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Organic Chemistry is the study of compds. containing carbon.

C
3 isotope

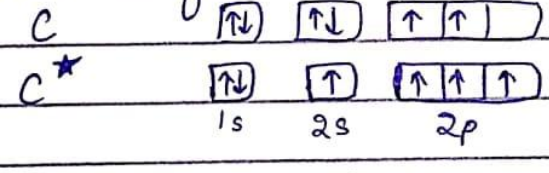
$^{12}_{6}C$ — 98.8 %. — A = 12 — Z = 6

$^{13}_{6}C$ — 1.1 %

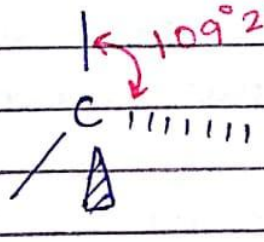
$^{14}_{6}C$ — 0.001 % — half life = 5730 yrs

Characterstic of C :-

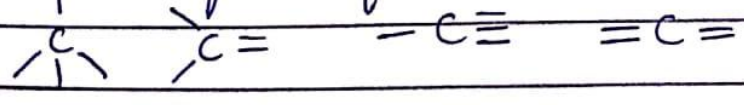
1. Tetravalent : C form 4 bond in excited state.



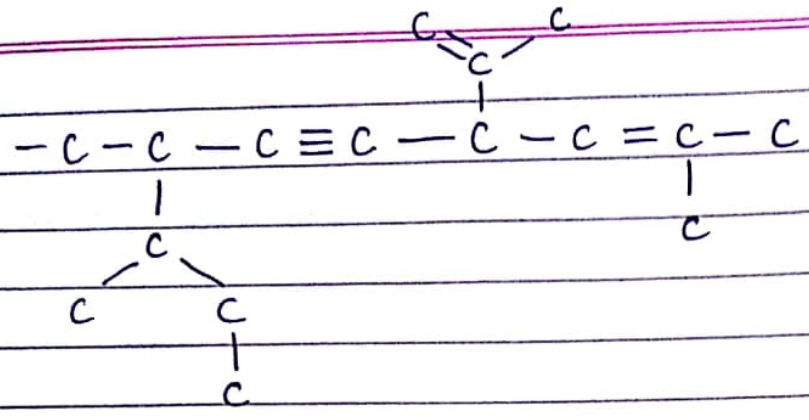
2. Tetrahedral : 4 bonds are directed towards corner of ~~of~~ tetrahr~~ed~~-on.



3. Tendency to form multiple bond :

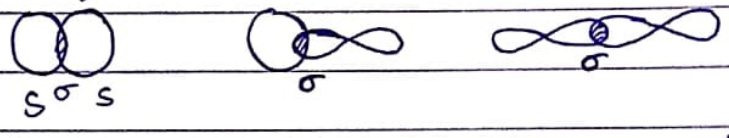


4. Catenation : Self linking property of C to form long chain.

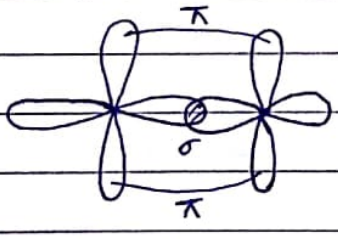


5. Hybridisation :-

σ bond : It is formed by coaxial overlapping of atomic orbitals.

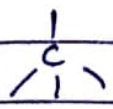


π-bond : formed by colateral / sidewise overlapping of atomic orbitals.



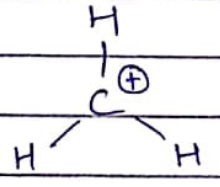
Note :- (1) σ bond is stronger than π-bond becoz extent of overlapping is more in σ bond.

(2) π-bond is more reactive than σ-bond.

Str.	σ, π bond	hyb.	B.A.	Shape
	4, 0	sp^3	109° 28'	tetrahedral
	3, 1	sp^2	120°	trigonal planar
$-C\equiv$	2, 2	sp	180°	linear
$=C=$	2, 2	sp	180°	linear

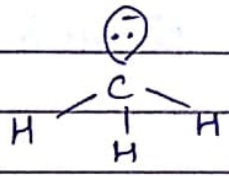
S.No. = no. of σ bond + no. of lp.

CH_3^+



sp^2

CH_3^-



sp^3

E.N. ∝ % S-Char

	sp	sp^2	sp^3
% s char	1/2 × 100 = 50%	1/3 × 100 = 33.3%	1/4 × 100 = 25%

E.N. → sp (3.25) > sp^2 (2.75) > sp^3 (2.5)

B.L. ∝ 1/E.N. $sp < sp^2 < sp^3$

B.S. ∝ E.N $sp > sp^2 > sp^3$

or

B.S. ∝ 1/B.L

Ques Find hyb. of underlined C ?

1. $CH_3-\underset{\underset{OH}{|}}{\underline{C}H}-CH_2-\underset{\underset{sp^2}{|}}{\underline{C}H}=CH_2$ ($\underline{C}H$: sp^3)

2. $CH_3-CH_2-\underline{C}\equiv N$ ($\underline{C}$: sp)

3. $CH_3-CH=CH-\underset{\underset{sp^3}{|}}{\underline{C}H_2}-\underset{\underset{O}{||}}{\underline{C}}-CH_3$ ($\underline{C}H_2$: sp^3; $\underline{C}$: sp^2)

4. $CH_3-\underset{\underset{O}{||}}{\underline{C}}-CH_2-\underline{C}OOH$ ($\underline{C}$: sp^2; $\underline{C}OOH$: sp^2)

5. $CH_3-\underset{\underset{OH}{|}}{\underline{C}}=CH-\underline{C}H_2-Cl$ ($\underline{C}$: sp^2; $\underline{C}H_2$: sp^3)

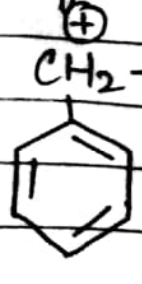
Ques Find hybridisation of C-C single bond

$HC\equiv\underset{\underset{sp}{|}}{\underline{C}}-\underset{\underset{sp^2}{|}}{\underline{C}H}=CH_2$

Ques Find hyb. of C_2 & C_3 in following

$HC\overset{6}{\equiv}\overset{5}{C}-\overset{4}{C}H_2-\underset{\underset{sp^3}{|}}{\overset{3}{C}H_2}-\underset{\underset{sp^2}{|}}{\overset{2}{H}C}=\overset{1}{C}H_2$

Ques Find hyb. of carbonium ion ?



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Ques find no. of σ & π-bond in following?

1. $CH_3-CH_2-CH_2-OH$ — 11σ

2. $CH_3-CH_2-CH=CH_2-OH$ — 13σ, 1π

3. CH_3-CH_2-CN — 8σ, 2π

4. CH_3-CHO — 6σ, 1π

5. CH_3-COOH — 7σ, 1π

6. $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-COOH$ — 12σ, 2π

7. $CH_3-\underset{\underset{OH}{|}}{C}=CH-COOH$ — 12σ, 2π

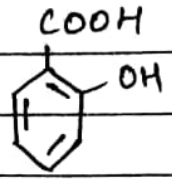
NIT
8. $CH_2=CH-C\equiv CH$ — 7σ, 3π

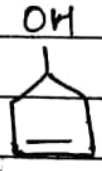
NIT
9. $CH\equiv C-CH_2-C\equiv C-CH_3$ — 11σ, 4π

ANIMS
10. $CH_2=CH-CH_2-CN$ — 9σ, 3π
allyl cyanide

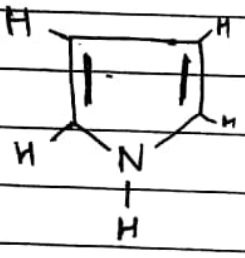
IIT
11. Toluene  — 15σ, 3π

DEC
12. Styrene  — 16σ, 4π

13.  $16\sigma, 4\pi$

14.  14σ ~~σ~~, 1π

15.  23σ, 2π

16.  10π, 2π

Ques Arrange following in ↑ing order of B.L.?

x y z

① $\underset{sp}{CH\equiv CH}$ $\underset{sp^3}{CH_3-CH_3}$ $\underset{sp^2}{CH_2=CH_2}$

B.L. $\propto \frac{1}{E.N}$

$y > z > x$

② $\underset{sp}{CH\equiv C\overset{a}{-}H}$ $\underset{sp^3}{CH_3-CH_2\overset{b}{-}H}$ $\underset{sp^2}{CH_2=CH\overset{c}{-}H}$

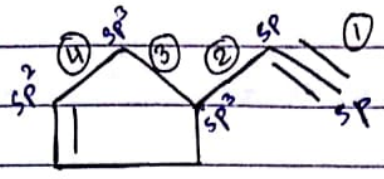
$b > c > a$

③ $CH_3\overset{\alpha}{-}CH=CH_2$ $CH_3\overset{\beta}{-}C\equiv CH$ $CH_3\overset{\gamma}{-}CH_2-CH_2$

$\gamma > \alpha > \beta$

IIT

(4)



~~2 = 3 > 4 > 1~~

3 > 4 > 2 > 1

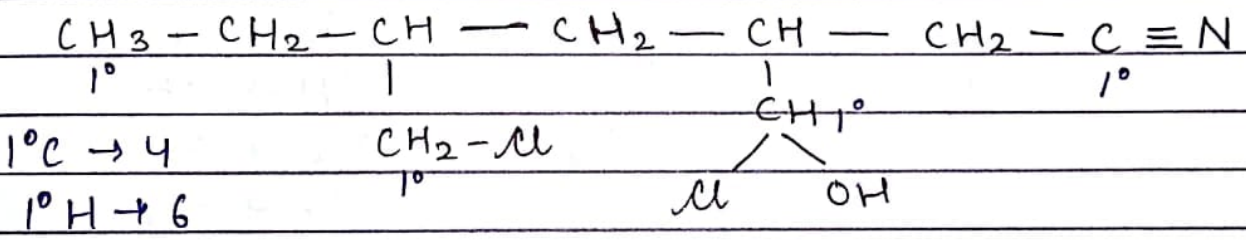
B.S. ① > ② > ④ > ③

Type of Carbon and Hydrogen :-

1. Primary Carbon & Primary Hydrogen :-

1°C → C which is attached to only 1° carbon.

1°H → H which is attached to only 1° C.



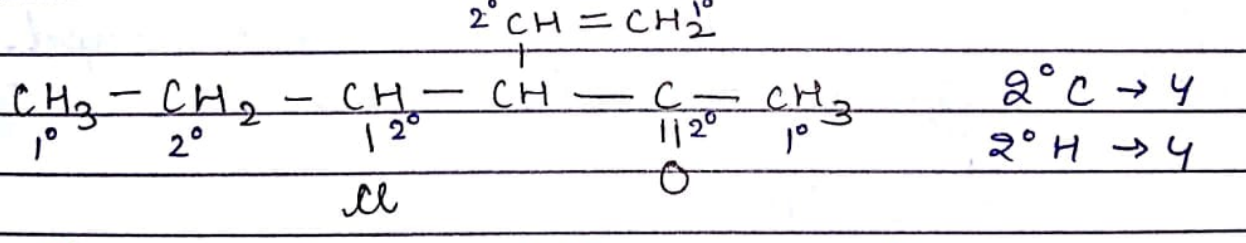
1°C → 4

1°H → 6

2. Secondary Carbon & Secondary Hydrogen :-

2°C → C which is attached to 2° carbon

2°H → H which is attached to 2° C.



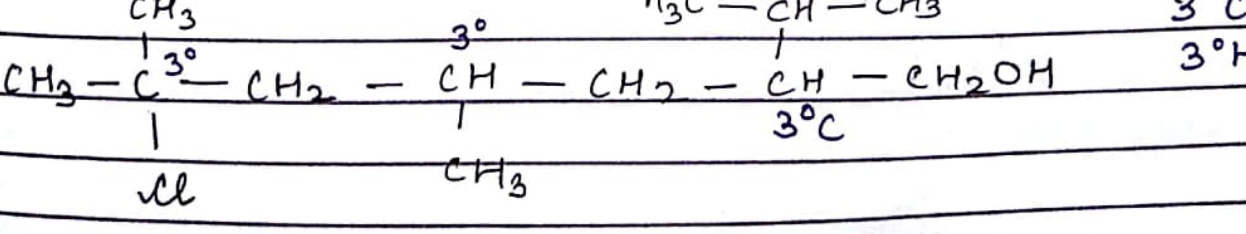
2°C → 4

2°H → 4

3. Tertiary Carbon & Tertiary Hydrogen :-

3°C → C which is attached to 3 carbon.

3°H → H which is attached to 3° C.

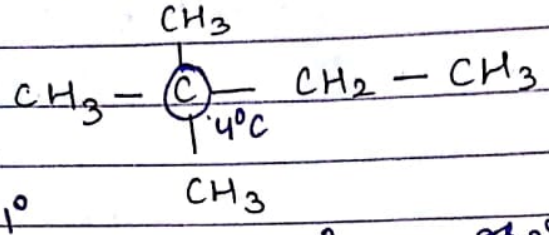


3°C → 4

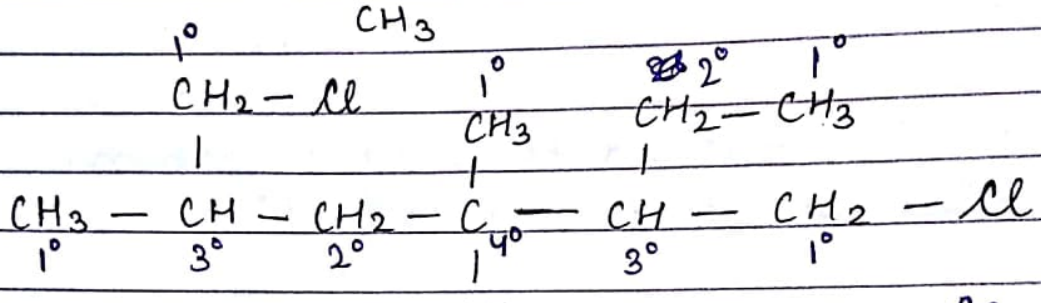
3°H → 3

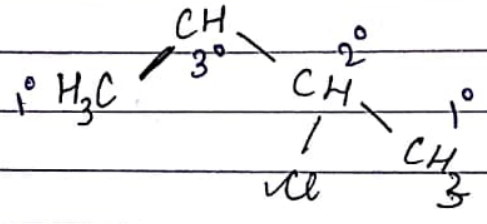
4. Quaternary Carbon :-

4°C → Carbon which is attached to 4 carbon atom



ex





1°C → 7C
1°H → 19H
2°C → 3C
2°H → 5H
3°C → 3
3°H → 3
4°C → 1

Type of Alcohol :-

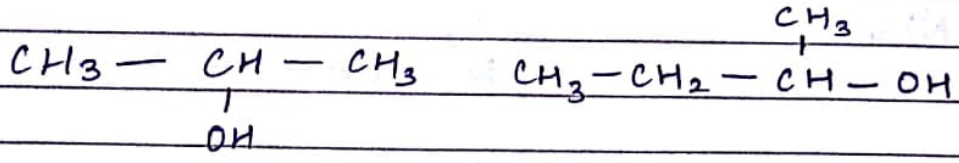
1. Primary Alcohol :- (1° OH) The alcoholic compd. in which OH gp. is attached to 1°C.

CH_3-CH_2-OH

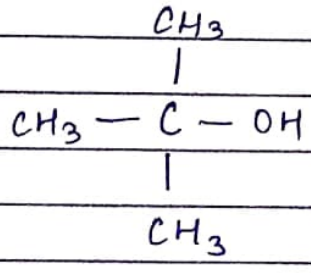
$CH_3-CH_2-CH_2-OH$

CH_3-OH

2. Secondary Alcohol : The compd in which OH gp. is attached to 2°C.

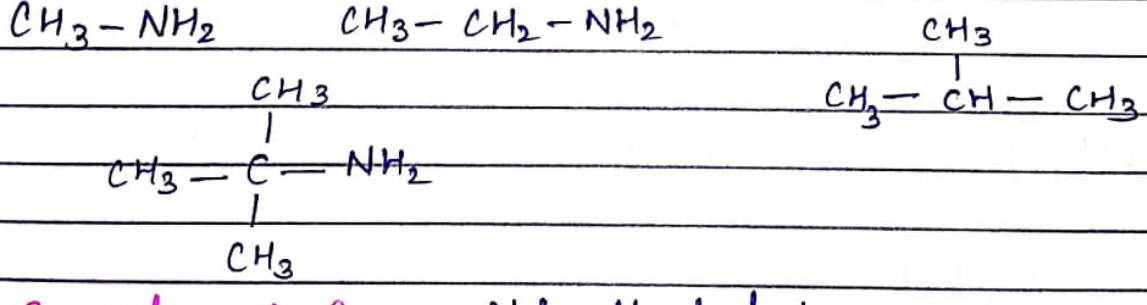


3. Tertiary Alcohol : The alcoholic compd. in which OH gp is attached to 3°C

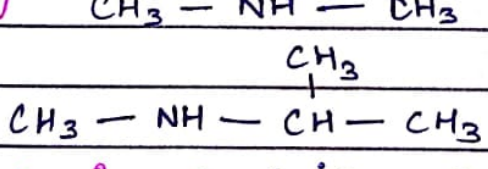


Type of Amine :-

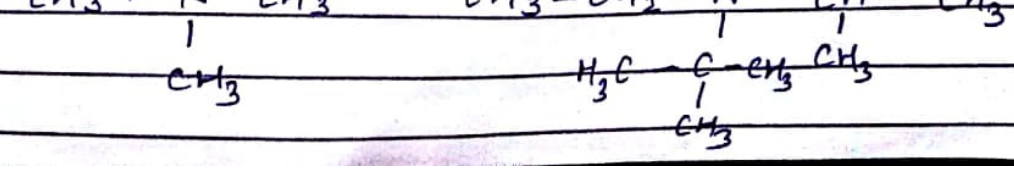
1. Primary Amine : N is attached to only 1 C atom.



