amine:-

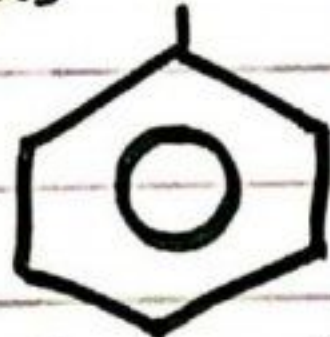
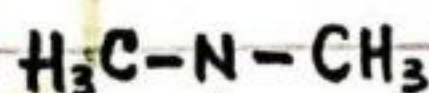


When 3 H-atom of ammonia (NH_3) is replaced by alkyl group, compound formed are called tertiary amine.



Trimethyl amine (C.N)

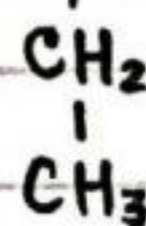
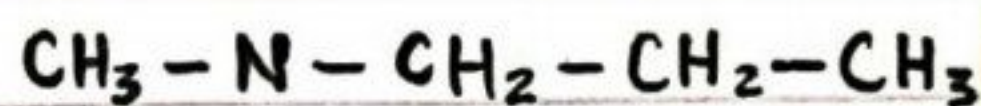
N,N-Dimethyl amino methane (IUPAC)



Dimethyl phenyl amine (C.N)

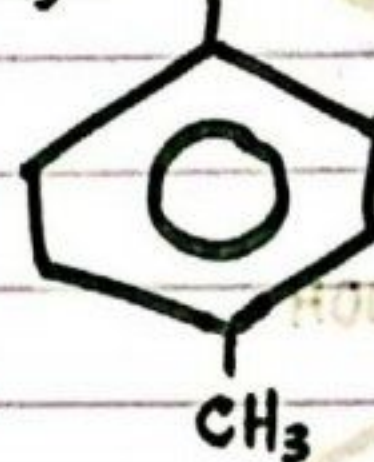
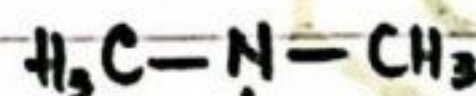
N,N-Dimethyl aniline (IUPAC)

OR
N,N-Dimethyl amino benzene



(C.N) Ethyl methyl propyl amine

N-Ethyl-N-methyl amino propane

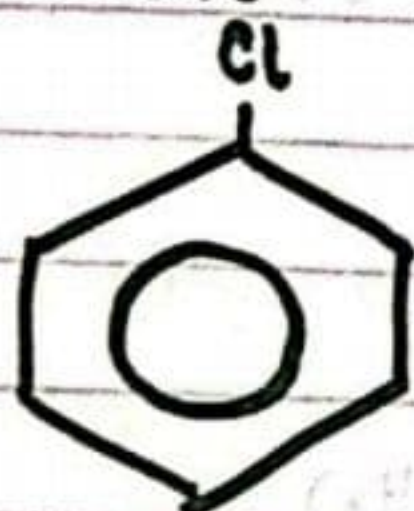


N,N-Dimethyl P-toluidine (IUPAC)

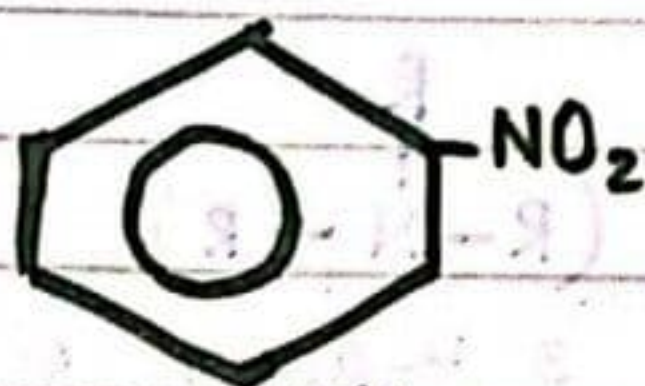
Benzene

pakcity.org

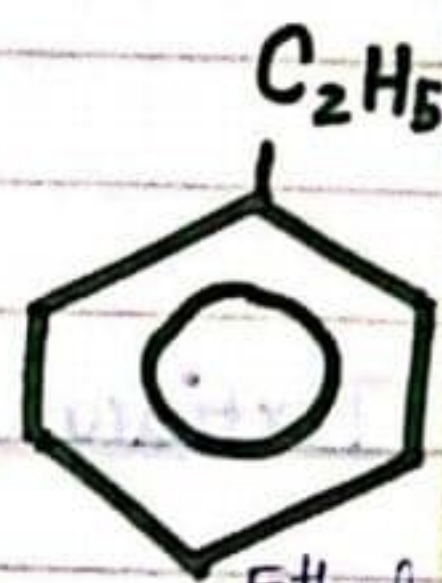
- 1- Mono substituted derivatives of benzene are named by prefixing the name of substituted to the word 'benzene'



