Nomenclature

IUPAC

Alkane

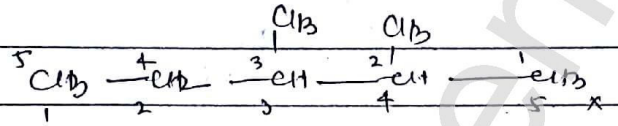
1. Select the continuous longest chain
2. Numbering the parent chain
3. Substituent will keep the Lowest position

(i) CH_3 → Substituent

$CH_3-CH_2-\underset{|}{\overset{(CH_3)}{CH}}-CH_2-CH_3$

3-methyl pentane

(ii)

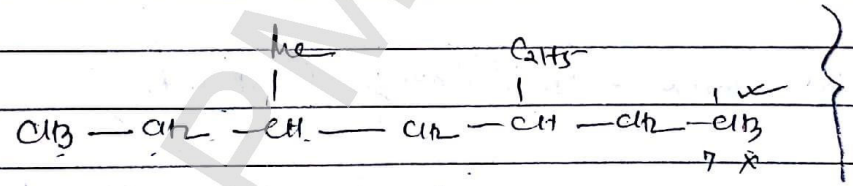


LHS – 3, 4 X
RHS – 2, 3 ✓
Never apply Sum rule

2, 3-dimethyl pentane

Apply first point difference rule

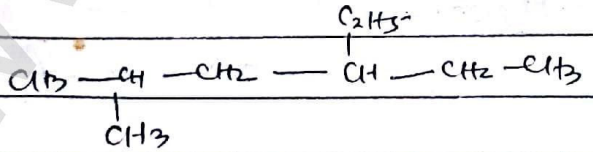
(*)



LHS 3, 5
RHS 3, 5
First Point Priority difference case

So priority on the basis of alphabates

3-ethyl-5-methyl heptane



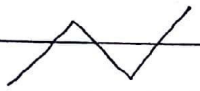
LHS 2, 4
RHS 3, 5

4-ethyl-2-methyl hexane

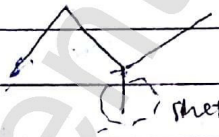
(*) $CH_3-CH_2-CH_2-CH_2-CH(1'CH-CH_3)(2'CH-CH_3)(3'CH_3)-CH_2-CH_2-CH_2-CH_3$

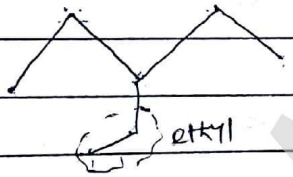
5 - [1',2' - dimethyl pentyl / Propyl] nonane

Bond line structure :



n- butane





Write IUPAC name of following compound.

(1) $CH_3-CH(C_2H_5)-CH_2-CH_3$

3- methyl Pentane

(2) $(CH_3)_2CH-CH_2-CH_2-CH_3$

2 - Methyl Pentane

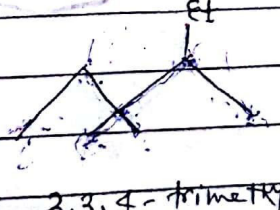
(3) $(CH_3)_2-CH-(CH_2)_2-CH(C_2H_5)_2$

3-ethyl-6-methyl heptane / 1- ethyl - 6-methyl hexane / 5-ethyl-2-methyl heptane

(4) $CH_3-CH(CH_3)-CH(CH_3)-CH_2-CH(C_2H_5)-CH_3$

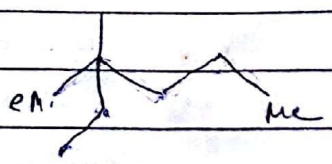
2, 3, 5- trimethyl heptane

(5)



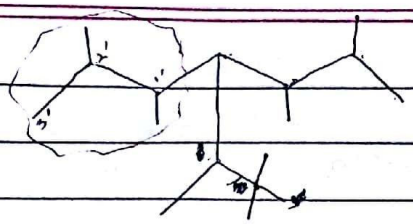
3,3,4 - trimethyl hexane

(6)



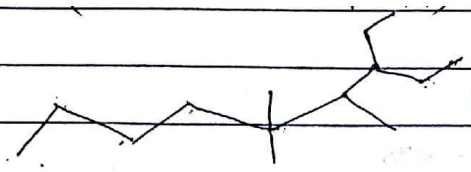
3,3- dimethyl hexane

(7)