2. Secondary Amine :- N is attached to 2 C atom.



3. Tertiary Amine :- ~~In which~~ N is attached to 3 C atom.



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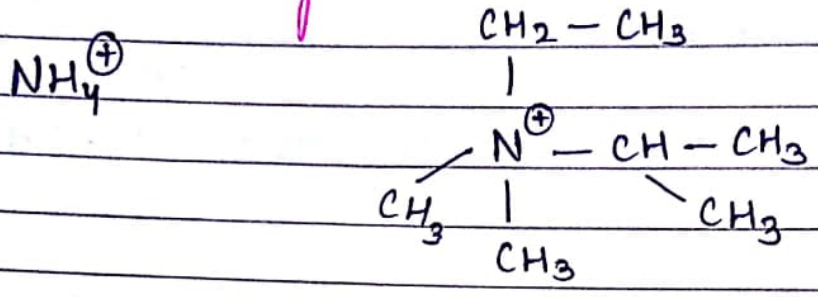
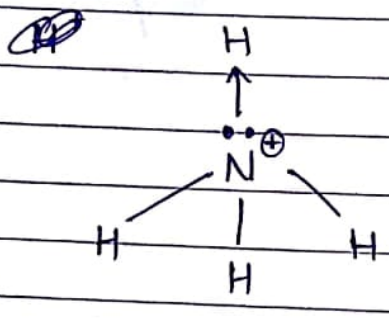
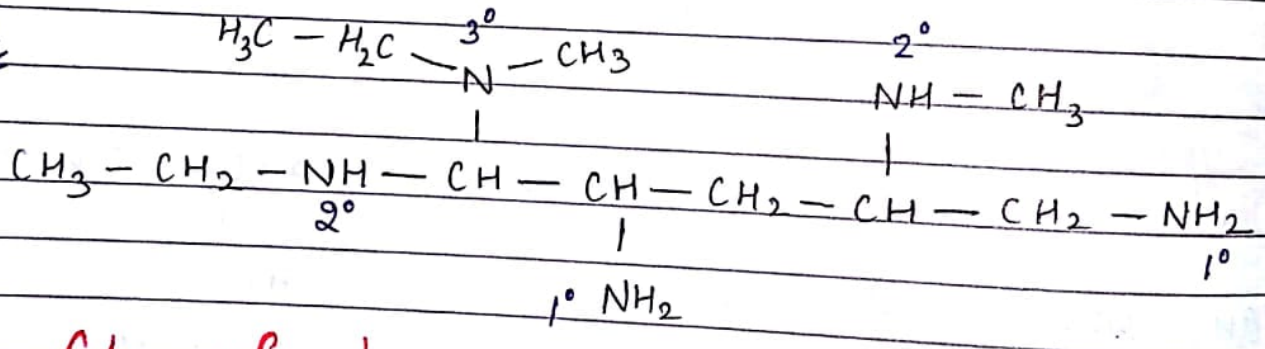
4. Quaternary amine : N is attached to 4C atom.





ex



Classification and Nomenclature

Classification :-

1. Based on structure
2. Based on Group
3. Based on Homologous

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① Based on structure :-

- **Open chain / aliphatic / acyclic**
  - **Saturated** — C–C
    - + alkanes
    - C_nH_{2n+2}
    - Paraffins
    - $CH_3-CH_2-CH_3$
    - $CH_3-\overset{\overset{O}{\|}}{C}-OH$
    - $CH_3-CH=O$
  - **Unsaturated**
    - $C=C$ — Olifinic bond — alkene — C_nH_{2n}
    - $C\equiv C$ — acetylinic bond — alkyne — C_nH_{2n-2}
- **Closed chain / Cyclic**
  - **Homocyclic**
    - alicyclic
    - aromatic
  - **Heterocyclic**
    - **Alicyclic**
    - **Aromatic**
      - Pyridine
      - Pyrole

Ques Which of the following is unsaturated compo

1. C_3H_8 ×
2. CH_3-CHO ×
3. CH_3-COOH ×
4. C_3H_4
5. $CH_3-CH_2-CH_2-OH$

6. $CH_3 - CH = CH - CH_3$

7. $CH_3 - \underset{\underset{O}{\|}}{C} - NH_2$

8. $CH_3 - \underset{\underset{O}{\|}}{C} - O - CH_3$

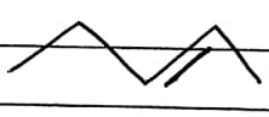
9. $CH_3 - C \equiv CH$

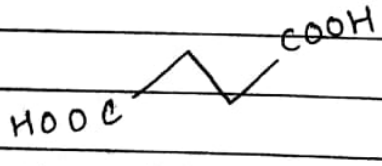
10. $CH_3 - CH_2 - \underset{\underset{\underset{O}{\|}}{C - O - CH_3}}{\overset{|}{CH}} - CH_3$

11. $CH_3 - CH_2 - CH = \underset{\underset{Cl}{|}}{C} - CH_3$

12. $CH_3 - CH_2 - CH_2 - NH_2$

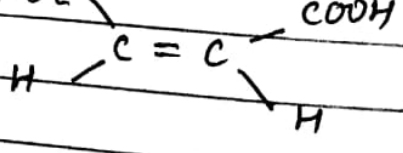
13. $CH_3 - CH = CH - CH_2 - NH - CH_3$

14. 

15. 

16. $CH_2 = CH$

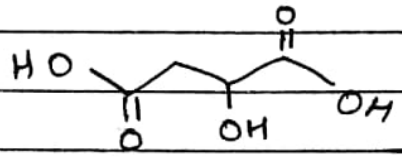
Ques Which of the following is unsaturated?

1. Maleic acid 

2. Succinic acid $\begin{matrix} CH_2 - COOH \\ | \\ CH_2 - COOH \end{matrix}$

3. Malonic acid $CH_2(COOH)_2$

4. acetic acid CH_3-COOH

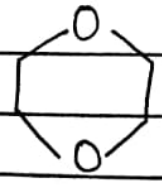
5. Malic acid 

A :- Acetic acid is not an unsaturated compd. ✓
R :- acetic acid do not have olefinic ~~comp~~ bond. (2)

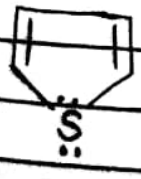
A :- acetic acid is saturated compd. ✓
R : acetic acid have $-\overset{\overset{O}{\|}}{C}-$ bond. ✓ (2)

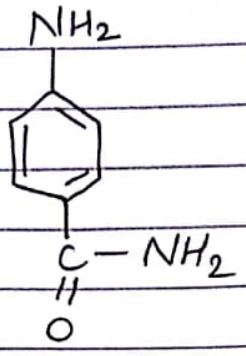
A : acetic acid have $-\overset{\overset{O}{\|}}{C}-$ bond.
R : acetic acid is saturated compd. (2)

Ques find no. of heteroatoms in following ?

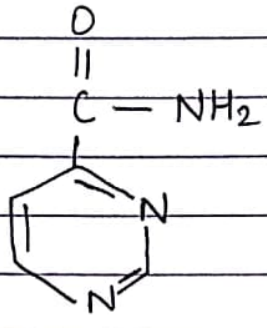
(1)  2

2.  1

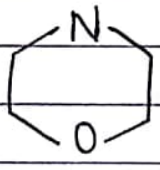
3.  1

4. 

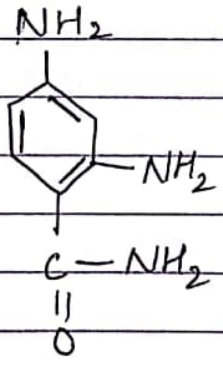
O

5. 

2

6. 

2

7. 

O

(2) Classification based on Group :-

$R-H \xrightarrow[-H]{+G_1} R-G_1$

Hydrocarbon → hyd-radical → G1

phy. property: B.P., M.P. & density etc

func^n gp. → chemical property

- $-OH$
- $-NH_2$
- $-X$
- $-COOH$
- $-CH=O$

Pentyl = amyl

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Hydrocarbon Radical (R–) :-

Saturated :

Monovalent :-

alkane $\xrightarrow{-H}$ alkyl

CH_4 $\xrightarrow{-H}$ CH_3-

Methane — Methyl

CH_3-CH_3 $\xrightarrow{-H}$ CH_3-CH_2-

ethane — ethyl

$CH_3-CH_2-CH_3$ (Propane) $\xrightarrow{-H}$ $CH_3-CH_2-CH_2-$ n-propyl

$CH_3-CH_2-CH_3$ (Propane) $\rightarrow$ $CH_3-\underset{|}{CH}-CH_3$ iso-propyl

Normal :- • Straight chain hydrocarbon
• no branching

eg

$CH_3-\underset{|}{CH_2}-\underset{|}{CH_2}-CH_3$

n-butane

$CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$

n-hexane

$CH_3-\underset{|}{CH_2}$

propane

n-pentane

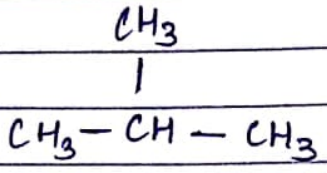
$CH_3(CH_2)_5CH_3$

n-heptane

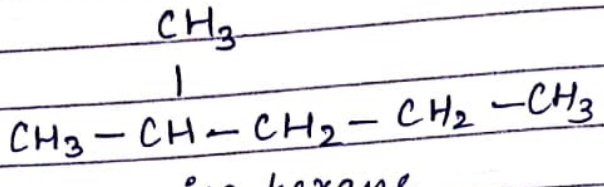
$CH_3-CH_2-CH_2-$ n-propyl

$CH_3-CH_2-CH_2-CH_2-$ n-butyl

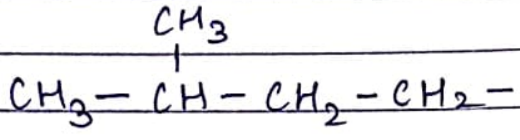
Iso : When methyl gp. is attached at 2nd last C or 2nd C (in case of alkanes) is c/a iso-comp.

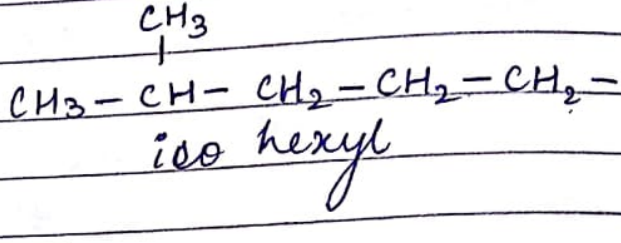


iso-butane

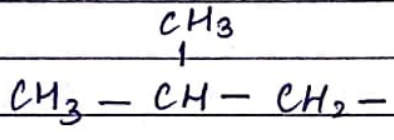


iso hexane

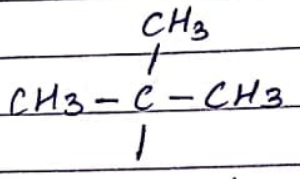




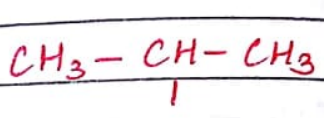
iso hexyl



iso-butyl

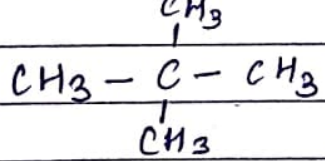


t-butyl

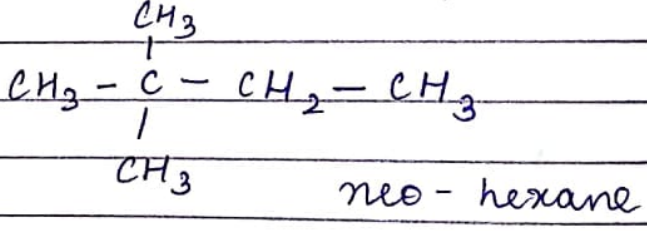


isopropyl

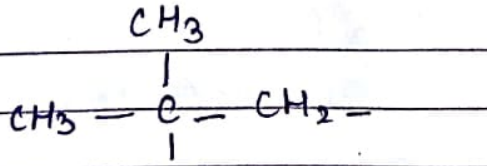
Neo :- When 2 methyl gp. is attached to 2nd last C or 2nd C (in case of alkane) c/a neo compd.



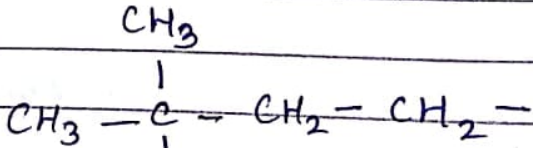
neo-Pentane



neo-hexane

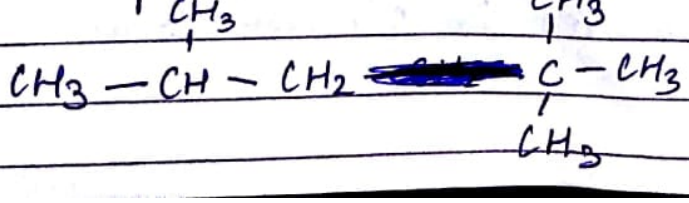


neopentyl

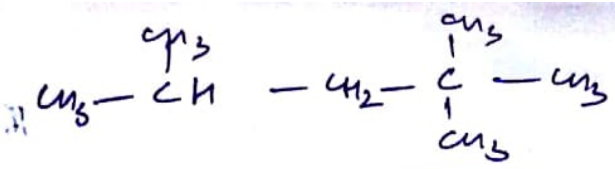


neo hexyl

Exception



Iso-octane



iso octane

PAGE NO.: 17
DATE: / /

$CH_3 - CH_2 - CH_2 - CH_2 - CH_2 -$ n-pentyl

$CH_3 - CH_2 - CH_2 - \underset{|}{CH} - CH_3$ Sec. pentyl

CH_3

$CH_3 - CH - CH_2 - CH_2 -$ iso · pentyl

CH_3

$CH_3 - C - CH_2 -$ neo pentyl

CH_3

Bivalent :- 2 valency free
from same C - atom → alkylidene
from vicinal C - atom → alkylene
terminal C - atom → polymethylene

$CH_4 \xrightarrow{-H} CH_3 - \xrightarrow{-H} CH_2 <$

Methylidene
or
Methylene

$CH_3 - CH_3 \longrightarrow CH_3 - CH_2 - \rightarrow CH_3 - CH <$ ethylidene

$CH_2 - CH_2$ ethylene
| |

$CH_3 - CH_2 - CH_3 \rightarrow CH_3 - CH_2 - CH <$ propylidene

$\rightarrow CH_3 - CH_2 - CH_2 -$ propylene
|

$CH_3 - C - CH_3$ isopropylidene

PAGE NO.: 19
DATE: / /

$-CH_2-CH_2-CH_2-CH_2-$

$CH_2=CH_2 \longrightarrow CH_2=CH- \longrightarrow CH_2=C\overset{\cdot}{}$

Vinyl or ethenyl — ethenylidene

$CH_3-CH=CH_2 \longrightarrow CH_3-CH=CH-$ propenyl

$\longrightarrow CH_3-\underset{|}{C}=CH_2$ isopropenyl

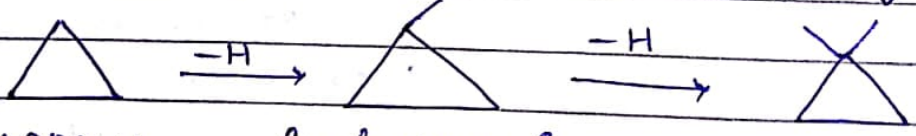
$\longrightarrow -CH_2-CH=CH_2$ Allyl

$CH\equiv CH \longrightarrow CH\equiv C-$ ethynyl

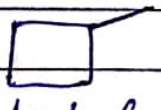
$CH_3-C\equiv CH \longrightarrow CH_3-C\equiv C-$ propynyl