Chlorobenzene

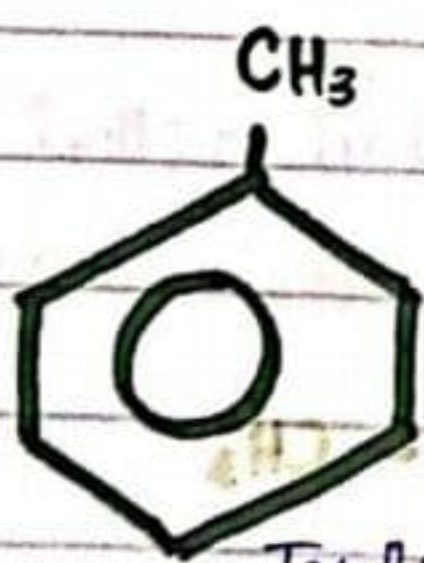


Nitrobenzene

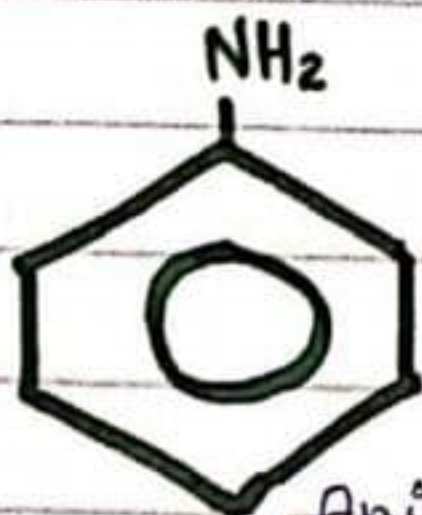


Ethyl benzene

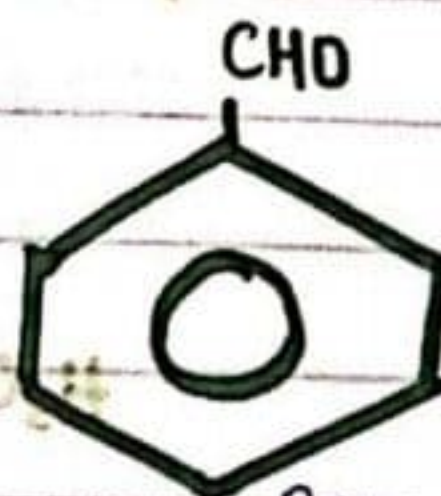
- 2- Many aromatic compounds have been known by their trivial / common names, as well as they are retained by IUPAC.