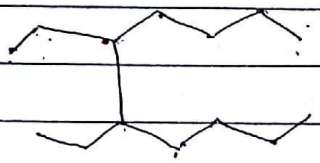
2,2,3,5,6-pentamethyl 4-(1'2'-dimethyl propyl) heptane

(8)



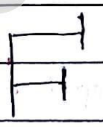
3-ethyl-4,5,5-trimethyl nonane

(9)



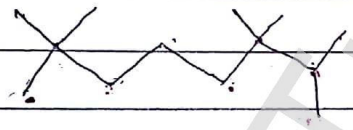
5,6-diethyl decane

(10)



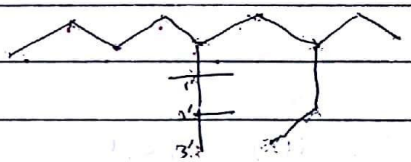
2,3,5-trimethyl hexane

(11)



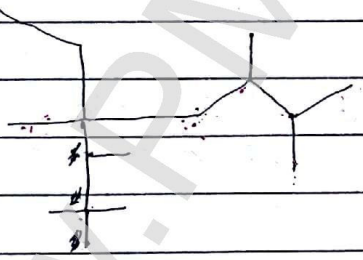
2,2,6,6,7-pentamethyl octane

(12)



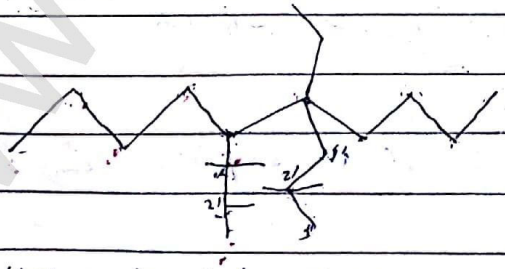
3-ethyl-5(1',1'2'-trimethyl propyl) nonane

(13)



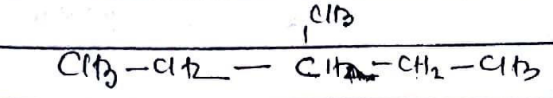
4-ethyl-2,2,3,4,6,7-hexamethyl octane

(14)



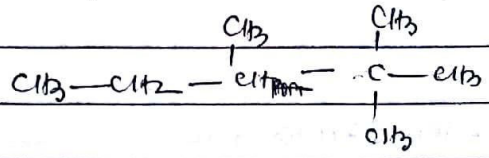
5-ethyl-5-(2',2'-dimethyl propyl)-6(1',1',2'-trimethyl propyl) decane

(15) Ethyl + sec butyl



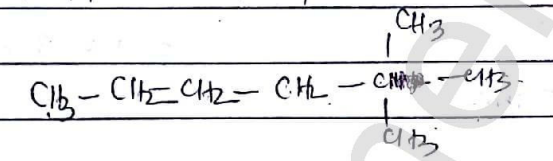
3-methyl pentane

(16) Sec butyl + t-butyl



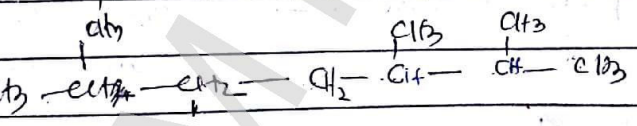
2,2,3 - trimethyl pentane

(17) n - Propyl + neopentyl



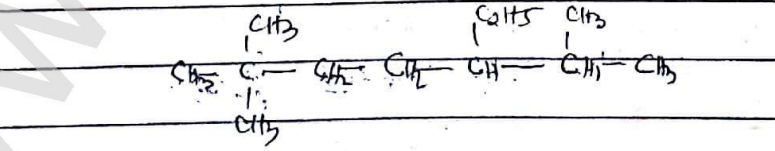
2,2-dimethyl hexane

(18) iso butyl + (2,3 - dimethybutyl)



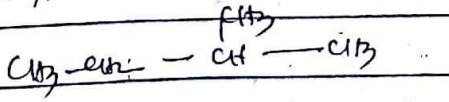
2,3,5 - trimethyl heptane

(19) (2,2 - dimethyl propyl) + (2 - ethyl-3 - methyl butyl)