$\longrightarrow -CH_2-C\equiv CH$ Propargyl

$CH_3-CH=CH-CH_2-$ Crotyl



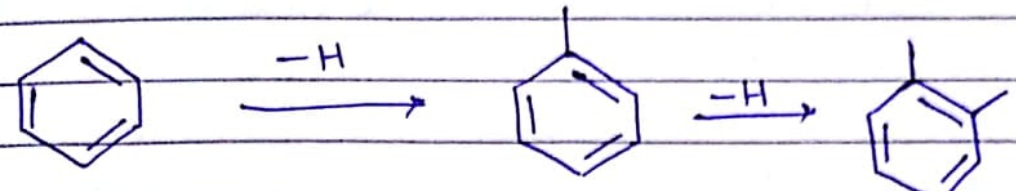
Cyclopropane — Cyclopropyl — cyclopropylidene



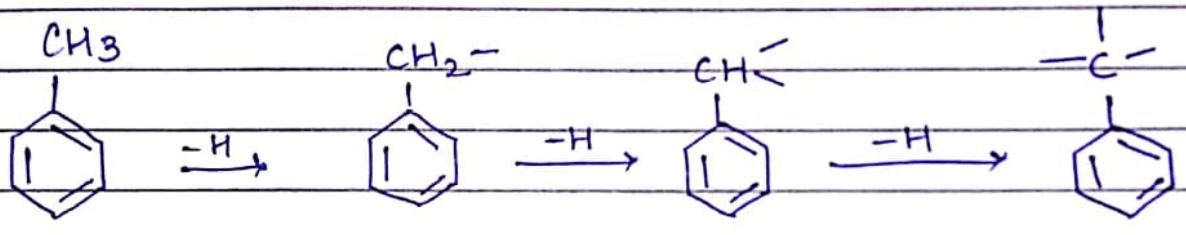
cyclobutyl

cyclopentyl

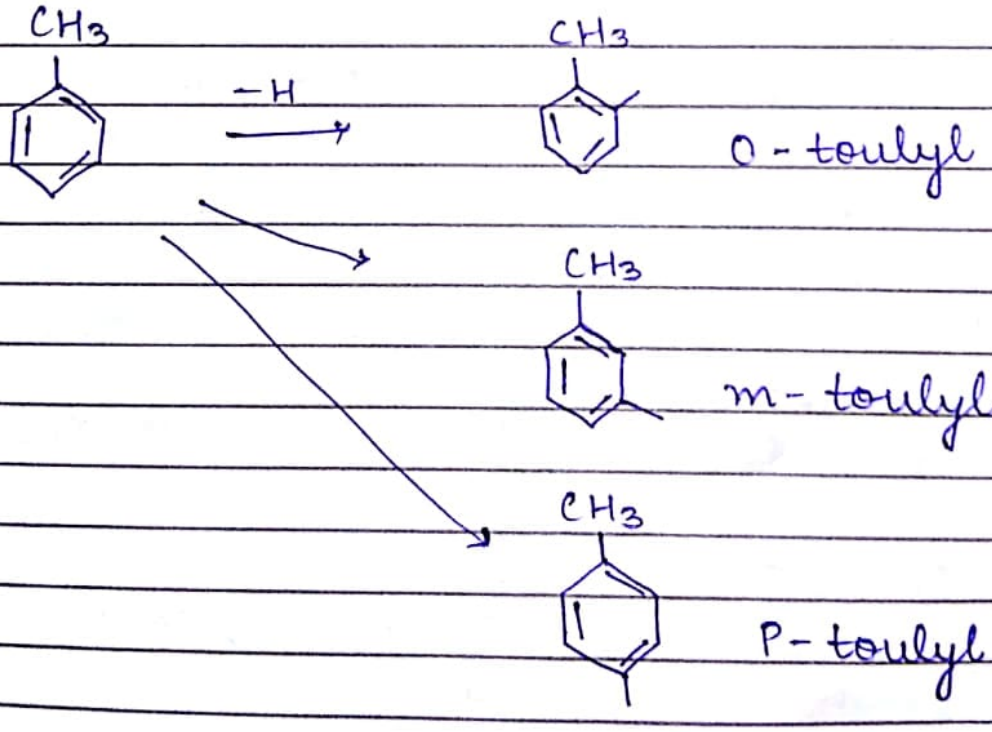
Aromatic :-



benzene or phene — phenyl — phenylene



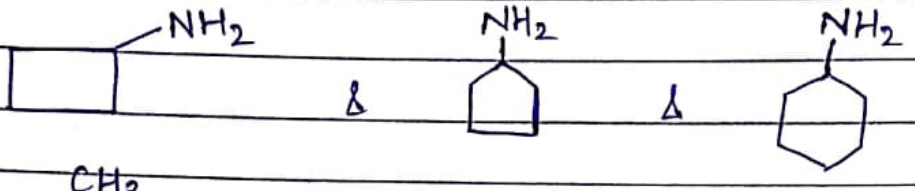
toluene — benzyl — benzal — benzo

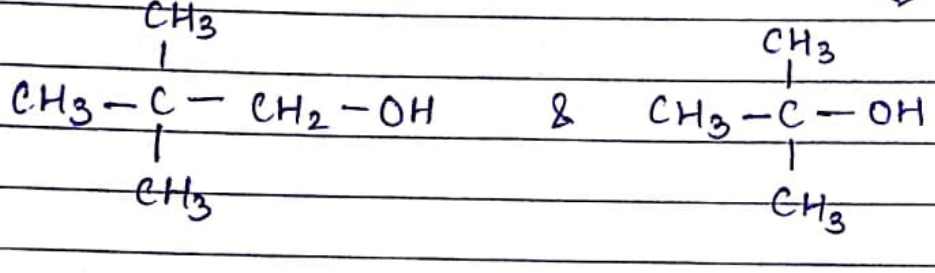


Concept of Homology :-

Those compd's which have same structural features as well as same general formula but differ by $-CH_2-$ group c/a homologs & series is c/a homologous series.

CH_3-CH_2-OH & $CH_3-CH_2-CH_2-OH$





	G.F.	
alkane	C_nH_{2n+2}	CH_4, CH_3-CH_3, $CH_3-CH_2-CH_3$
alkene	C_nH_{2n}	$CH_2=CH_2$, $CH_3-CH=CH_2$, $CH_3-CH_2-CH=CH$
alkyne	C_nH_{2n-2}	$CH\equiv CH$, $CH_3-C\equiv CH$
Alcohol	$C_nH_{2n+2}O$	CH_3-OH, CH_3-CH_2-OH, $CH_3-CH_2-CH_2-OH$
ether	C_nH_{2n+O}	CH_3-O-CH_3, $CH_3-O-CH_2-CH_3$
Halide	$C_nH_{2n+1}X$	
aldehyde or	$C_nH_{2n}O$	$H-\underset{\underset{O}{\|}}{C}-H$, $CH_3-CH=O$, CH_3-CH_2-CHO
Ketone	$C_nH_{2n}O$	$CH_3-\underset{\underset{O}{\|}}{C}-CH_3$
acid/ester	$C_nH_{2n}O_2$	$H-\underset{\underset{O}{\|}}{C}-OH$, CH_3-COOH

Characteristics of Homologues :-

1. Have same general formula i.e. same method of preparation.
2. Have same type of atom.
3. have same functional gp. hence similiar chemical property.
4. Have different physical property.
5. 2 successive members differ by CH_2- gp i.e. a weight of 14 unit.

$R-CH_3$ $\xrightarrow{-CH_2}$ $R-H$ (Lower Homologue)

$R-CH_3$ $\xrightarrow{+CH_2}$ $R-CH_2-CH_3$ (Higher Homologue)

Ques Write lower & higher homologue of isopentyl alcohol.

$$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-CH_2-CH_2-OH$$

Higher $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-CH_2-CH_2-CH_2-OH$

Lower $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-CH_2-OH$ isobutyl alcohol

Ques Which of the following is pair of Homologues?

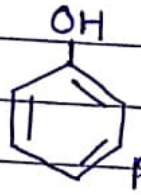
1. $CH_3-CH_2-CH_2-NH_2$ & $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle |}{CH}}-NH_2$ X

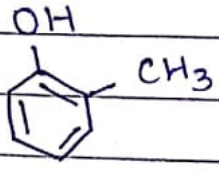
2. CH_3-CH_2-OH & $CH_3-CH_2-O-CH_3$ ✗

3. $H-\underset{\underset{O}{\|}}{C}-H$ & CH_3-CHO ✓

4. $CH_3-CH=CH_2$ & $CH_3-CH_2-\underset{\underset{H}{|}}{C}=CH_2$ ✓

5. CH_3-CH_2-Cl & CH_3-CH_2-Br ✗

6.  Phenol &  alcoholic ✗

7.  &  ✓

8. $CH_3-CH=CH_2$ &  ✗

9. $CH_3-CH_2-NH_2$ & $CH_3-CH_2-NH-CH_3$ ✗

10. $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$ & $CH_3-CH_2-CH_2-CH=O$ ✗

11. $CH_3-CH_2-CH_2-OH$ & CH_3-O-CH_3 ✗

12.  &  ✓

13. $HCOOH$ & CH_3COOH ✓

14. $CH_3-\underset{\underset{O}{\|}}{C}-OH$ & $CH_3-O-\underset{\underset{O}{\|}}{C}-CH_3$ ✗

15. $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$ & $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ ✓

16. $CH_3-\underset{\underset{CH_3}{|}}{CH}-CH_2-Cl$ & $CH_3-CH_2-CH_2-Cl$ ✗

Nomenclature :-

~~Too~~ Common Name | Derived Name | IUPAC System

1. Common Name OR TRIVAL NAMING :-

- based on source of origin.

Structure	Source	Common Name
CH_4	Marshy area	Marsh Gas
CH_3-OH	distillation of wood	wood spirit
$HCOOH$	formica (Red Ant)	formic acid
CH_3-COOH	acetum (Vinegar)	acetic acid
$CH_3-\underset{\underset{OH}{|}}{CH}-COOH$	Milk	Lactic acid
C_3H_7-COOH	Butter	butyric acid
$HOOC-CH_2-\underset{\underset{OH}{|}}{CH}-COOH$	Apple	Malic acid
$HOOC-\underset{\underset{OH}{|}}{CH}-\underset{\underset{OH}{|}}{CH}-COOH$	~~tar~~ tamarind	tataric acid

$HOOC-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-COOH$ Citrus fruit Citric acid

(R) — (G) fun^c gp
hydrocarbon

Common Name
Functional Group

① Non-Terminating (without C containing func gp)
eg $-OH, -NH_2, -O-, -\underset{\underset{O}{||}}{C}-$

② terminating (C containing func^c gp)
$-COOH$, $-CHO$

1. Non terminating

	Suffix
$-OH$	alcohol
$-SH$	thio alcohol
$-X$	Halide
$-NH_2$	amine
$-NH-$	amine
$-\underset{\underset{|}{}}{N}-$	amine
$-O-$	ether
$-S-$	thio ether
$-\underset{\underset{O}{||}}{C}-$	Ketone

Polyvalent func^c gp:-
1. If same hydrocarbon gp is attached then di, tri, tetra etc used.
2. If diff. hydrocarbon are attached then write them in alphabatical order

Note: di, tri, tetra, primary, secondary, etc. are not considered in alphabatical order while terms iso, neo are considered in alphabetical order

CH_3-O-CH_3 — dimethyl ether

$CH_3-O-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$ — isopropyl methyl ether

$CH_3-\overset{\displaystyle O}{\overset{||}{C}}-CH_3$ — dimethyl ketone

$CH_3-\overset{\displaystyle O}{\overset{||}{C}}-CH_2-CH_3$ — ethyl methyl ketone

CH_3-CH_2-OH — ethyl alcohol

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-Cl$ — isopropyl chloride

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2-NH_2$ — isobutyl amine

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_2-OH$ — neo pentyl alcohol

$CH_2=CH-Cl$ — Vinyl chloride

$CH_2=CH-CH_2-OH$ — Allyl chloride

$CH_3-NH-CH_3$ — dimethyl amine

$CH_3-\underset{\displaystyle CH-CH_3}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{N}}}}-CH_2-CH_3$ — ethyl isopropyl methyl amine

H

Terminating func^c gp :-

Prefix :-

Total no. of C	Prefix form
1C	form
2C	acet
3C	propion
4C	butyr — n, iso
5C	Valer

① M
Cu
eg

3C + 1db	C-C=C	acryl
4C + 1db	C-C=C-C	croton

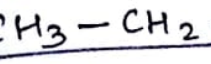
Suffix :-

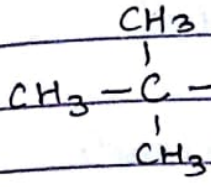
P. fg	Suffix
$-COOH$	ic acid
$-\overset{O}{\overset{\|\|}{C}}-O-R$	alkyl --- ate
$-\overset{O}{\overset{\|\|}{C}}-X$	yl halide
$-CHO$	aldehyde
$-\overset{O}{\overset{\|\|}{C}}-O-\overset{O}{\overset{\|\|}{C}}-$	ic anhydride
$-CN$	o nitrile
$-NC$	o iso nitrile
$-\overset{O}{\overset{\|\|}{C}}-NH_2$	amide

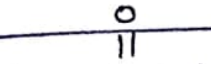
$H-\overset{O}{\overset{\|\|}{C}}-O-H$ — formic acid

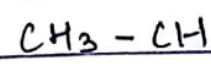
CH_3-COOH — acetic acid

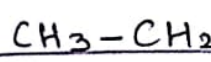
$CH_3-\underset{CH_3}{\underset{|}{CH}}-COOH$ — isobutyric acid


n - butyric acid


neo valeric acid


formaldehyde

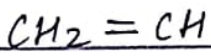

acetaldehyde


propionaldehyde

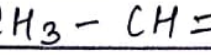

isobutyraldehyde

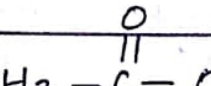

isovaler aldehyde

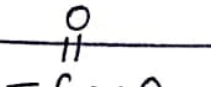

acryl aldehyde

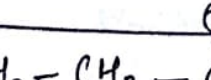

acrylic acid

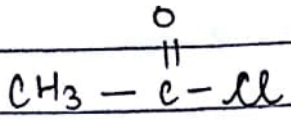

Croton aldehyde

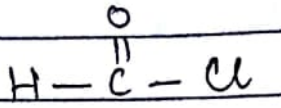

crotonic acid


methyl acetate

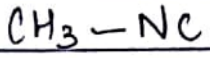

ethyl formate

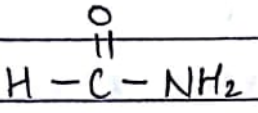

isopropyl ethyl acetate

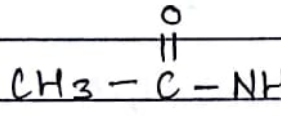

acetyl chloride

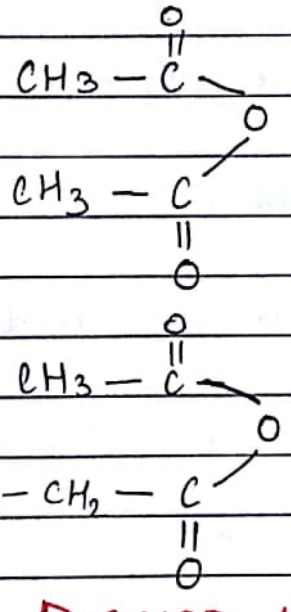

formyl chloride


propionitrile


aceto isonitrile


formamide


acetamide


acetic anhydride

acetic propionic anhydride

DERIVED NAME :

(3) Based on famous Homolog

selection of parent chain
4°C > 3°C > 2°C > 1°C

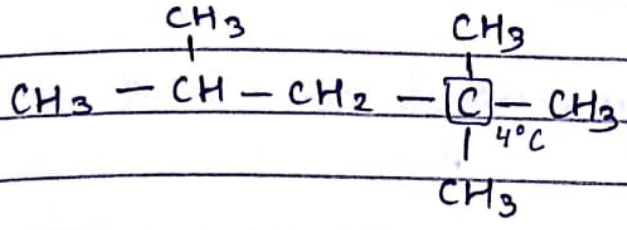
alkane :- CH_4 methane

$CH_3-\boxed{CH_3}$ methyl methane

$CH_3-\underset{CH_3}{CH_2}-\boxed{CH_2}-CH_3$ ethyl methyl methane

$CH_3-\underset{CH_3}{\boxed{CH}}-CH_2-CH_3$ ethyl dimethyl methane

Ques Write derived name of iso-octane?



