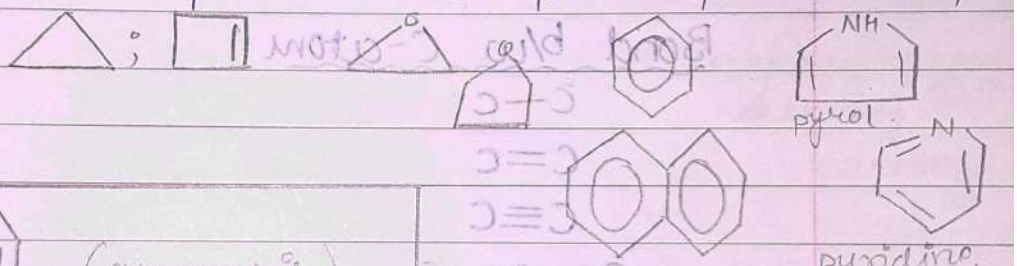
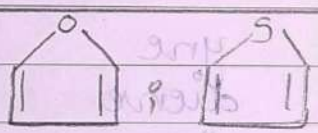
* Classification of organic compound:

- Open chain (acyclic) (aliphatic)
  - Saturated
  - Unsaturated
- Closed chain (cyclic)
  - Alicyclic
    - Homocyclic
    - Heterocyclic
  - Aromatic
    - Homocyclic
    - Heterocyclic





furan thiol (aromatic) (heterocyclic)

IUPAC (NOMENCLATURE):

- International Union of Pure and Applied Chemistry.

Prefix-2 +	Prefix-1 +	C. word root +	Suffix-1 +	Suffix-2.
(substituent)	(substituent)		(bond type)	(func. grp)

* Carbon word root: (Parent/main carbon chain)

C_1 = meth	C_5 = pent	C_9 = non	
C_2 = eth	C_6 = hex	C_{10} = dec	
C_3 = prop	C_7 = hept	C_{11} = undec	
C_4 = but	C_8 = oct	C_{12} = dodec	
C_{20} = icosane		C_{17} = heptadec.	

* Priority of ene > yne > ane.
* $-N\overset{+}{\equiv}C^{-}$

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* Prefix-1:

- it is used only for cyclic compound / molecule.
- always written as 'CYCLO'.

* Suffix-1:

- it tells us about saturation or unsaturation of a carbon atom.

Bond b/w C-atom	Suffix-1
C—C	ane
C=C	ene
C≡C	yne
C=C=C	diene
C≡C—C≡C	diyne
C=C—C≡C	enyne.

* Prefix-2:

- it is used for substituent group of an organic molecule or compound.
- it may be one or more than one.

Substituent	Name	Substituent	Name
$-R\ [C_nH_{2n+1}]$	Alkyl	$-NO_2$	Nitro.
eg: CH_3	methyl	$-OR$ (Ether)	Alkoxy
C_2H_5	ethyl	eg: $-OCH_3$	methoxy
C_3H_7	propyl.	$CH_2=CH_2 \xrightarrow{H^+(out)}$	Ethene + yl
$-X$ [Cl, Br, I]	Halo	$CH_2=CH-$ (Vinyl)	→ Ethenyl
eg: Br	bromo	$CH\equiv CH \xrightarrow{H^+}$	Ethyne + yl
I	iodo	$CH\equiv C-$ (Vinyl)	→ Ethynyl

oic = aliphatic
carboxylic = when benzene ring
(suffix)

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* Suffix-2: (main func. group / principle func. group)

	Functional group	Suffix-2	Prefix-2
1.)	$-COOH$	-oic acid or carboxylic acid	carboxy
2.)	$-SO_3H$	-sulphonoic acid	sulpho
3.)	$-CO-O-CO-$	-oic anhydride	
4.)	$-COOR$ / $-\overset{O}{\overset{\|\|}{C}}-OR$ (ester)	oate	Alkoxy carbonyl (when top 3 are ⊕)
5.)	$-COX$ / $-\overset{O}{\overset{\|\|}{C}}-X$ (acid halide)	-oyl halide	Halo carbonyl
6.)	$-CONH_2$ / $-\overset{O}{\overset{\|\|}{C}}-NH_2$ (amide)	-Amide	carbamoyl (Amino)
7.)	$-CN$ / $-C\equiv N$ (cyanide)	-nitrile	cyano.
(13) *	$-NC$ (Iso cyanide)	-isonitrile	
8.)	$-CHO$ (aldehyde)	-al	Formyl / oxo carbaldehyde
9.)	$-CO$ / $-\overset{O}{\overset{\|\|}{C}}-$ (ketone)	-one	Oxo / Keto
10.)	$-OH$ (alcohol)	-ol	Hydroxy
11.)	$-SH$ (Thiol)	-thiol	mercapto
12.)	$-NH_2$ (amine)	-amine	Amino