5 - ethyl - 2,2,6 - trimethyl heptane

(20) Ethyl + iso propyl



2 - methyl butane

Write the correct IUPAC name

(1) 2-isopropyl butane

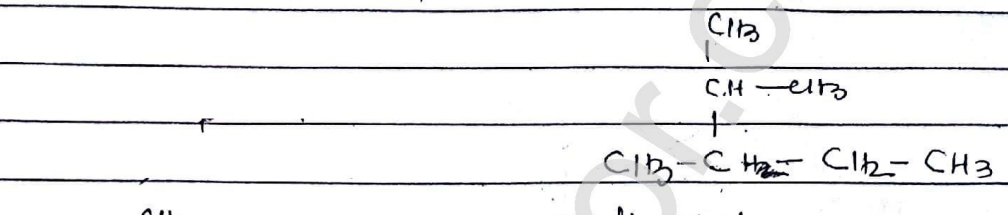
(2) 2-ethyl pentane

(3) 2,4-diethyl pentane

(4) 2,2-dimethyl-3-ethyl butane

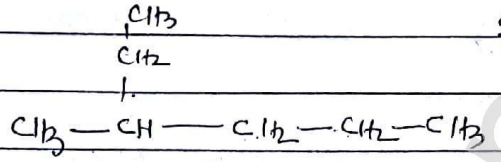
(5) 2,2-diethyl-4,5-dimethyl hexane

(1)



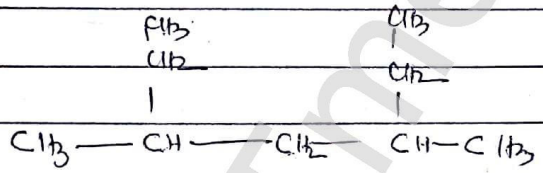
2,3-dimethyl pentane

(2)



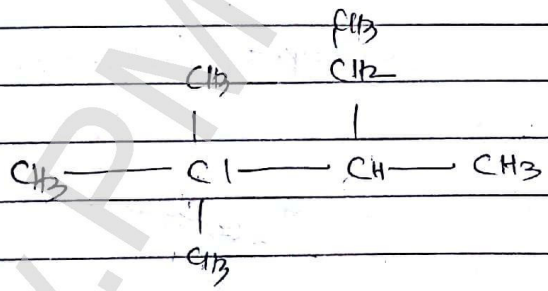
3-methyl hexane

(3)



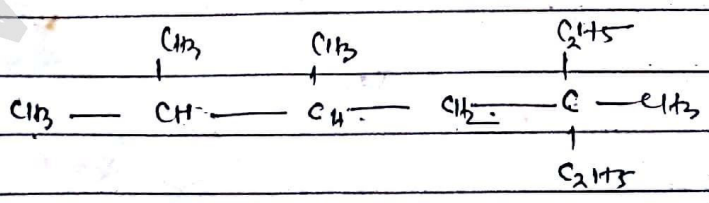
3,5-dimethyl heptane

(4)



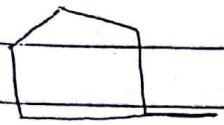
3,4,4-trimethyl pentane 2,2,3-trimethyl pentane

(5)

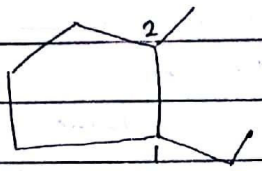


5-Ethyl-2,3,5-trimethyl heptane

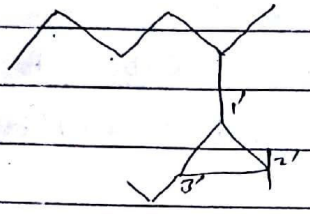
Cycloalkane



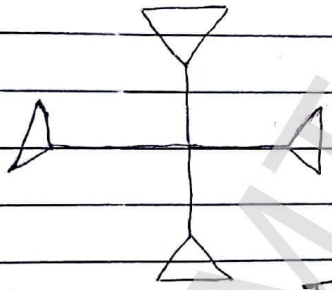
Methyl cyclopentane



1-ethyl-2-methyl cyclopentane

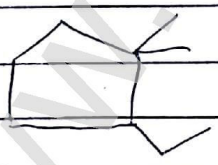


2-[3'-ethyl-2',2'-dimethyl cyclopropyl] hexane



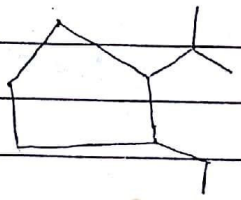
Tetracyclopropyl methane

(1)