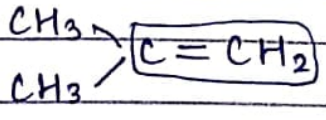
isobutyl trimethyl methane

alkene : $CH_2=CH_2$ ethylene

Fg > multiple bond
=> =

$CH_2=CH-CH_3$ methyl ethylene

$CH_3-CH=CH-CH_3$ sym. dimethyl ethylene



unsym. dimethyl ethylene

alkyne : $CH\equiv CH$ acetylene

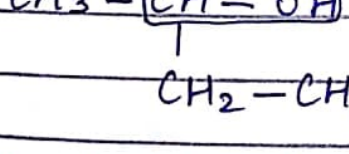
$CH_3-C\equiv CH$ methyl acetylene

$CH_3-C\equiv C-CH_2-CH_3$ ethyl methyl acetylene

$CH_2=CH-C\equiv CH$ Vinyl acetylene

alcohol : CH_3-OH Carbinol

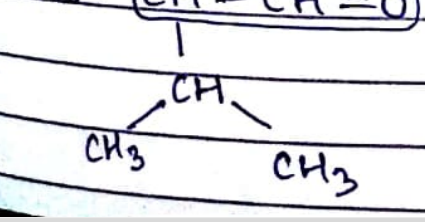
$CH_3-CH_2-CH_2-OH$ ethyl carbinol



ethyl methyl carbinol

aldehyde : $CH_3-CH=O$ acetaldehyde

$CH_3-CH_2-CH=O$ methyl acetaldehyde



isopropyl methyl acetaldehyde

acid : CH_3-COOH acetic acid

$CH_3-\underset{\displaystyle CH_2-CH_3}{\underset{|}{CH}}-COOH$ ethyl methyl acetic acid

Cl_3CCOOH

$Cl-\underset{Cl}{\overset{Cl}{C}}-COOH$ trichloro acetic acid

Ketone : $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3$ acetone

$CH_3-CH_2-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_2-CH_3$

ethyl methyl acetone

IUPAC Naming

International Union of Pure & Applied Chemistry

Parts of IUPAC

1. Word — Root
2. Prefix — Pri / Sec.
3. Suffix — Pri. / Sec.

Secondary Prefix	Primary Prefix	Word Root	Primary Suffix	Secondary Suffix
2°	1°	WR	1°	2°
substituent is written in alphabetical order - Cl Chloro - NO_2 Nitro	used when compd is cyclic "cyclo"	represent total no. of C in Principal C chain 1C - meth 2C - eth 3C - Prop ⋮ 10C - dec 11C - undec 12 - dodec ⋮ 20 Eicos	tells whether compd. is saturated or unsaturated C - C ane 1C = C ene 1C ≡ C yne 2C = C diene 2C ≡ C diyne C=C & C≡C enyne	tells about Principal func gp. - COOH - CHO - OH - NH_2

PRIORITY ORDER of FUNCTIONAL GROUP :-

Functional Gp.	Prefix	Suffix
-(C)OOH (carboxylic acid)	x	oic acid
-COOH	carboxy	carboxylic acid
$-SO_3H$ (Sulphonic acid)	sulpho	sulphonic acid
$-(C)(=O)-O-(C)(=O)-$ (anhydride)	x	oic anhydride

Functional Group	Prefix	Suffix
-(C)OOR (ester)	X	alkyl --- oate
-COOR	alkoxycarbonyl or carbalkoxy	alkyl --- carboxylate
-(C)OX (acidhalide)	X	oyl halide
-COX	halo formyl	carbonyl halide
-(C)ONH$_2$ (amide)	X	amide
-CONH$_2$	carbamoyl	carboxamide
-(C)N (cyanide)	X	Nitrile
-CN	cyano	carbonitrile
-N$\rightleftarrows$(C) (isocyanide)	X	isonitrile
-NC	isocyano/ carbyl amino	carbyl amine
-(C)HO (aldehyde)	oxo	al
-CHO	formyl	carbaldehyde
-(C)- (Ketone) $\|\|$ O	Keto/oxo	one
-OH (alcohol)	hydroxy	ol
-SH (thio alcohol)	mercapto	thiol
-NH$_2$ (amine)	amino	amine

Substituents	Prefix
-R	alkyl
-X	halo
-NH$_2$	amino
$-N^{=O}_{\rightarrow O}$	nitro
-O-N=O	nitrite
-N=O	nitroso

Substituents	Prefix
$-OCH_2CH_3$	ethoxy
$-CH_2-OH$	hydroxy methyl
$-CH_2-Cl$	chloro methyl
$-NH-CH_3$	methyl amino
$-S-$	thio
$-S-R$	alkyl thio
$CH_3-\overset{\overset{O}{\|}}{C}-O-$	acetoxy/ethanoyloxy
$CH_3CH_2-\overset{\overset{O}{\|}}{C}-O-$	propanoyloxy
$C_6H_5-\overset{\overset{O}{\|}}{C}-O-$	benzoyloxy
$-OR$	alkoxy

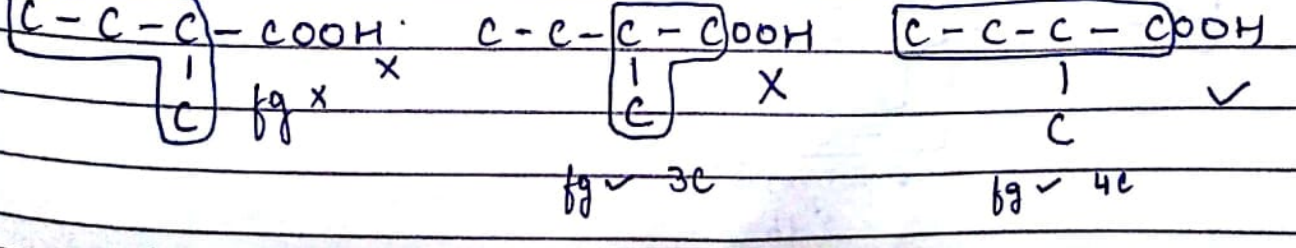
Rules of IUPAC :-

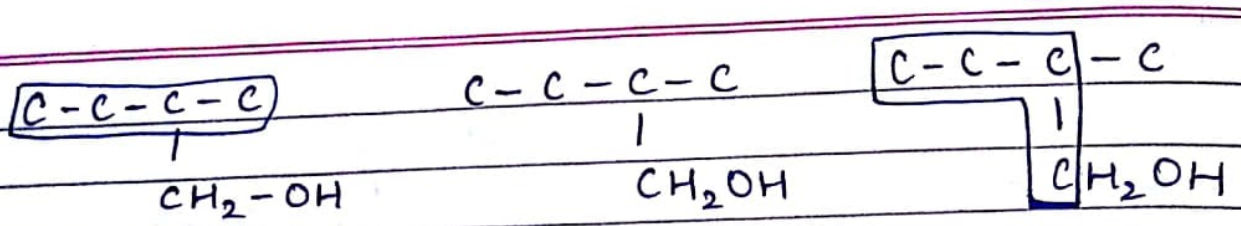
1. Selection of Principal Carbon chain
2. Numbering of P.C.C.

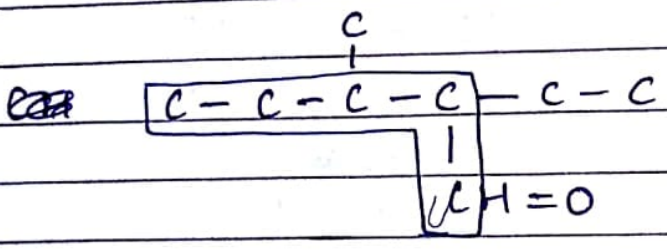
1. Selection of Principal Carbon Chain (PCC)

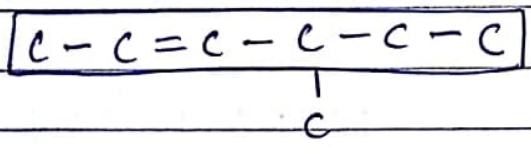
P.C.C. will be that ~~largest~~ longest continuous chain of carbon which have

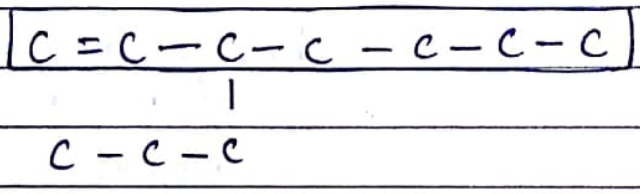
Pfg > Max^m no. of multiple bond > max. no. of C-atom

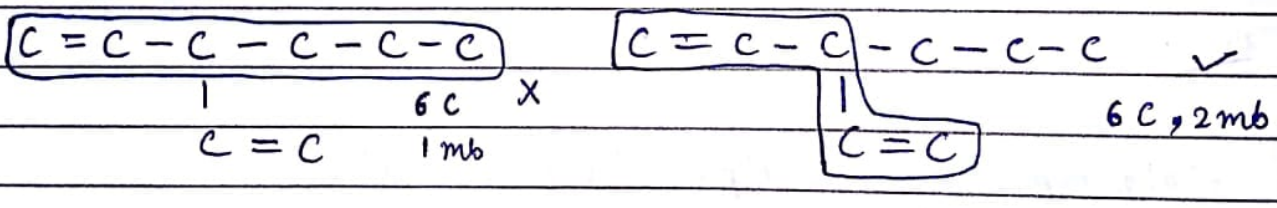


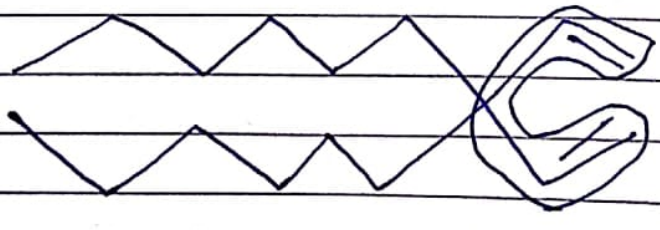




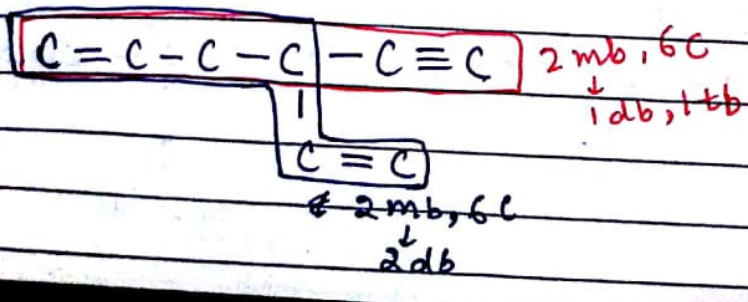


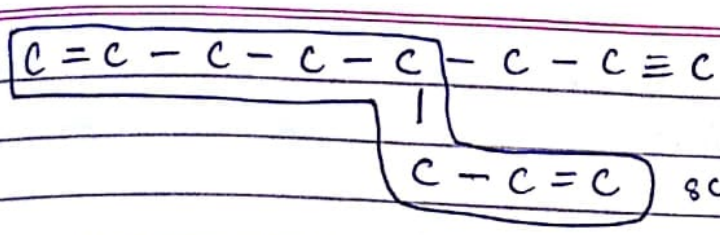




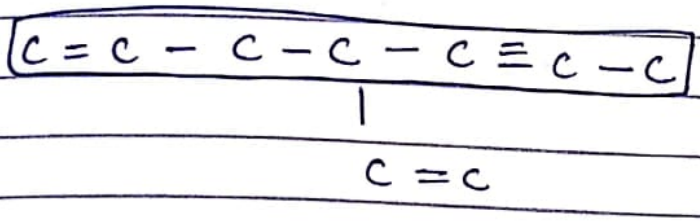


If symmetric molecule is +nt then priority is given to double & bond over triple bond

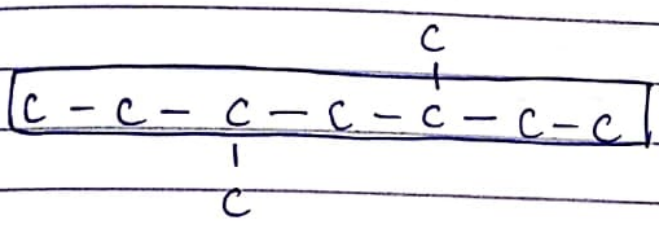




8C, 2 mb → 2 db

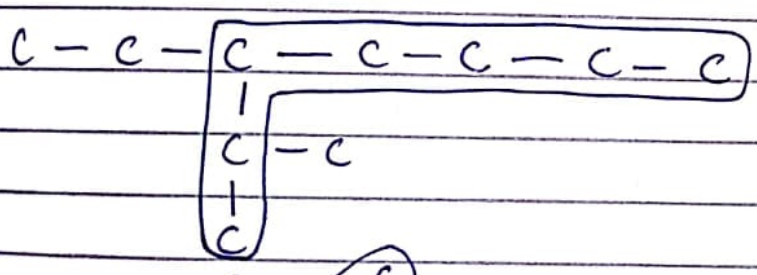


7C, 2 mb

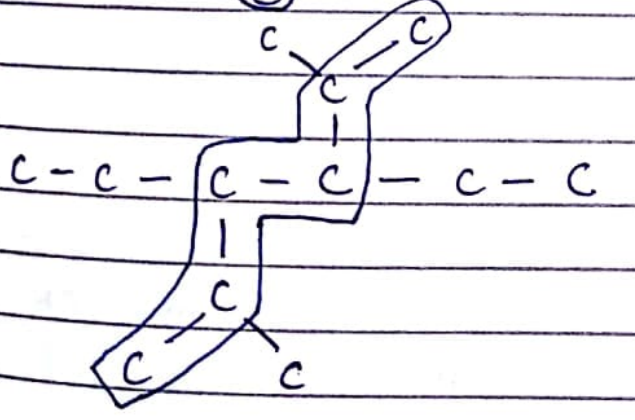


7C

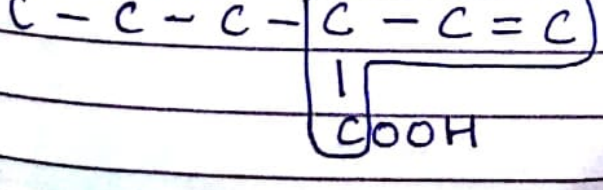
If 2 diff. P.C.C. have same no. of C in a molecule ~~tho~~ then that P.C.C. will be selected as P.C.C. which have max^m no. of Sb (/more branching)



2 sub, 7C

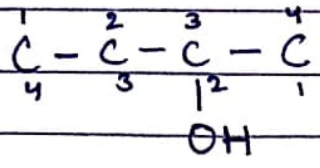


6C, 4 Sub

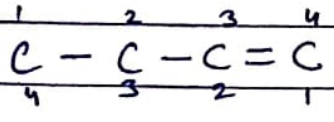


Numbering of P.C.C.:-

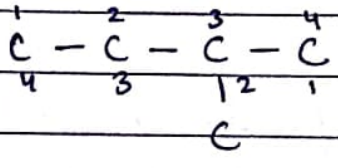
① Lowest no. will given to Pfg > Mb > Sb



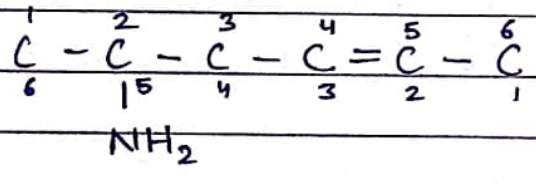
	fg
LHS	3
RHS	2



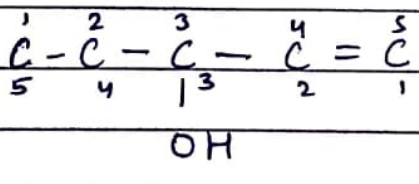
	mb
LHS	3
RHS	1



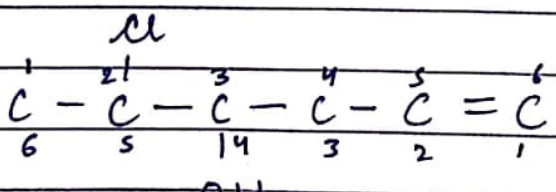
	Sb
L.H.S	3
RHS	2



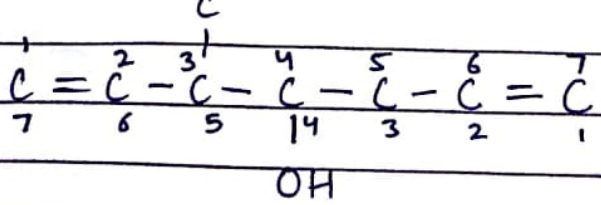
	fg
LHS	2
RHS	5



	fg	mb
LHS	3	4
RHS	3	1

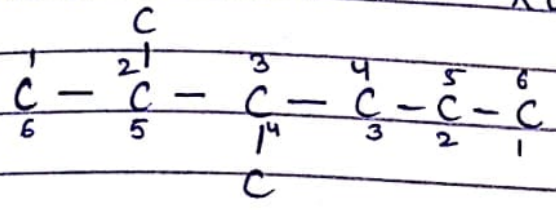


	fg
LHS	3
RHS	4

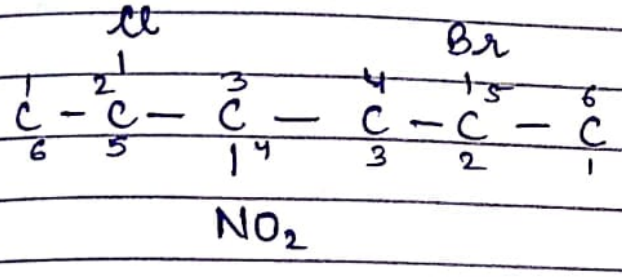


	fg	mb	Sb
LHS	4	1, 6	3
RHS	4	1, 6	5

(2) If more than one substituent are +nt then least ~~low~~ locant no. Rule is followed.