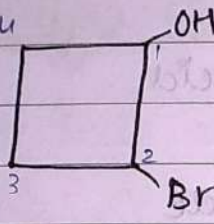
13) ene 14) yne 15) ane

1.) $CH_3-\underset{Cl}{\underset{|}{CH}}-CH_2-OH$

P_2 = 2-chloro P_1 = X
C = Prop S_1 = ane
S_2 = ol.

→ 2-Chloro Propan-1-ol
or 2-Chloro propanol.

2.)

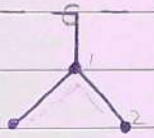


2-Bromo-Cyclo-butanol.
or 2-Bromo cyclo butan-1-ol.

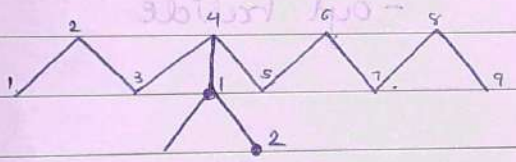
* Some complex substituent or locant or prefix-2:

(A) Isopropyl: (1-methyl ethyl)

V = iso

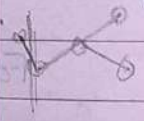


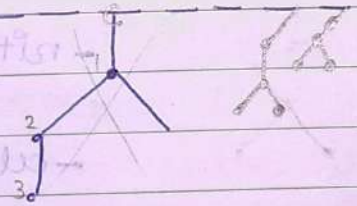
eg:



4-iso propyl nonane or 4-methyl ethyl nonane

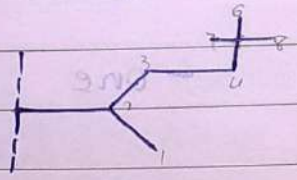
(B) Isobutyl:

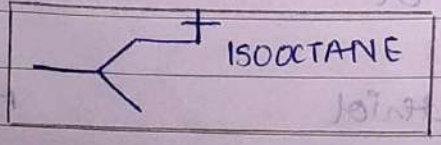




(1-methyl propyl)

(C) Isooctyl:

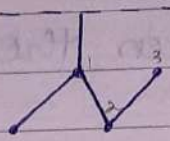




REASON: Before IUPAC nomencl, isooctane name was most popular in petroleum indu. So, the name is accepted as it is by the organisation.

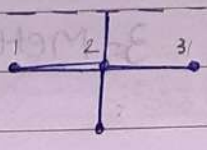
(B). $CH_3-CH(CH_3)-CH_3$ ISOBUTANE

(D.) Secondary butyl:
(2° butyl)



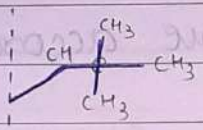
(methyl propyl)
≈ (iso butyl)

(E.) Tertiary butyl:
(3° butyl)

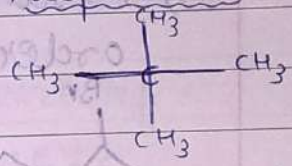


(2 methyl propyl)

(F.) Neopentyl:



* Neopentane:



* Nomenclature of alkane:

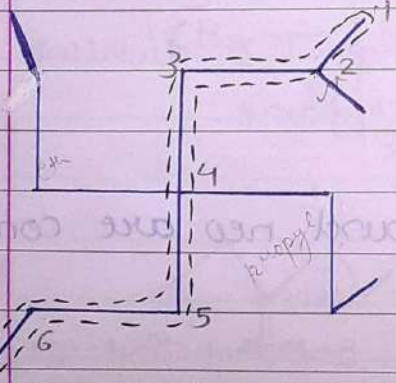
* Rules:

1.) Selecting longest carbon chain.