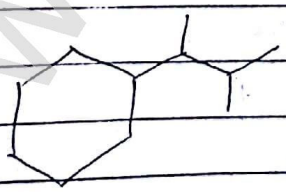
2-ethyl-1,1-dimethyl-~~2-ethyl~~ pentane

(3)



1-ethyl-2-isopropyl cyclopentane

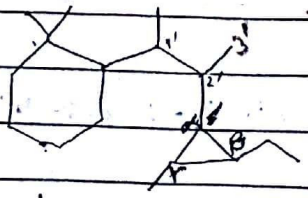
(3)



1-[1',2'-dimethyl propyl] cyclohexane

[1',2'-dimethyl propyl] cyclohexane

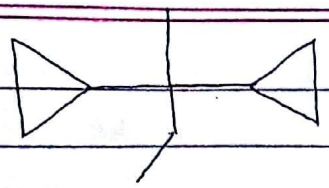
(4)



1,1-dimethyl-2-[1',2'-dimethyl-3'-(2''ethyl-3''methyl cyclopropyl)

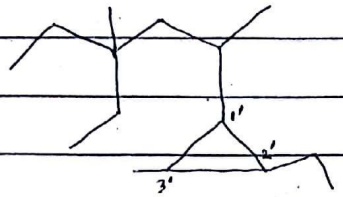
2 - [2'- (β-ethyl-γ-methyl cyclopropyl) - 1'- methyl propyl] cyclohexane

(5)



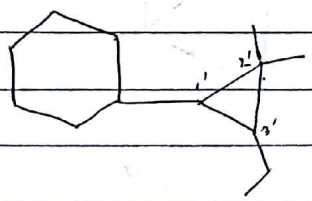
2,2 - dicyclopropyl butane

(6)



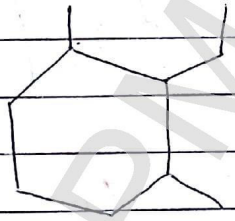
2-[2'-Ethyl - 3'- methyl cyclopropyl] - 4-ethyl - 4- methyl hexane

(7)



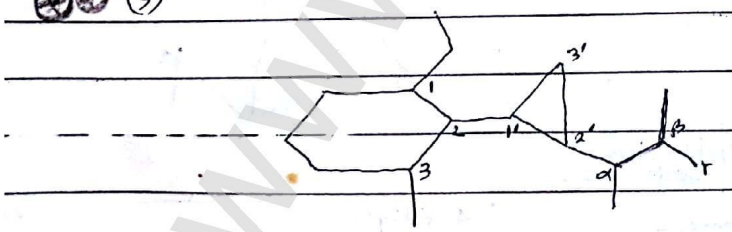
3'- ethyl - 2', 2'- dimethyl cyclopropyl cyclo hexane

(8)



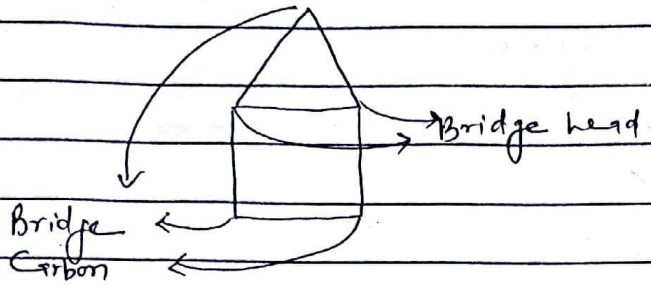
2- ethyl - 1,3- dimethyl cyclohexane

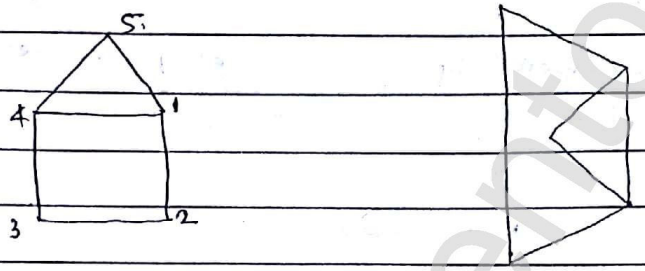
(9)