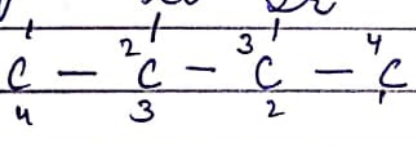


Sb
LHS 2,3 ✓
RHS 4,5

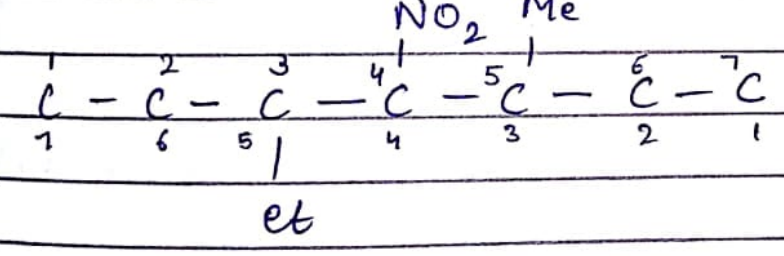


Sb
LHS 2, 3, 5 ✓
RHS 2, 4, 5

3. If 2 or more substituent are +nt at same posⁿ from either side then no. ~~of~~ starts from the side where alphabetically prefered substituent get lowest no.

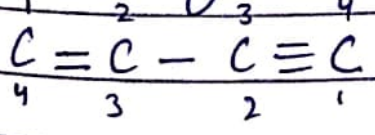


LHS 2, 3
RHS ~~or~~ 2, 3 ✓



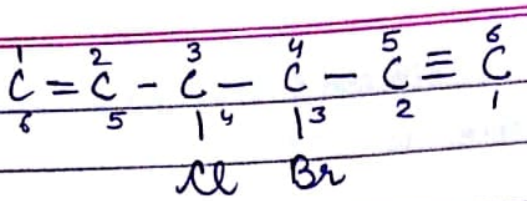
ethyl
LHS 3 4 5 ✓
RHS 3 4 5

4. If db & tb are at similiar posⁿ from either side of PCC then priority is given to db ~~r~~

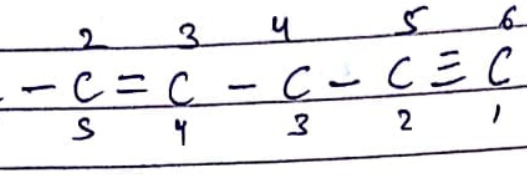


db tb
L·HS 1, 3 ✓
RHS 1, 3

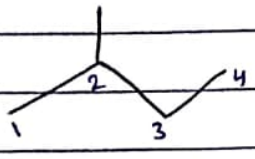
mb
db ← 1,5 3,4 ✓
LHS
RHS 1,5 3,4
tb



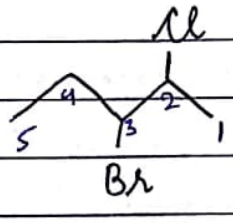
mb
LHS 2,5
RHS 1,4 ✓



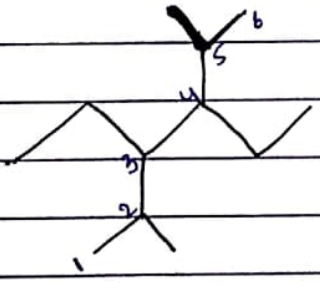
Ques



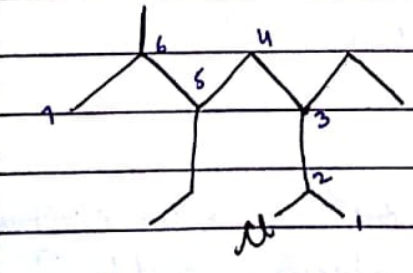
2-Methyl Butane



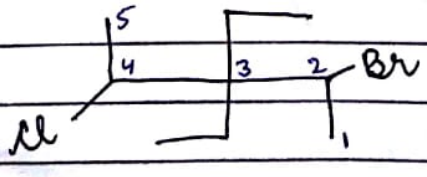
3-Bromo-2 Chloro Pentane



3,4 diethyl - 2,5 dimethyl Hexane

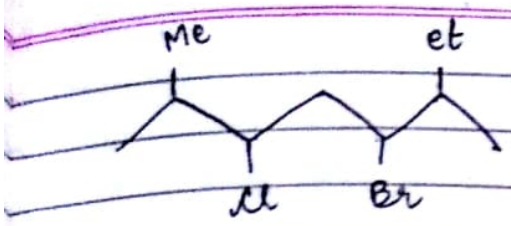


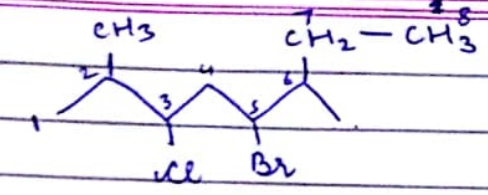
2-Chloro - 3,5 - diethyl - 6-methyl heptane



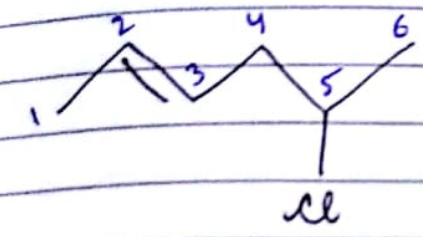
2-Bromo - 4 - Chloro - 3,3-diethyl Pentane

PAGE NO.: 29
DATE: / /

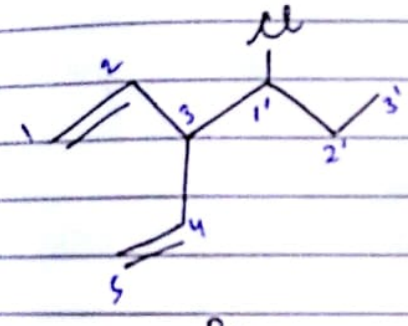




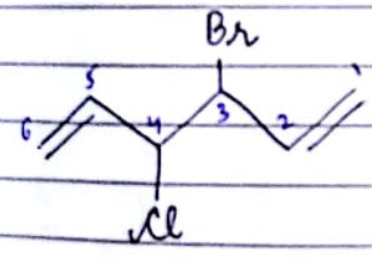
5-Bromo-3-Chloro, 2,6-dimethyl Octane



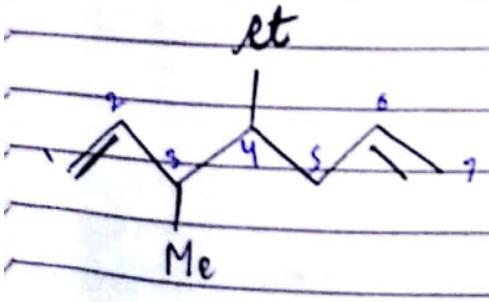
5-Chloro-~~Hex~~ Hex-2-ene



3(1'-Chloro Propyl) ~~Pent~~ Pent-1,4-diene



3-Bromo-4-Chloro hex-1,5 diene



4-ethyl-3-methyl-hept-1,6-di ene

$\overset{1}{CH_2}=\overset{2}{CH}-\overset{3}{CH_2}-\overset{4}{C}\equiv\overset{5}{CH}$ Pent-1-ene-4-yne

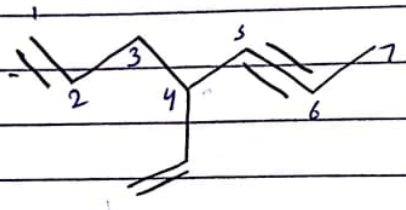
AIRM7-10

$CH_3 - \overset{6}{CH} = \overset{5}{CH} - \overset{4}{CH_2} - \overset{3}{C} \equiv \overset{2}{CH}$

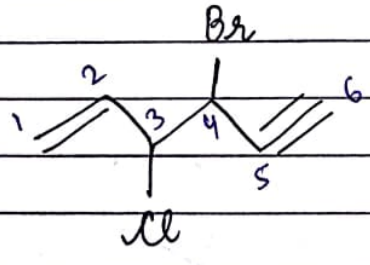
Hex - 4 - ene - 1 - yne

$CH_3 - \overset{3}{C}(=CH_2) - \overset{2}{C}(=CH_2) - CH_2 - CH_3$

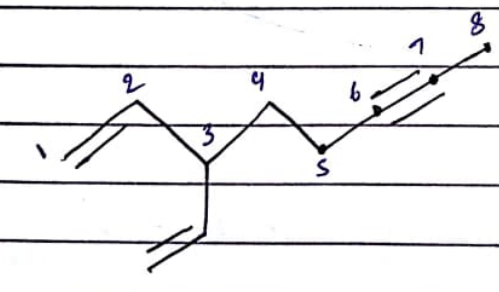
2 - Ethyl - 3 - Methyl But~~a~~ - 1,3 - diene



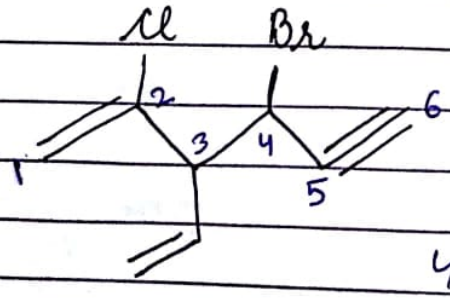
4 - ~~Eth~~ Vinyl hept - 1 ene - 5 - yne
or
4 - ethenyl hept - 1 - en - 5 - yne



4 - Bromo - 3 - Chloro - Hex - 1 - ene
5 - yne



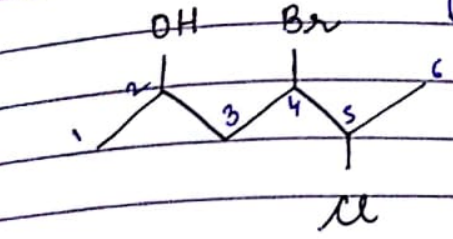
3 ethenyl - Oct - 1 ene - 6 - yne



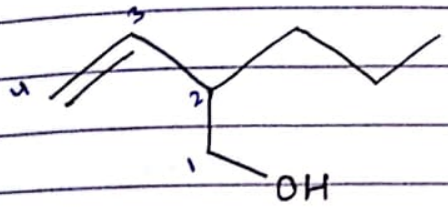
4 - Bromo - 2 - Chloro - 3 Ethenyl -
Hex - 1 ene - 5 yne

4 - Bromo - 2 - Chloro - 3 - Vinyl Hex - 1 ene -
5 - yne

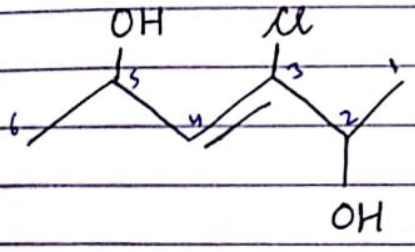
	Prefix	Suffix
-OH	Hydroxy	ol



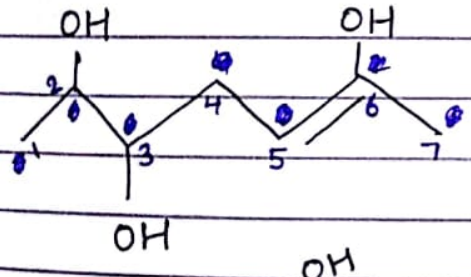
4 - Bromo - 5 - Chloro - 2 - Hexanol



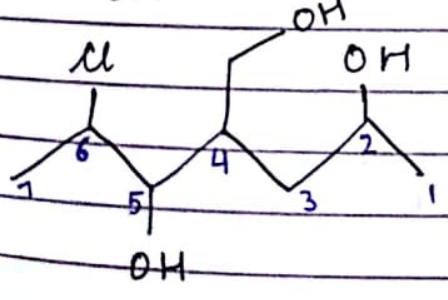
2 - Propyl - But - 3 - ene - 1 - ol



3 - Chloro - Hex - 3 - ene - 2, 5 - diol

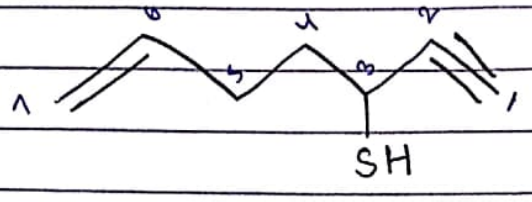


hept - 5 - ene - 2, 3, 6 - triol



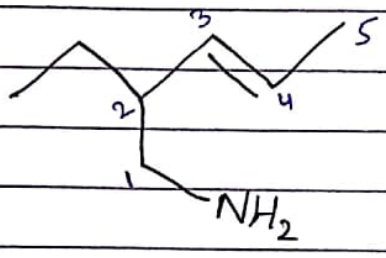
6 Chloro - 4 hydroxy Methyl hept - 2, 5 - diol

	Prefix	Suffix
$-SH$	mercapto	thiol

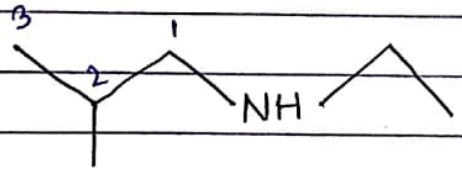


Hept - 6 - ene - 1 - yne - 3 - thiol

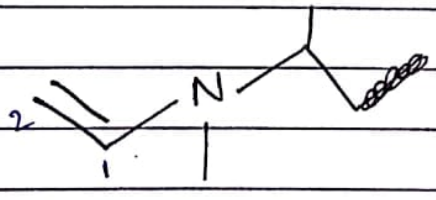
	Prefix	Suffix
$-NH_2$	amino	amine



2 - Ethyl - Pent - 3 - ene - 1 - amine

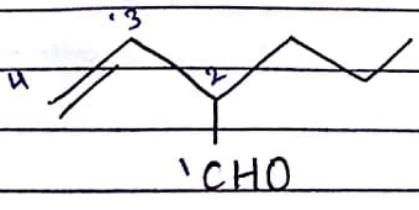


N - ethyl - 2 - methyl Propan amine

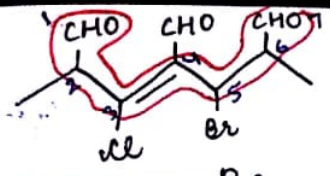


N - isopropyl - N - methyl ethene amine

	Prefix	Suffix
$-CHO$	oxo / formyl	al / carbaldehyde



2 - Propyl But - 3 - en al



5-Bromo-3 Chloro. 4-formyl-2,6-dimethyl hept an-1,7-dial

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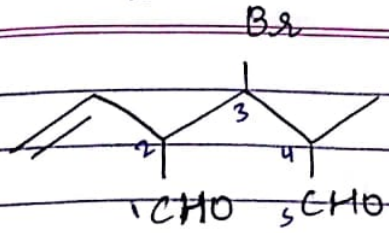
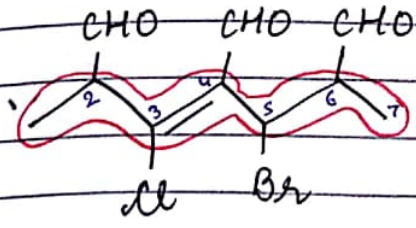
DATE: / /

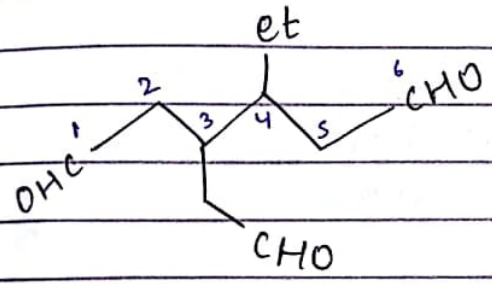


3-Bromo-2-ethenyl-4-methyl Pentan-1,5-dial

Note: When more than 2 carbon containing same func gp are attached to main ring chain then exclude all of them.