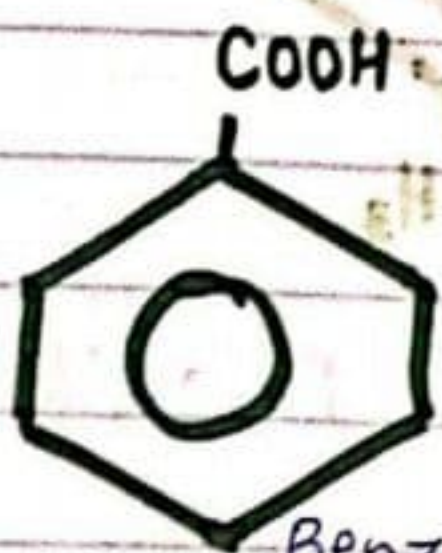
Toluene



Aniline



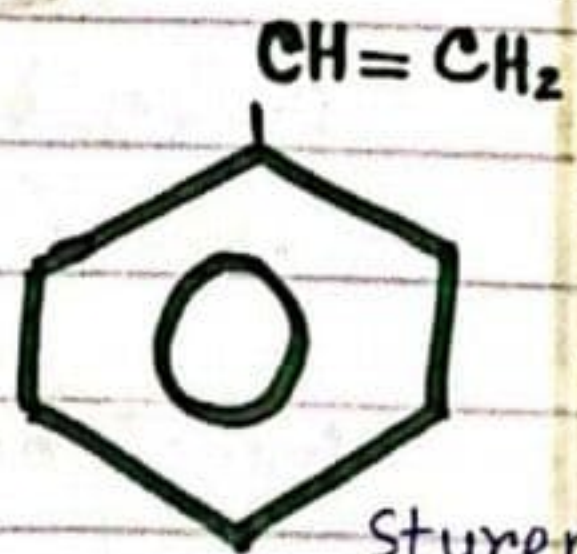
Benzaldehyde



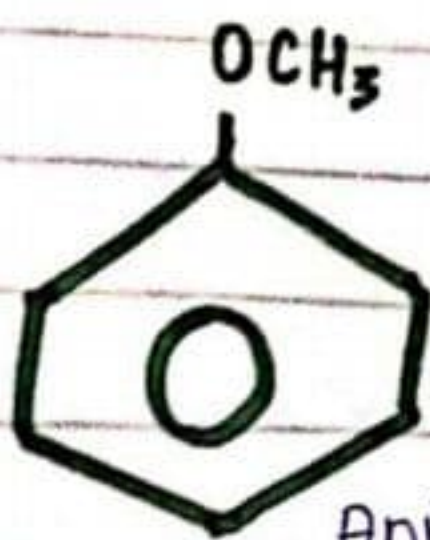
Benzoic acid



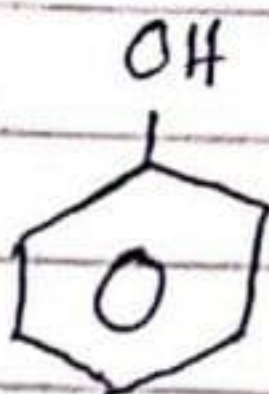
Cumene



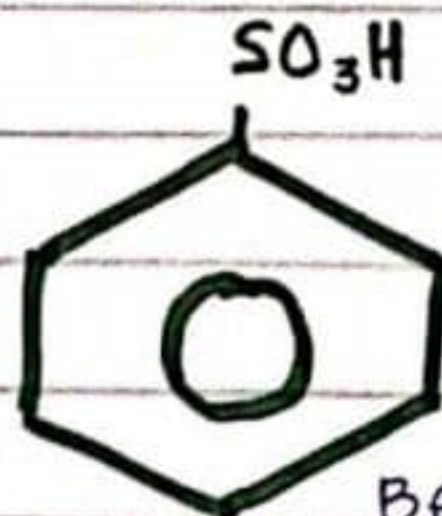
Styrene



Anisole

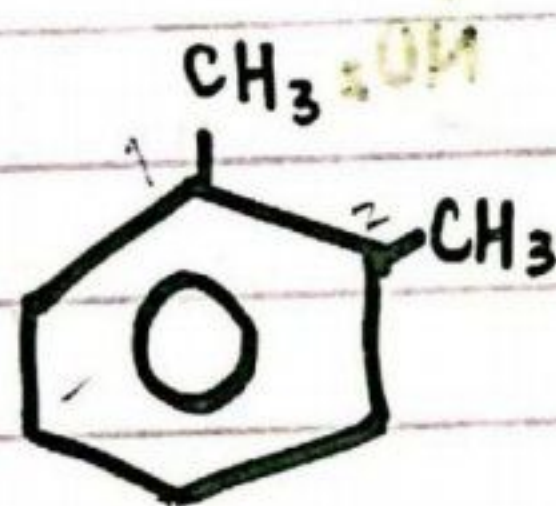
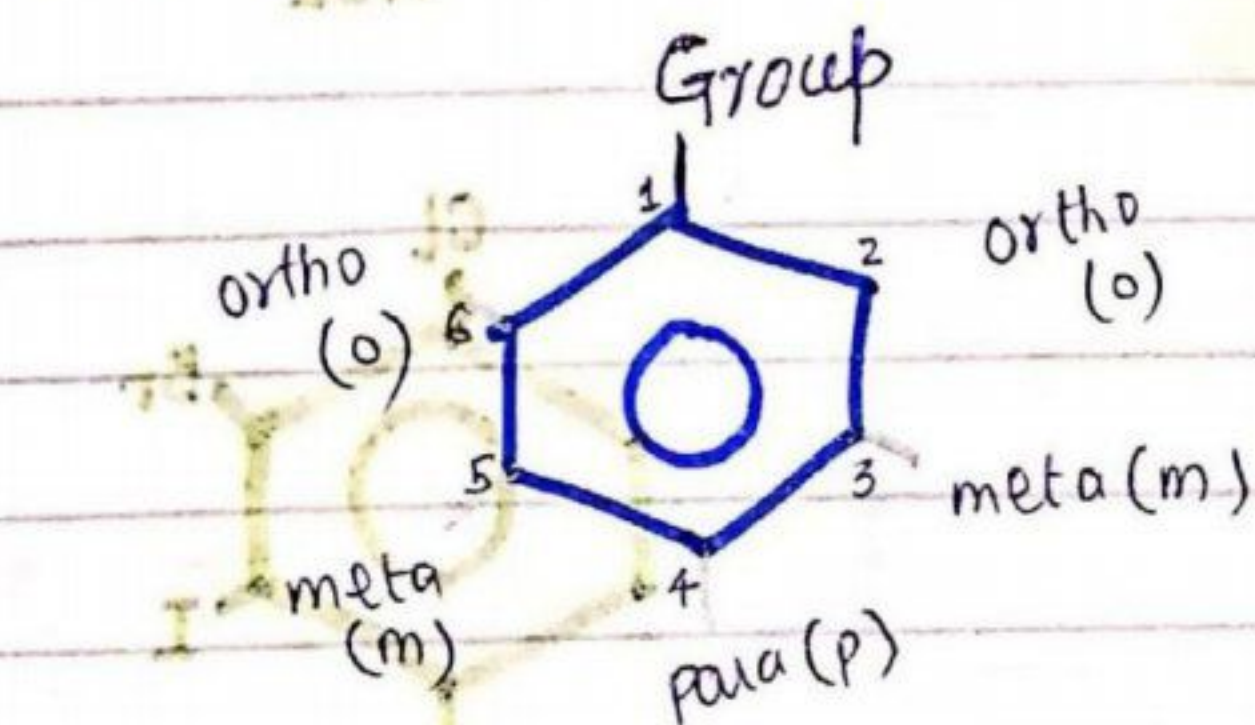