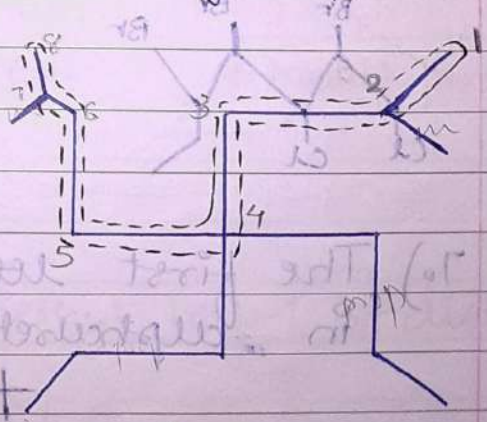
2.) if multiple chains having same number of carbon atoms than select the one having maximum number of locant or substituent.

3- Ethyl pentane

4- Methyl heptane.

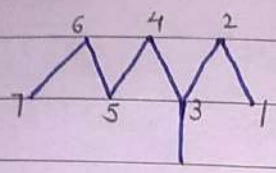


2-Methyl - 4,4- dipropyl heptane.



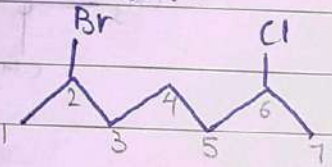
2,7- Dimethyl - 4,4- dipropyl octane.

3.) Locant is given the lowest number of carbon chain.



3-Methyl heptane.

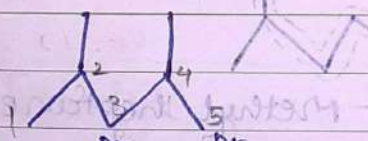
4.) Arranging locants name according to alphabetical order.



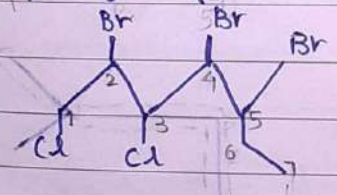
2-Bromo-6-chloro heptane.

5.) If 2 locants get same number on both the sides than we use alphabetical order.

6.) If the same locant appears more than one time over a chain, than they are indicated by prefixes such as di, tri, tetra, etc.

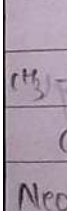


2,4-Dimethyl pentane.

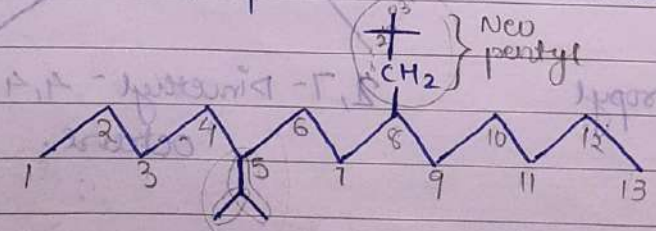


2,4,5-Tribromo-1,3-dichloro heptane.

7.) The first letter of iso and neo are considered in alphabetical order.



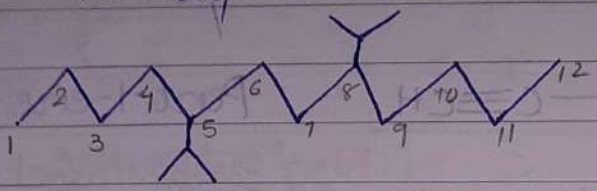
Neopentane



also,
5-Methyl ethyl-8-(2,2 dimethyl propyl) tridecane

5-Isopropyl-8-neopentyl tridecane

8.) In the case of secondary butyl and tertiary butyl, the word 'b' from butyl is considered in alphabetical order.

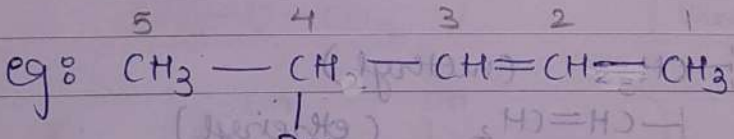


Bis (5,8-isopropyl) dodecane.

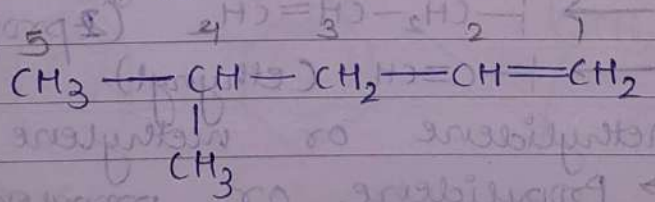
* NOTE:
→ use prefix for branch locant if found more than one time:
i.e. Bis, tris, teraris

* Nomenclature of alkene & alkyne:

* Rules:
1.) Give the lowest possible number to double and triple bonds in Carbon-chain over the locant or substituent.