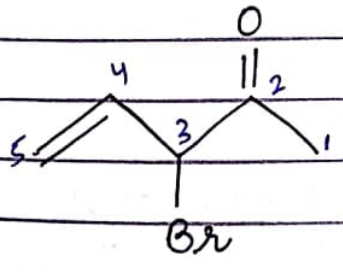


5-Bromo-3-Chloro hept-3-ene-2,4,6-tricarbaldehyde

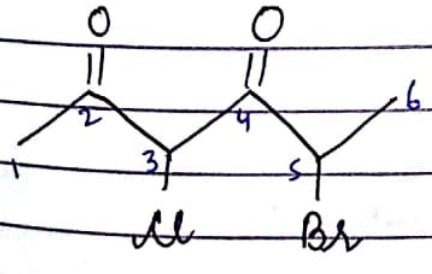


4-ethyl-3-formyl methyl-hexan-1,6-dial

Prefix	Suffix
oxo / keto	one

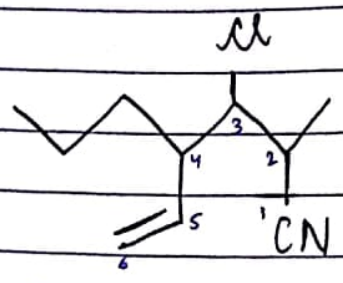


3-Bromo-Pent-4-en-2-one

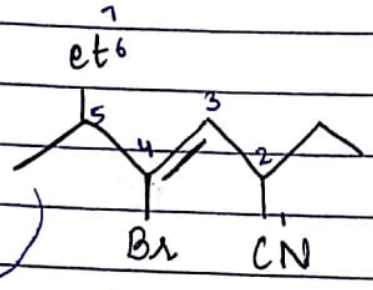


5 Bromo-3-Chloro hexan-2,4-dione

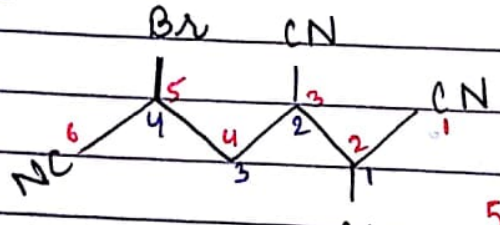
$-CN$ $-(C)N$ $-CN$ × cyano nitrile carbonitrile



3-Chloro-2-Methyl-4-Propyl-hex-5-ene nitrile



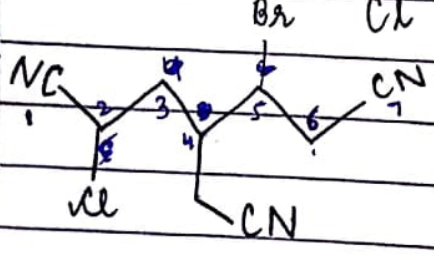
4-Bromo-2-ethyl-5-Methyl hept-3-ene nitrile



Pfg
CHS 1,3,4
RHS 1,2,4

4-Bromo-1-Chloro butane-1,2,4-carbo nitrile

5-Bromo-2-Chloro-3-cyano hexane-1,6-dinitrile



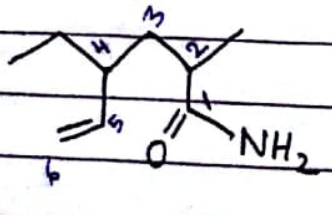
5-bromo-2-Chloro-4-cyano methyl heptane-1,7-dinitrile

$-C(=O)-NH_2$

$-(C=O)-NH_2$

$-C(=O)NH_2$

× carbamoyl amide carboxamide



4-Ethyl-2-Methyl-hex-5-ene amide

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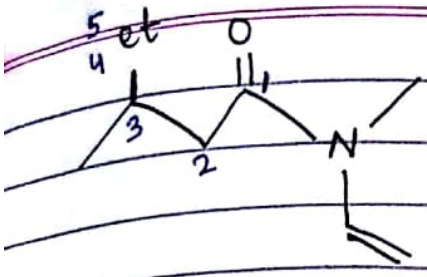
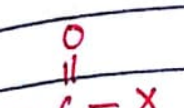
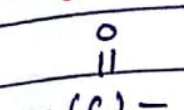
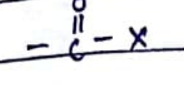
DATE: / /



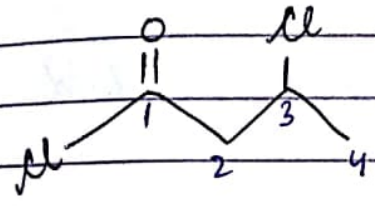
N - ethenyl - 3, N - dimethyl Pent -anamide



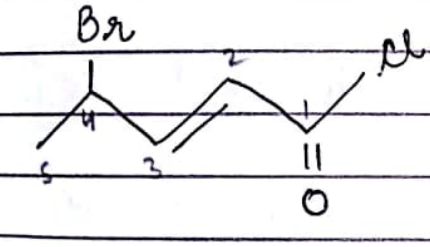




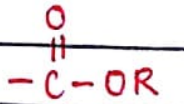
	X	oyl halide
	halo formyl	carbonyl halide

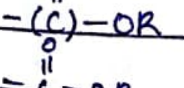


3 - Chloro - Butanoyl Chloride



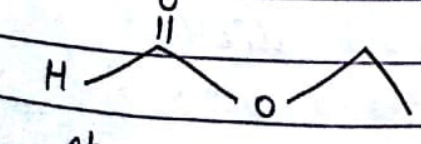
4 - Bromo - Pent - 2 - eneoyl Chloride



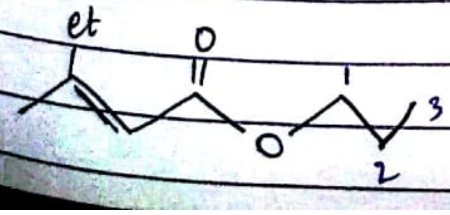


	X	alkyl --- oate
	alkoxy carbonyl	alkyl --- carboxylate

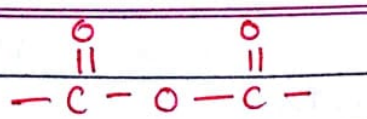
methyl - Propanoate



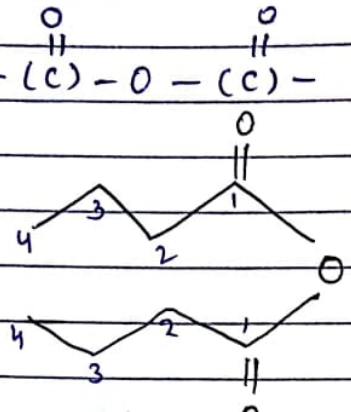
Ethyl - Methanoate



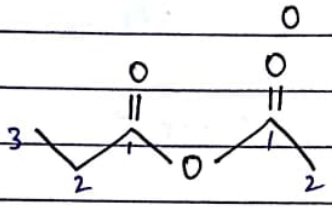
Propyl Ethyl - 3 - Methyl - Pent 2 - ene oate



$-C(=O)-O-C(=O)-$ × oic anhydride

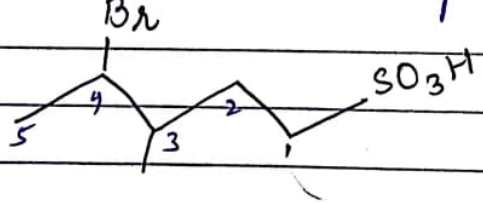


Butanoic anhydride



Ethanoic - Propanoic anhydride

$-SO_3H$ Sulpho sulphonic acid

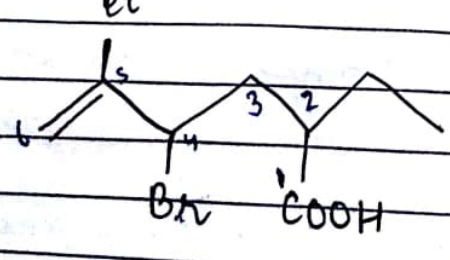


4-Bromo-3-Methyl Pentane sulphonic acid.

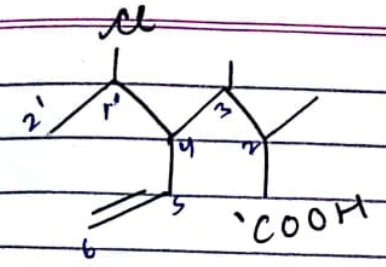
$-COOH$

$-C(=O)-OH$ × oic acid

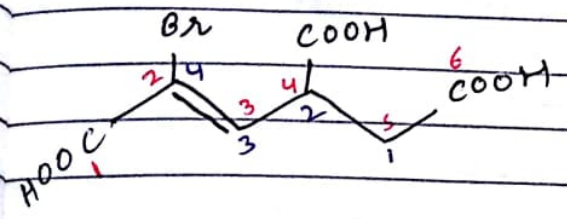
$-C(=O)-OH$ Carboxy carboxylic acid



4-Bromo-2,5-diethyl hex-5-ene-oic acid

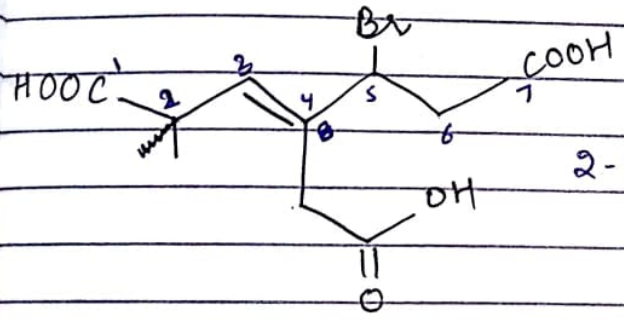


4 (1'-Chloro Ethyl) - 2, 3 - dimethyl hex - 5 - ene - oic acid



2-bromo - 4-carboxy hex - 2 - ene - 1, 6 - dioic acid But - 3 - ene -

4 - Bromo - 1, 2, 4 - ~~dicarboxy~~ dicarboxylic acid ~~Buta~~ - 3 - ~~a~~ ene

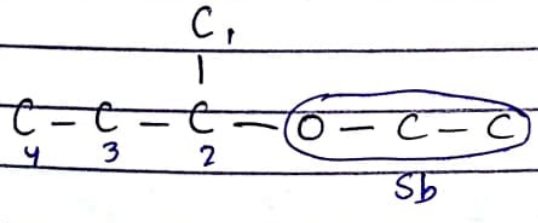


5 - Bromo - 4 - carboxy ~~ethyl~~ methyl 2 - Methyl - Hept - 3 - ene - 1, 7 - dioic acid

IUPAC Naming

$CH_3 - O - CH_3$ methoxy methane

$CH_3 - CH_2 - O - CH_3$ methoxy ethane

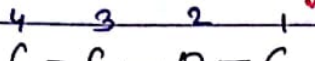


2 - ethoxy butane

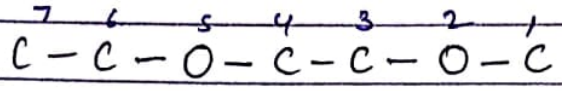
$C - C - C - C - O - C = C$ butoxy ethene

Oxa - System →

O को C atom से जोड़कर Least locant no. देनी है

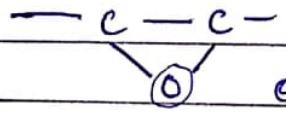


2-oxa-butane

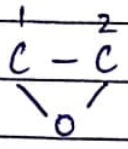


2,5-dioxa heptane

Cyclic ether

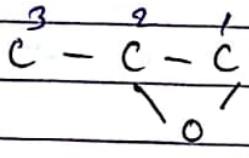


epoxy

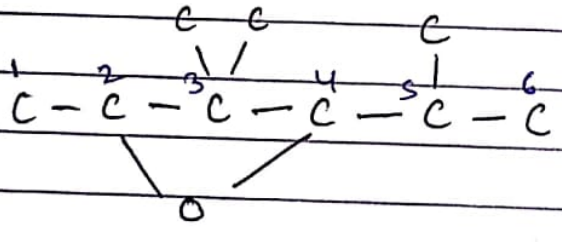


epoxy ethane

Or oxirane (trivial name)

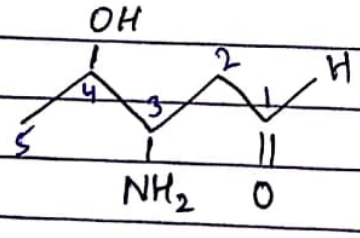


1,2-epoxy propane

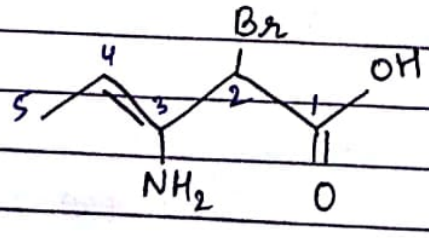


2,4-epoxy-3,3,5-trimethyl hexane

IUPAC Naming of Polyfunctional group :-



3-amino-4-hydroxy Pentanal



3-amino-2-Bromo-Pent-3-enoic acid

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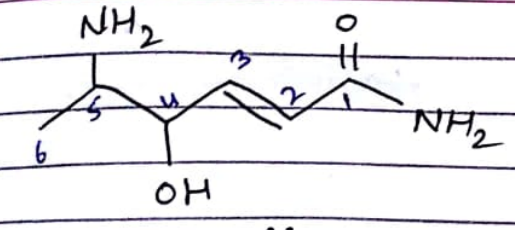
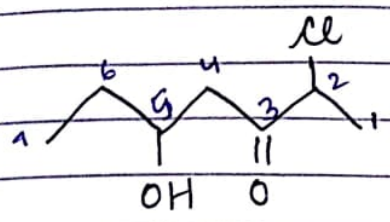
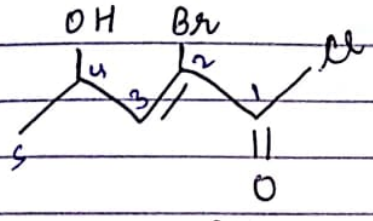


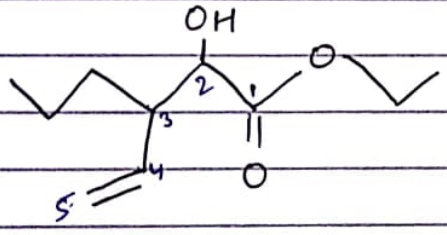
5 - amino - 4 - hydroxy hex - 2 - ene amide



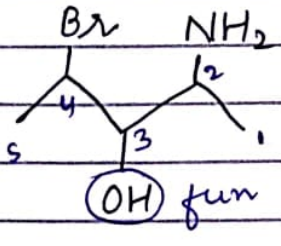
2 - Chloro - 5 - hydroxy heptan - 3 - one



2 - Bromo - 4 - hydroxy Pent - 2 - enoyl Chloride

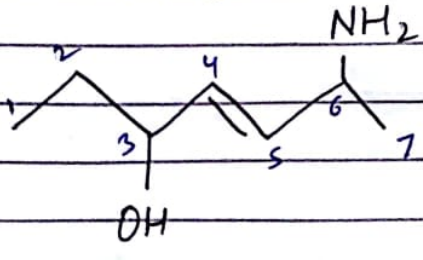


ethyl - 2 - hydroxy - 3 - Propyl Pent - 4 - enoate

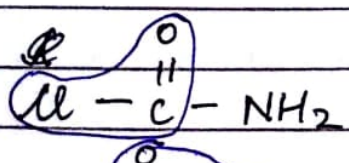


2 - amino - 4 - Bromo ~~- 3 - hydroxy~~ Pentan 3-ol ~~amine~~

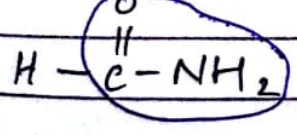
(OH) fun



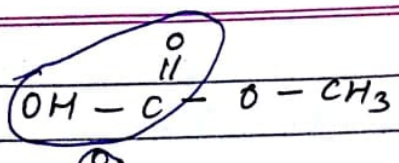
6 - amino hept - 4 - ene - 3 - ol

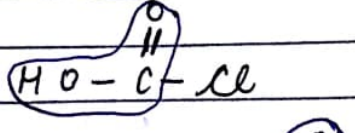


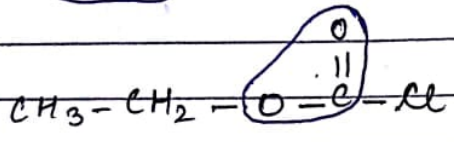
amino · methanoyl chloride

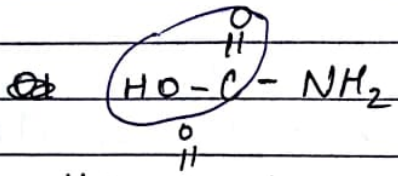


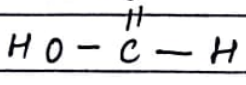
methanamide

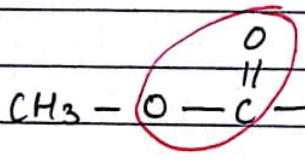

methoxy methanoic acid


Chloro methanoic acid

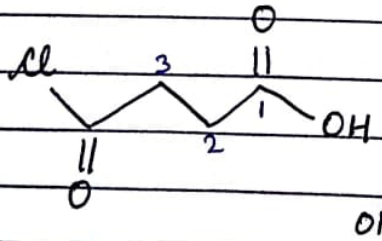

ethyl chloro methanoate

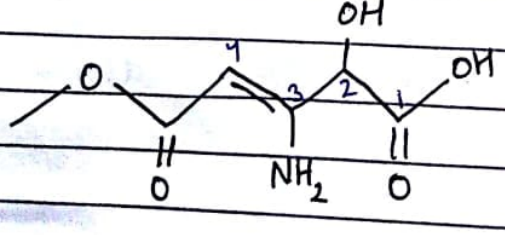

amino methanoic acid


methanoic acid


methyl amino methanoate

Note: In polyfunctional gp containing substance if C-containing func gp is not as substituents then its C is not considered in P.C.C. but in case of -CHO & $-\overset{\overset{O}{\|}}{C}-$ its C can be included in chain.