Phenol
(Carbolic acid)



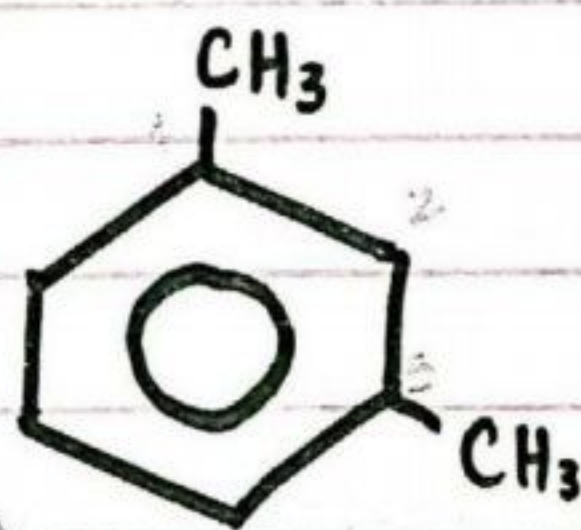
Benzene sulphonic acid

- 3- When there are 2 substituents on benzene ring their relative positions are indicated by prefixes, like; ortho (o), meta (m), para (p) in common naming system. And by numerals while naming acc. to IUPAC system.



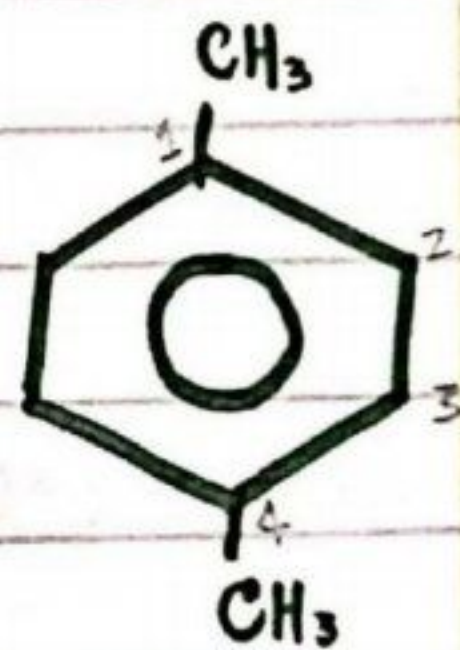
1, 2 - Dimethyl benzene

O - Dimethyl benzene
(O - Xylene)



1, 3 - Dimethyl benzene

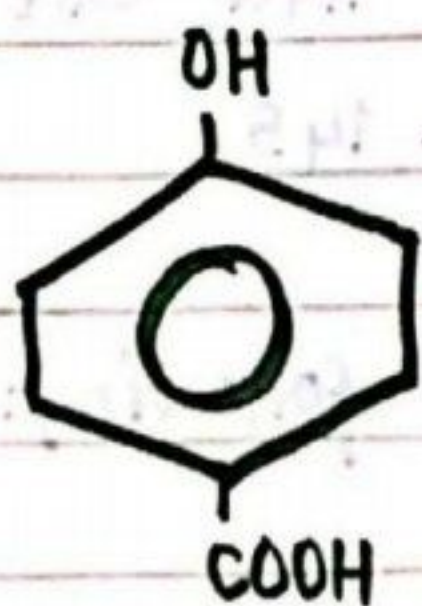
m - Dimethyl benzene
(m - Xylene)



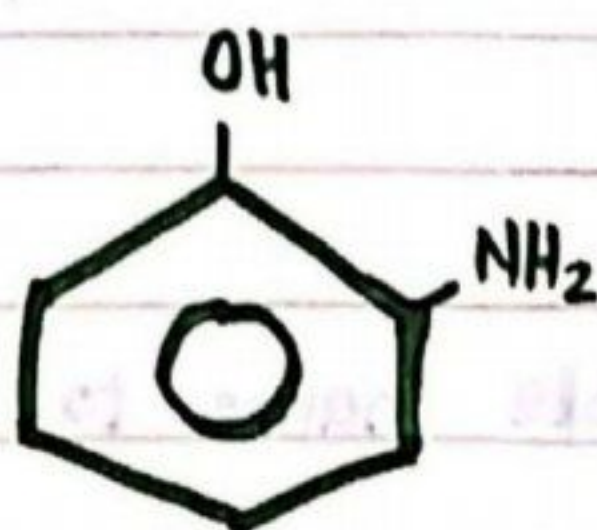
1, 4 - Dimethyl benzene
(IUPAC)
p - Dimethyl benzene
(p - Xylene)