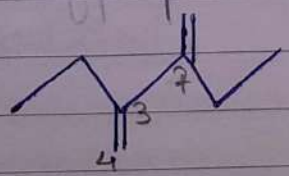


4-Bromo pent-2-ene ← (4-Bromo 2-pentene)

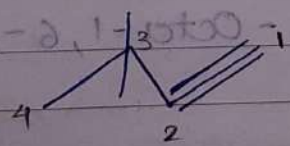


4-Methyl pent-1-ene

eg: Q:



2,3-Diethyl buta-1,3-diene



3,3-Dimethyl but-1-yne
butyne

2.) When both double bond and triple bond are present at symmetrical position then priority is given to double bond.

eg: $\overset{1}{CH_2}=\overset{2}{CH}-\overset{3}{CH_2}-\overset{4}{C}\equiv\overset{5}{CH}$ ✓ Pent-1-en~~X~~-4-yne

∴, 1,4 Pentadiyne

3.) If both double bond and triple bonds are present in the parent carbon chain (unsymmetrically arranged) then follow lowest locant (number) rule.

eg: $\overset{1}{CH}\equiv\overset{2}{C}-\overset{3}{CH_2}-\overset{4}{CH}=\overset{5}{CH}-\overset{6}{CH_3}$ (1,4) ✓ (2,5) ✗

∴, 2 Hex-4-en~~X~~-1-yne

(4,1 Hexenyne)

* Some unsaturated locant (substituent):

a.) $CH_4 \longrightarrow -CH_3$ (methyl)

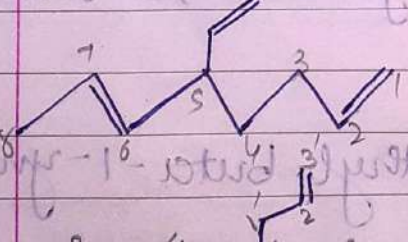
b.) $CH_2=CH_2 \longrightarrow -CH=CH_2$ (ethenyl)

c.) $CH_3-CH=CH_2 \longrightarrow -CH_2-CH=CH_2$ (2-propenyl)

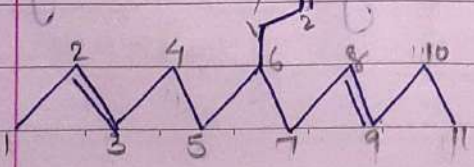
d.) $CH\equiv CH \longrightarrow -C\equiv CH$ (ethynyl)

e.) $=CH_2 \longrightarrow$ Methylidene or methylene

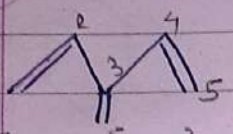
f.) $=CH-CH_2-CH_3 \longrightarrow$ Propylidene or ~~propylene~~

eg: 

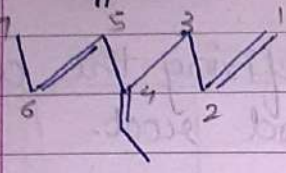
5-Ethenyl-Octa-1,6-diene

eg: 

6-(Prop-2'-enyl)undeca-2,8-diene.

eg: 1 

3- Methylene Penta-1,4-diene.

eg: 

4- Ethylidene hepta-1,5-diene.

* Homologous Series:

- sequence of compounds having same functional group in which the member of series can differ by molecular formulae of CH_2 and molecular mass of 14 amu.

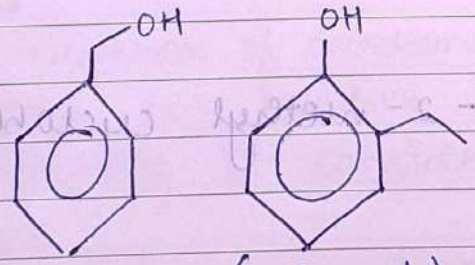
eg: * Homologous series of Alkane: (mol. wt = 14 amu)

CH_4, C_2H_6, C_3H_8 } CH_2, CH_2

Of Alcohol:

CH_3OH, C_2H_5OH, C_3H_7OH } CH_2, CH_2

* CH_3OH, CH_3-O-CH_3 } CH_2 [are not homologous as they've diff. functional group]

* 

benzyl alcohol (phenol) } CH_2 [not homologous] [2 diff. func. groups] [alcohol diff. from phenol]