Chloro formyl
3-~~methyl chloride~~ - Propanoic acid


3-amino-2-hydroxy-4-methyl carbonyl-3-butenoic acid

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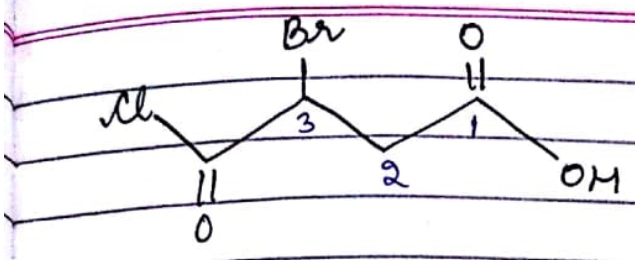
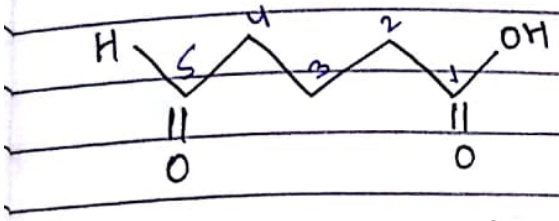
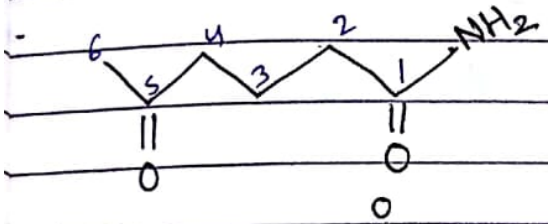


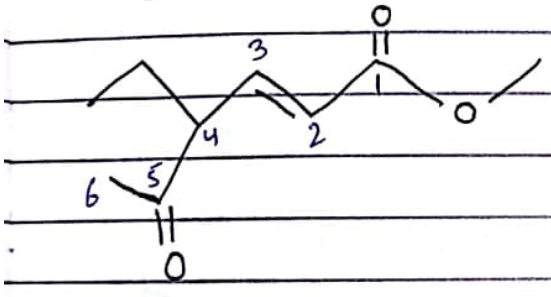
3 - Bromo - 3 - Chloroformyl Propanoic acid



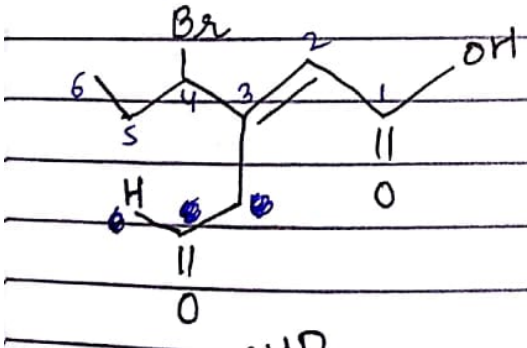
5 - Oxo - Pentanoic acid



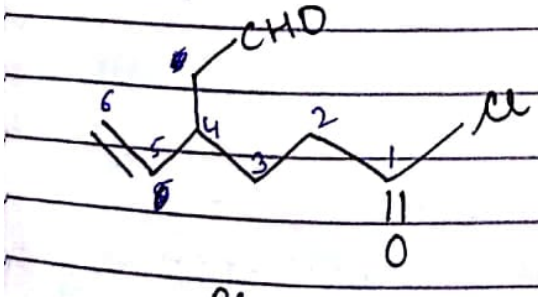
5 - Keto - Hexanamide



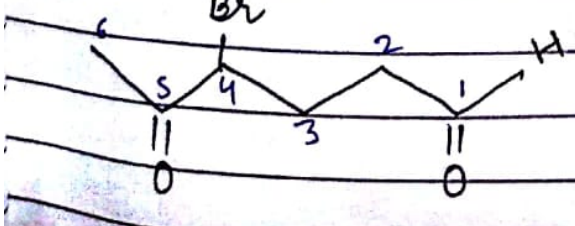
4 - ethyl - ~~methoxy carbonyl~~
5 - keto ~~Hexo - 2 - ene~~ methyl
Hex - 2 - ene oate



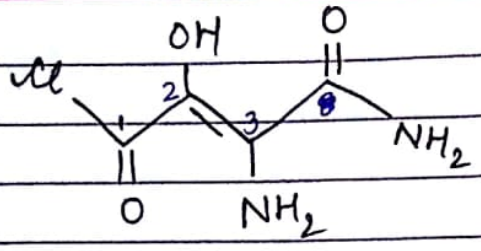
~~5 - Keto - 3 - Bromo Propyl~~
~~Hex - 2 - ene oic acid~~
4 - Bromo - 3 - methyl formyl hex - 2 - enoic acid



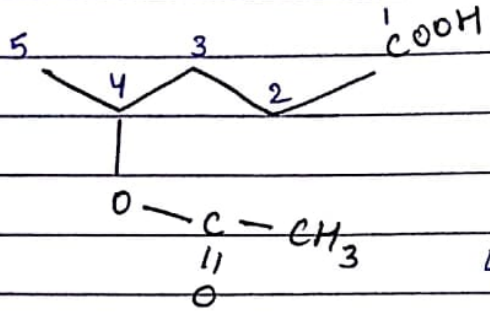
formyl methyl
4 - ~~Methyl formyl~~ - 5 - hexenoyl Chloride



4 - Bromo - 5 - keto Hexanal

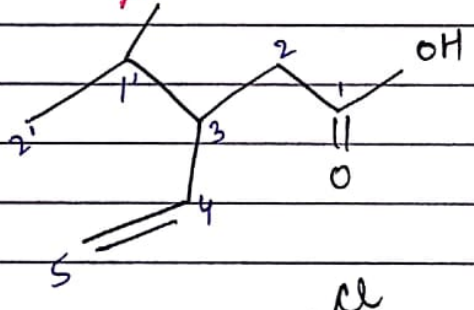


3 - amino - 3 - carbo amoyl
2 - hydroxy Prop
- 2 ene - ~~Chlor~~
oyl chloride

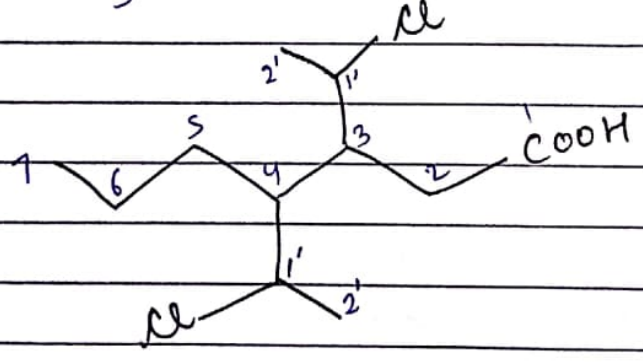


4 - ethanoyloxy pentanoic acid
or
4 - acetoxy Pentanoic acid

Complex Substitutent :-



3 isopropyl Pent - 4 - enoic acid
or
3 (1'-methyl ethyl) pent - 4 - enoic acid



bis - 3,4 - (1'- Chloroethyl) heptanoic acid

IUPAC name of Cyclic compounds :-

Rule (1) If an org. comp. is consist of open chains & closed chain then that chain will be PCC which have -

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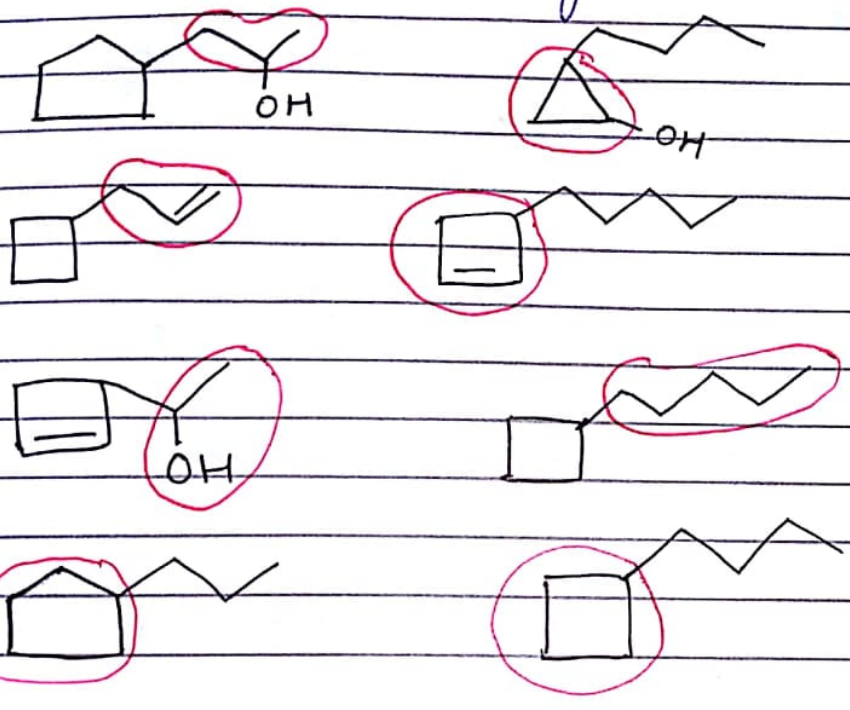
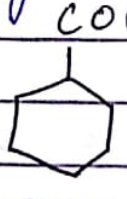
Pfg > max^{m} no. of mb. > max^{m} no. of C-atom or longest chain > ring if open & closed chain have same no. of C-atom



Rule-2 If C-containing Pfg is directly attached to ring then it is consider as part of ring but its C is not included in P.C.C.



cyclo hexane carboxylic acid

cyclo hexane carbonitrile

Numbering as usual

Note:- ① ring prefix → cyclo

② Word cyclo is considered in alphabetical order

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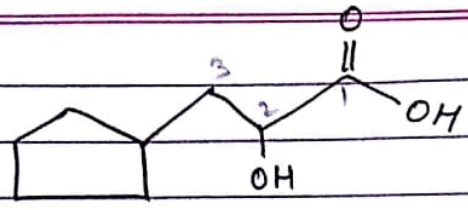
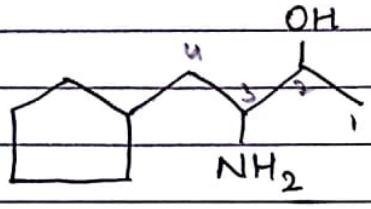
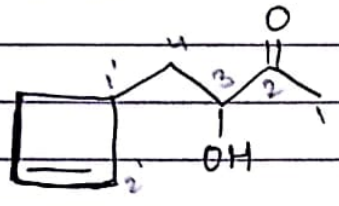


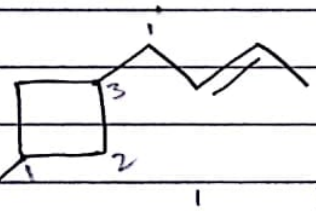
3-cyclo Pentyl-2-hydroxy Propanoic acid



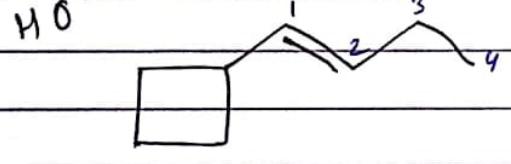
3-amino-4-cyclo Pentyl -Butan-2-ol



4 (2'-cyclobutenyl) -3-hydroxy -2-butanone

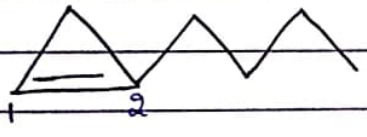


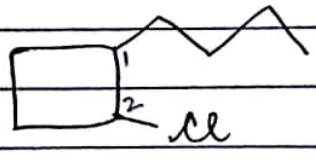
3 (2'-butenyl) butanol



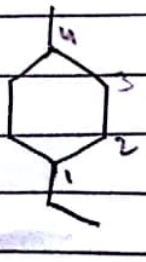
1-cyclo Butyl Buto-1-ene

2-Butyl-cyclo Propene





1-Butyl-2-Chloro-cyclo Butane



1-Ethyl-4-Methyl cyclo hexane

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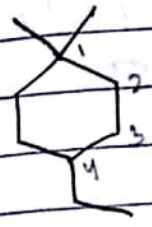
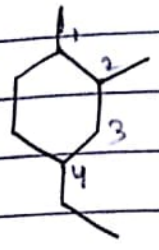
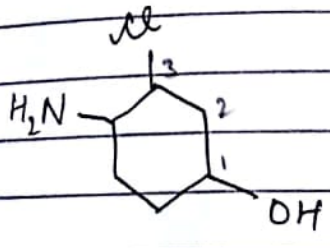


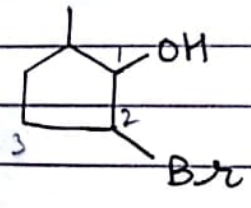
4-Ethyl-1,1-dimethyl cyclohexane.



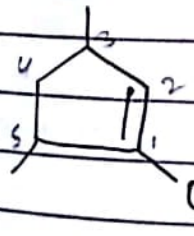
4-ethyl-1,2-dimethyl cyclohexane



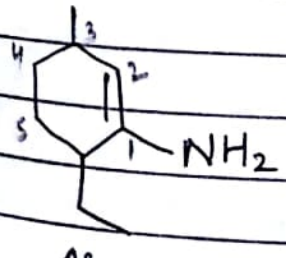
4-amino-3-chloro cyclohexanol



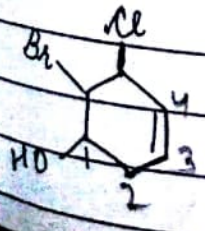
2-Bromo-5-methyl cyclo Pentanol



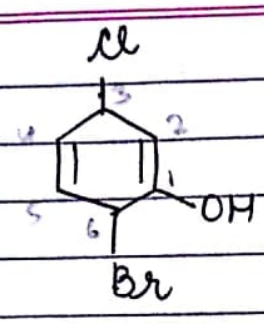
3,5-dimethyl cyclo Penteneol



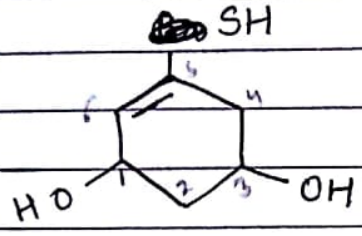
6-Ethyl-3-Methyl cyclo Hexeneamine



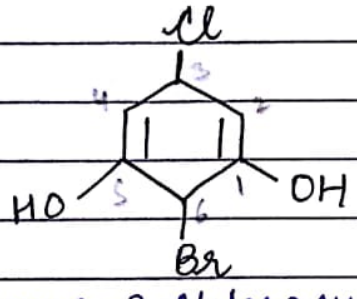
6-Bromo-5-Chloro-cyclohex-3-eneol

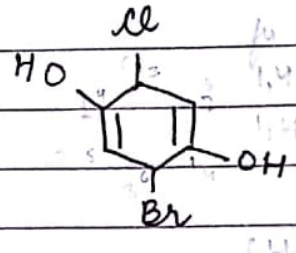


6 - Bromo - 3 - Chloro - cyclohex-1,4 - dienol



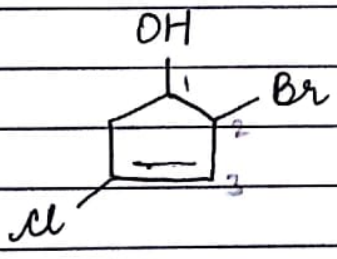
5 - mercapto - cyclo - hex - 5 - ene - 1, 3 - diol



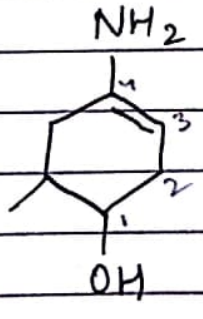


3 - Bromo - 6 - Chloro cyclohex - 1,4 - diene - 1,4 - diol

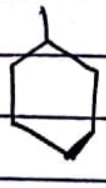
6 - Bromo - 3 - Chloro cyclohiex - 1,4-di-ene - 1,5 - diol



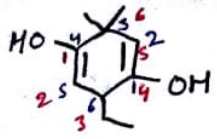
2 - Bromo - 4 - Chloro - cyclo Pent - 3 - enol