4- Priority order of different functional group:-

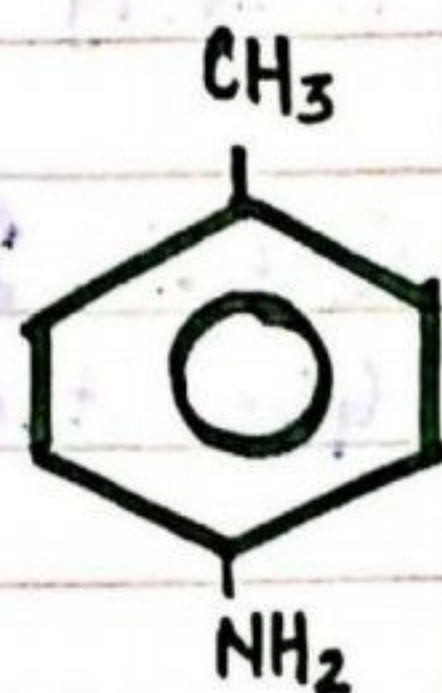
$-\text{COOH}$, $-\text{SO}_3\text{H}$, $-\text{C}\equiv\text{N}$, $-\text{C}(=\text{O})-\text{H}$, $-\text{C}(=\text{O})-\text{R}$, $-\text{OH}$, $-\text{NH}_2$, $-\text{OR}$, $-\text{R}$



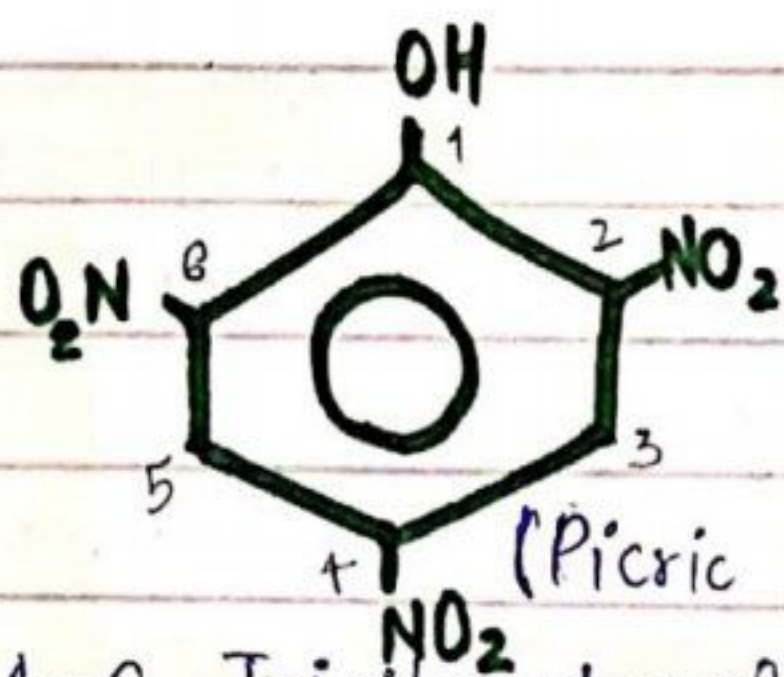
p - Hydroxybenzoic acid
OR
4 - Hydroxybenzoic acid



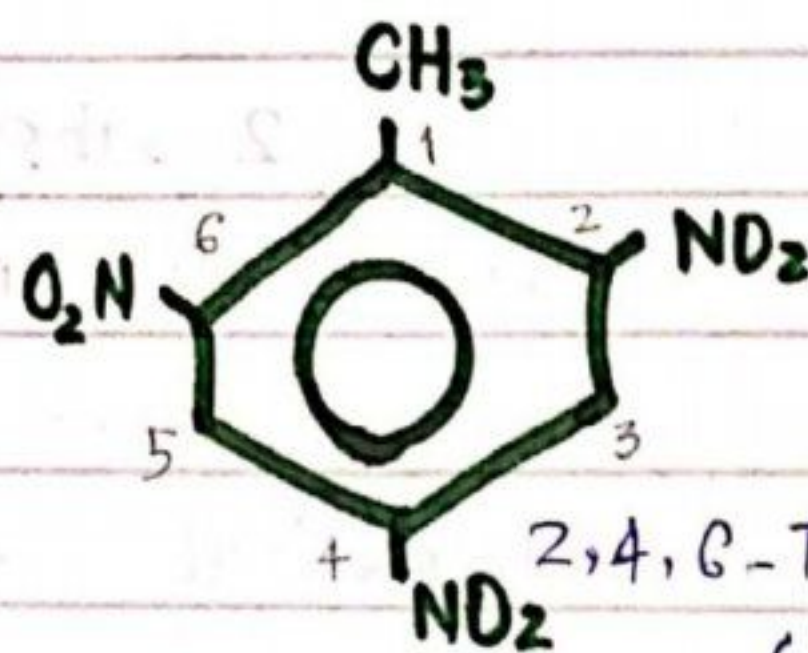
O - Aminophenol
OR
2 - Aminophenol



p - Methyl aniline
OR
4 - Methyl aniline

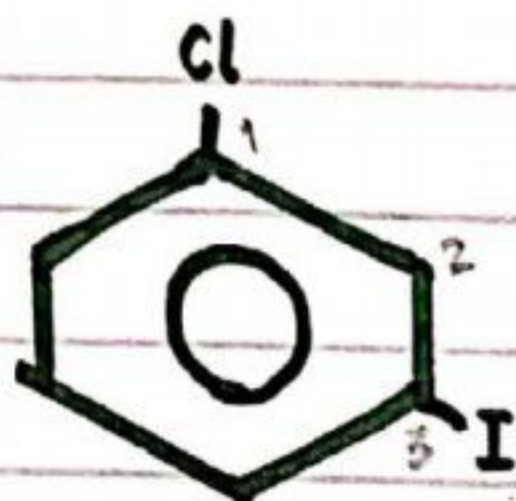


(Picric acid) (C₆H₃N₃O₇)
2,4,6-Trinitrophenol (IUPAC)

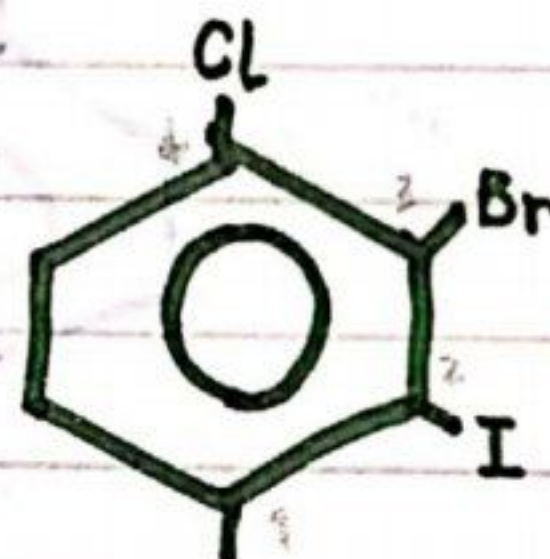


(IUPAC)

2,4,6-Trinitrotoluene
(TNT)

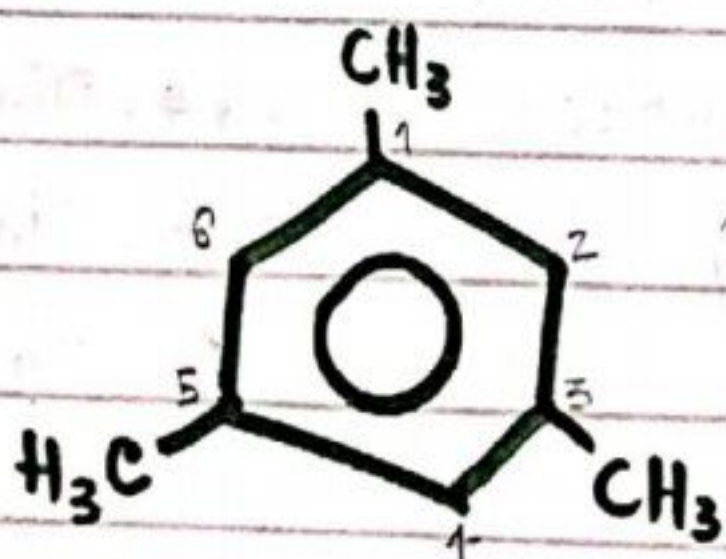


3-Chloriodobenzene (IUPAC)