4 - amino - 6 - methyl - cyclo hex - 3 - ene ol



1 - carbonyl chloride - cyclohexane



Pf	mb	sb
1,4	1,4	3,3,6 ✓
1,4	1,4	3,6,6

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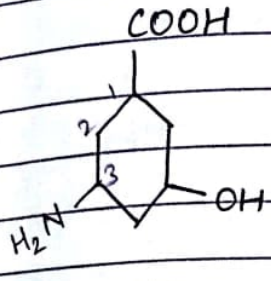
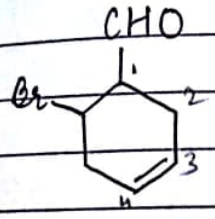
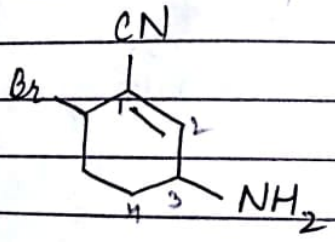
2- cyclo hexyl ethanal



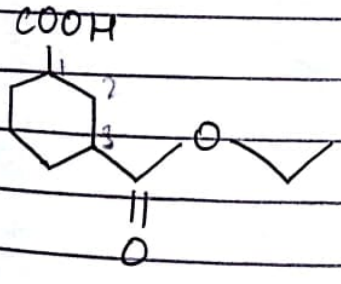
3 - amino - 5 - hydroxy - cyclo hexane carboxylic acid



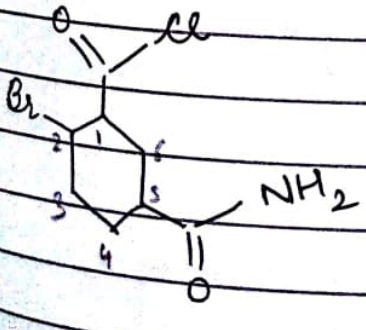
6 - Bromo - cyclo hex - 3 - ene - carbaldehyde



3 - amino - 6 - Bromo - cyclohexene carbonitrile



3 - ethoxy carbonyl - cyclo hexane carboxylic acid



2 - Bromo - 5 - carbamoyl cyclo - hexane carbonyl halide

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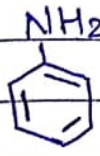
IUPAC Name of Aromatic


Benzene

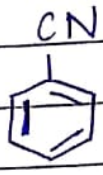

toulene


Phenol

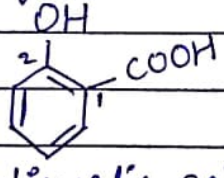

aniline

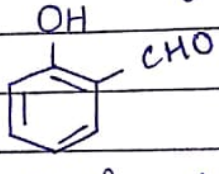

Benzoic acid

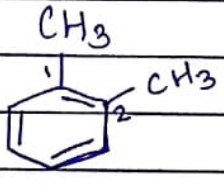

Benzaldehyde

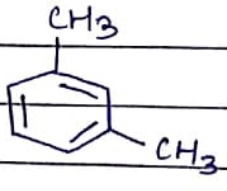

Benzonitrile


anisole

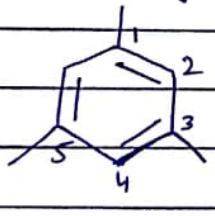

Salicyclic acid
2-hydroxy benzoic acid


Salicyaldehyde
2-hydroxy benzaldehyde


1, 2-dimethyl benzene
O-Xylene


m-Xylene

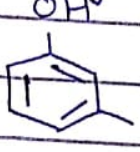

P-Xylene

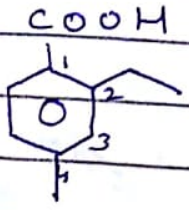

1, 3, 5-trimethyl benzene
or
mesitylene

Rule: ~~Its~~ If aromatic compd is consist of open and closed chain then PCC will be
(1) which have P func gp.
(2) Open chain if it have more than 2 carbon

(in case when fun^{c} gp not +nt)

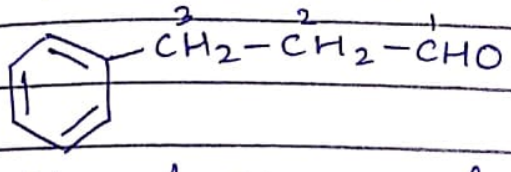
2-methyl Phenol
O-Cresol



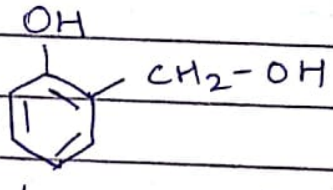


2-ethyl-4-methyl benzoic acid

2-phenyl ethanoic acid

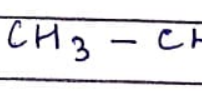


3-phenol propanal



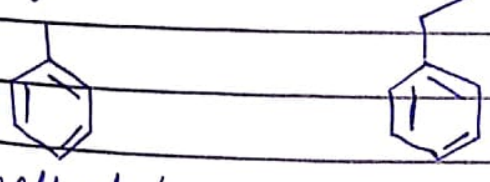
✓2-hydroxy methyl phenol
≡(2-Hydroxy phenyl)-methanol

OH → phenolic gp
Phenol

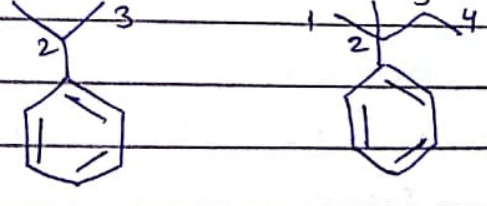


alcoholic gp

Alcoholic gp has more priority than phenolic gp.



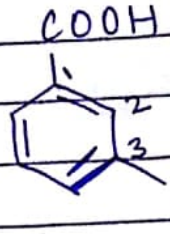
methyl benzene ethyl benzene



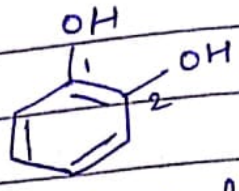
2-phenyl propane

1-Chloro-3 phenyl propane

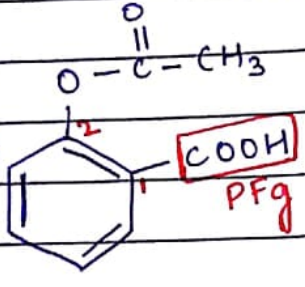
If more than 2 fun^{c} gp are ⊥nt



benzene-1,3-dicarboxylic acid

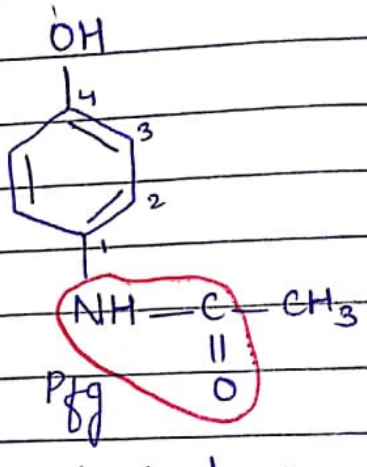


Catechol
benzene-1,2-diol

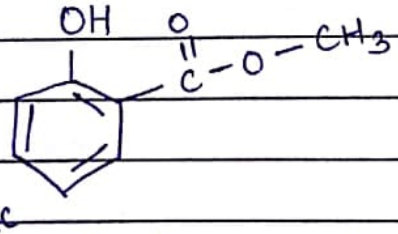


Aspirin

2-ethanoyl oxy benzoic acid
2-acetoxy benzoic acid
acetyl salicylic acid

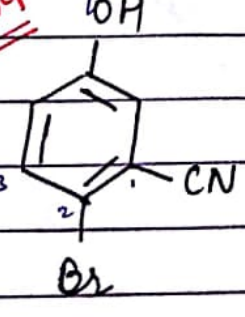


N-(4-hydroxy phenyl) ethanamide
Paracetamol



IUPAC
methyl-2-hydroxy Benzoate
common methyl salicylate
→"oil of winter green"

IIT-09



2-Bromo-5-hydroxy ~~phenyl cyano~~ benzo nitrile

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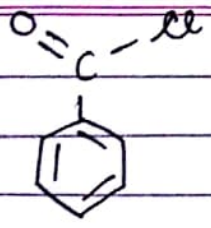
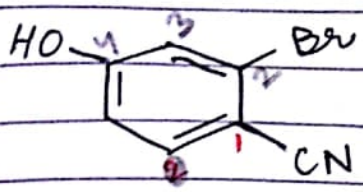
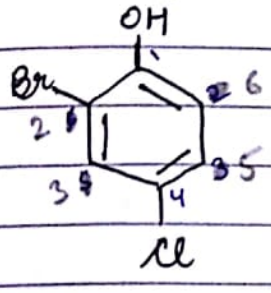


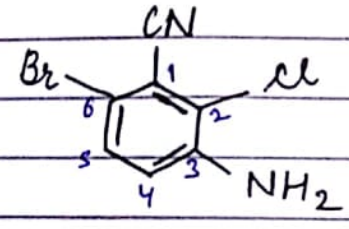
Benzene carbonyl chloride



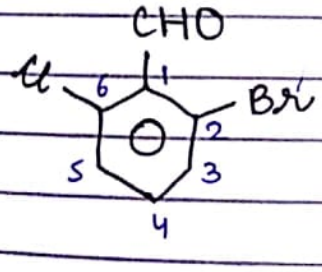
6 - Bromo - 4-hydroxy ~~benzene~~ benzo nitrile



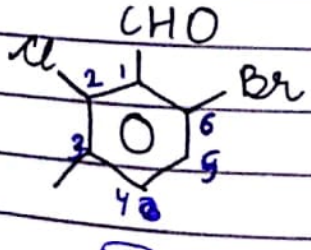
2 6 - Bromo - 4-Chloro - benzanol

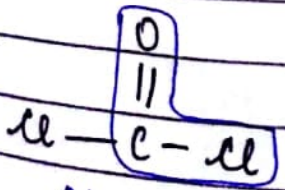


3 - amino - 6 - Bromo - 2 - Chloro ~~Cde~~
Benzo - nitrile.



2 - Bromo - 6 - Chloro - Benzaldehyde





Phosgene gas
poisonous gas
Chloro - ~~meth~~ anoyl chloride

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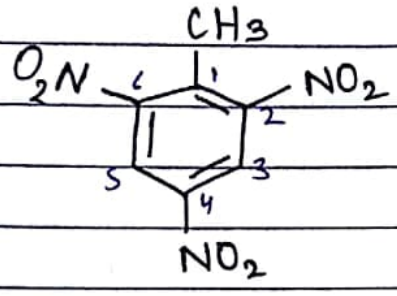
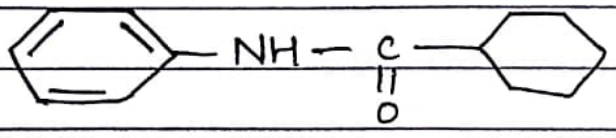
CCl_4 tetrachloro methane

$CHCl_3$ → chloroform / 1,1,1 - trichloro methane

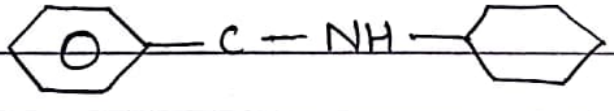
tear gas → $CCl_3.NO_2$
trichloro nitro methane



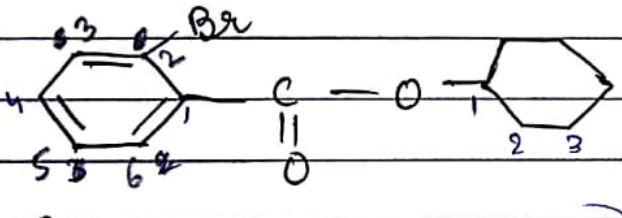
2,4,6 - trinitro toulene



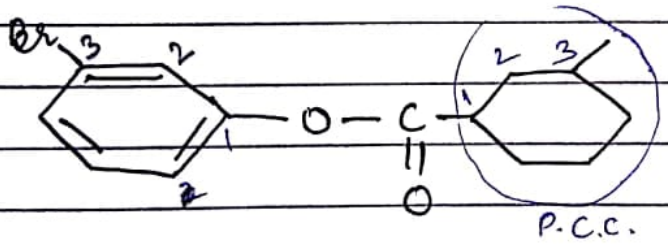
N - Phenyl ~~carbox~~ cyclo hexane carboxamide ~~hexane~~



N - cyclo - hexyl benzene carboxamide



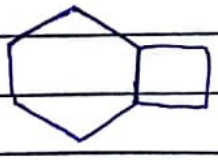
(4 - methyl cyclo hexyl) - 6 - Bromo Benzoate



(5 - bromo phenyl) - 3 methyl cyclo hexane carboxylate

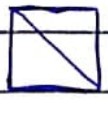
Bicyclo compounds

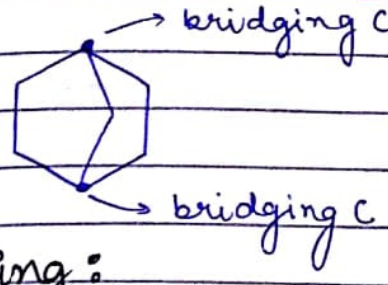
4 rings are fused



General formula → C_nH_{2n-2}

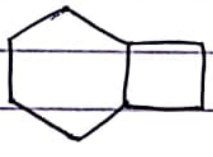
min C → 4C



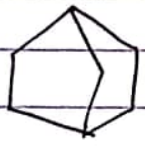


Naming:

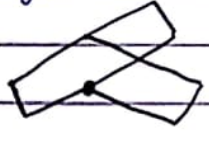
- Prefix → bicyclo
- no. of C-atoms in bridges are written in ↓ order in square bracket separated by full stop (.)
  [ ]
- word root → total no. of C-atom



bicyclo [4.2.0] Octane

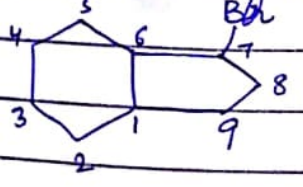


bicyclo [2.2.1] heptane

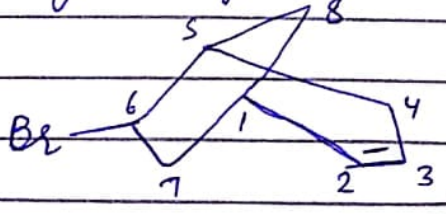


bicyclo [2.2.2] Octane

If subs. is +nt then numbering start from bridged carbon & then we move from large ring to small ring



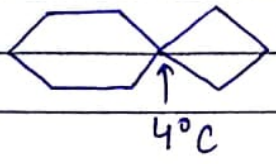
bicyclo [4.3.0] -7-Bromo nonane



bicyclo [3.2.1] 6-bromo-Oct-2-ene

Spiro - compounds :-

When 2 rings are fused at common carbon (4°C)

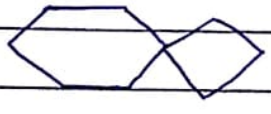
eg 

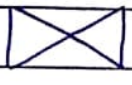
G.F. → C_nH_{2n-2}

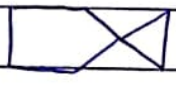
min. no. of C → 5C

Naming :-

- Prefix spiro
- no. of C atoms in ring are written in ↑ order
- word root, suffix.

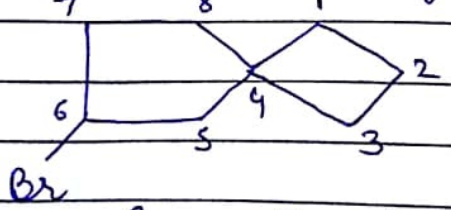
 Spiro [3.5] nonane

 Spiro [2.2] Pentane

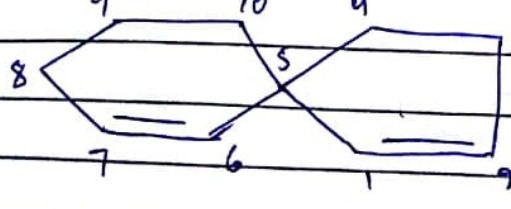
 Spiro [2.4] heptane

* Sub is +nt

Numbering starts from adjacent carbon to common C & move through smaller ring to large ring



Spiro [3.4] - 6 - Bromo Octane



Spiro [4.5] dec - 1, 6 - diene

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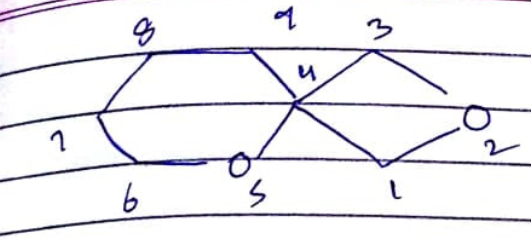
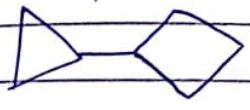
c)



spiro [3.5] 2,5 dioxa nonane

Extra different org i.e. no common carbon



1 - Chloro - 4 - Methyl benzene

4 - Chloro - toulene