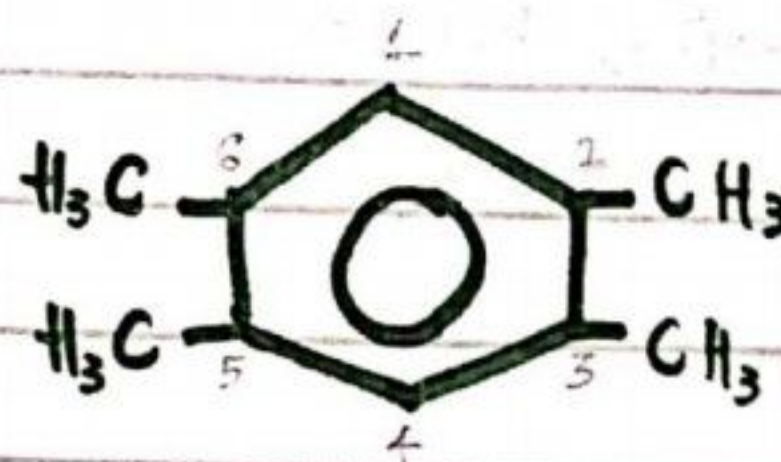
3-Bromo-4-chloro-2-iodo-nitrobenzene

5- Some polysubstituted benzene are:-



(Mesitylene) (C₆H₃CH₃)

1,3,5-Trimethylbenzene (IUPAC)



(Durene) (C₆H₂CH₃)

1,2,4,5-Tetramethylbenzene

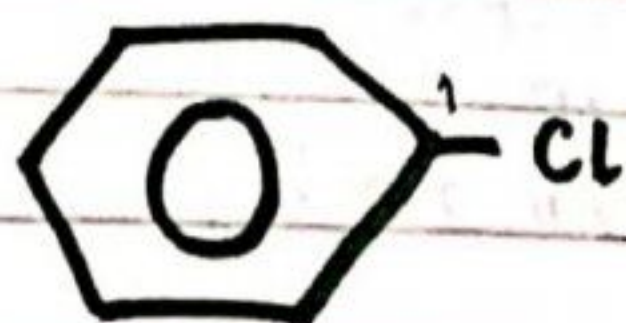
Activity

Chapter # 16 Hydrocarbons.

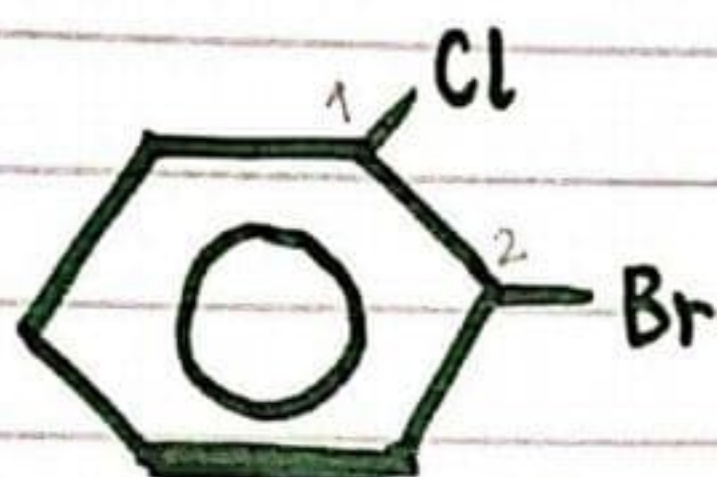
Page no.

Question 1:-

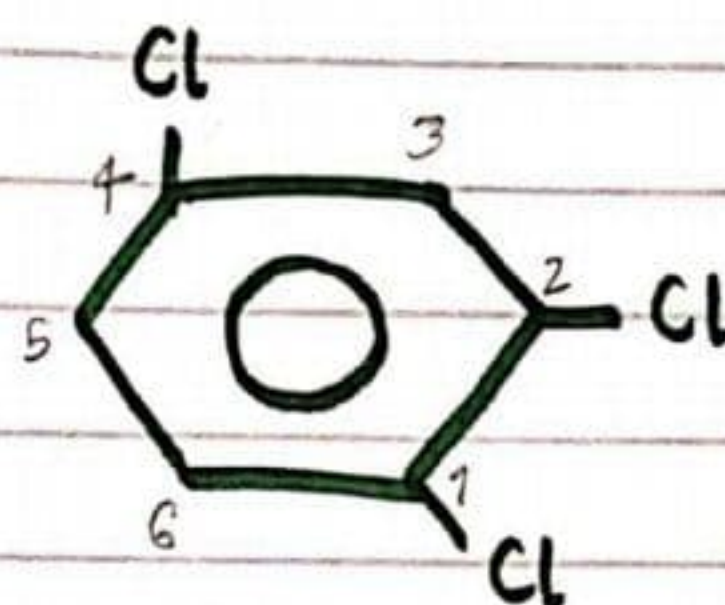
Give the suitable name to each of the following:



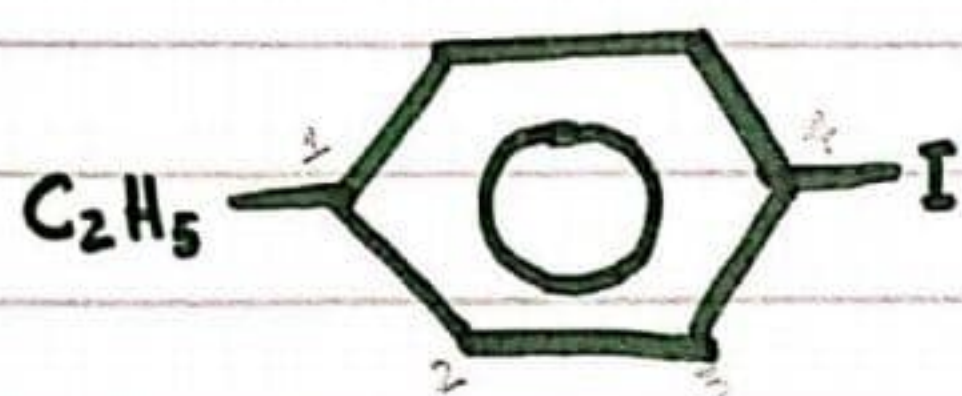
1-Chlorobenzene



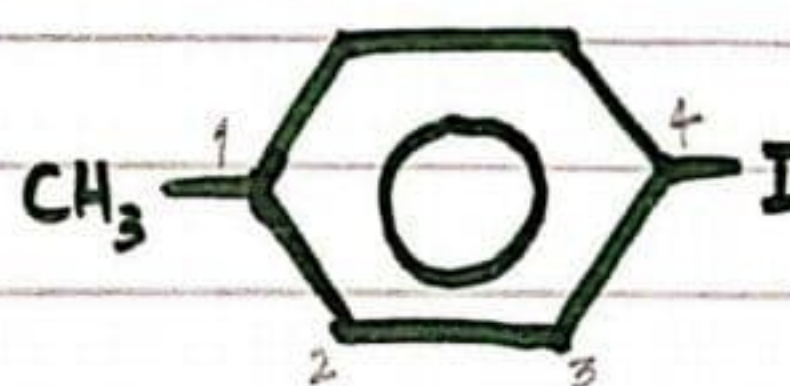
2-Bromochlorobenzene



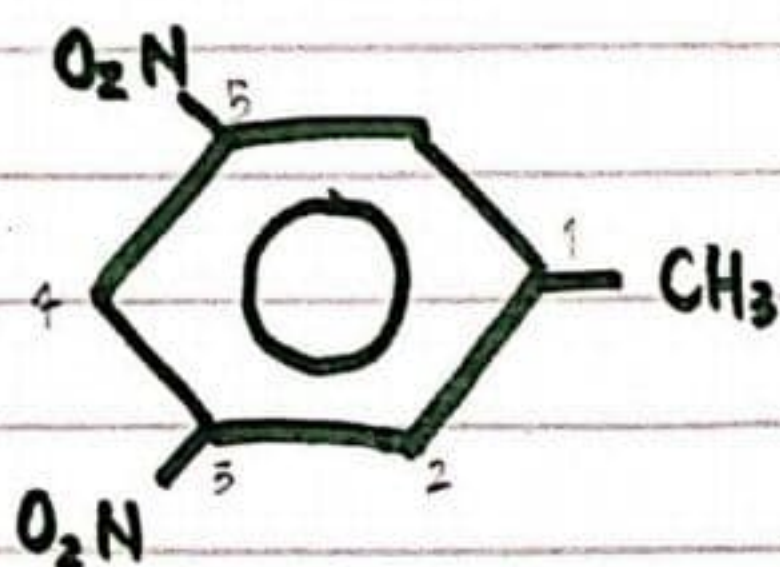
1,2,4-Trichlorobenzene



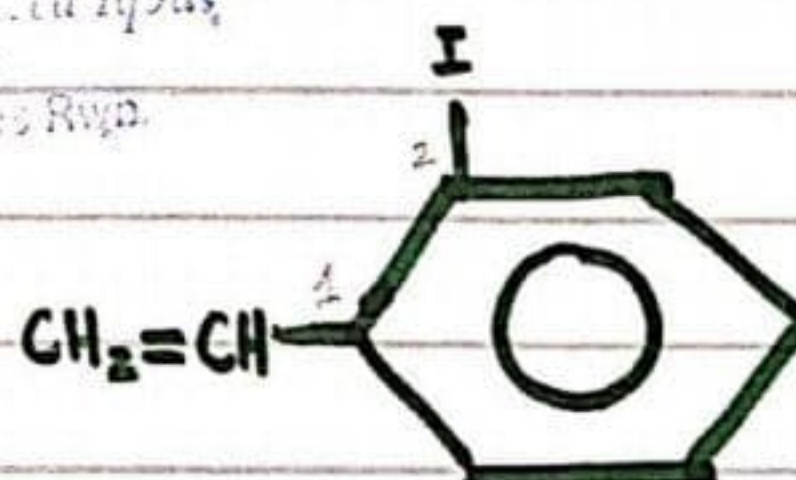
4-Iodoethylbenzene



4-Iodotoluene



3,5-Dinitrotoluene



2-Iodostyrene