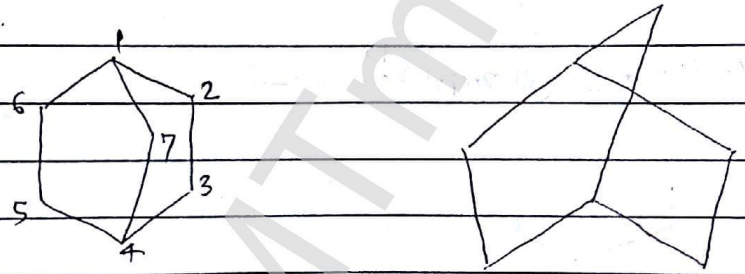
2-[2'- (α,β-dimethylpropyl) cyclopropyl] - 1- ethyl-3-methylcyclohexane

Bicyclo Compound



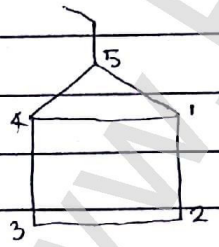


Bicyclo [2-1-0] Pentane



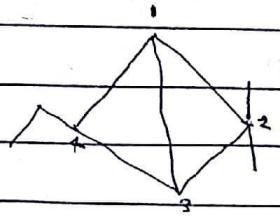
Bicyclo [2,2,1] heptane

(1)



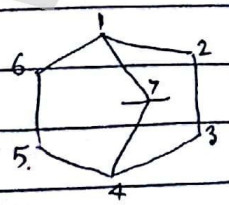
5-ethyl- bicyclo [2,1,0] pentane

(2)



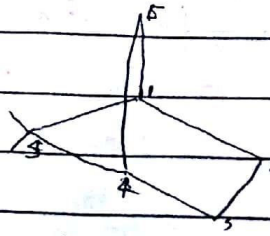
4-ethyl-2,2-dimethyl Bicyclo [1,1,0] butane

(3)



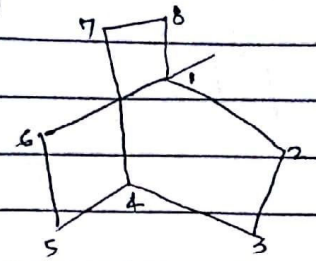
7,7-dimethyl-Bicyclo [2,2,1] hexane

(4)



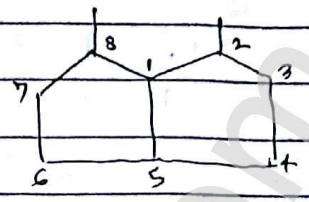
5,5-dimethyl Bicyclo [2,1,1] hexane

(5)



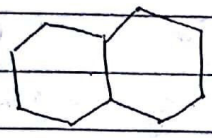
1-methyl Bicyclo [2,2,2] octane

(6)



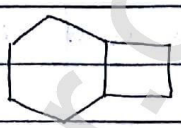
2,8-dimethyl Bicyclo [3,3,0] octane

(7)



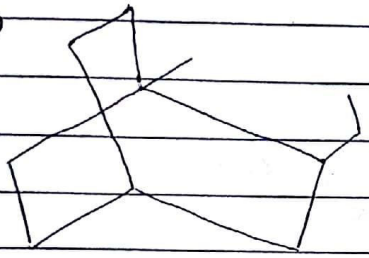
Bicyclo [4,4,0] decane

(8)



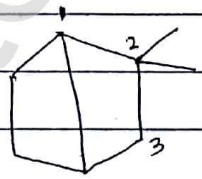
Bicyclo [2,2,0] octane

(9)

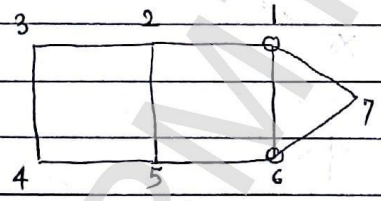


2-ethyl-1-methyl Bicyclo [2,2,2] octane

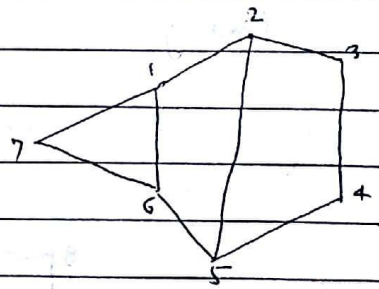
(10)

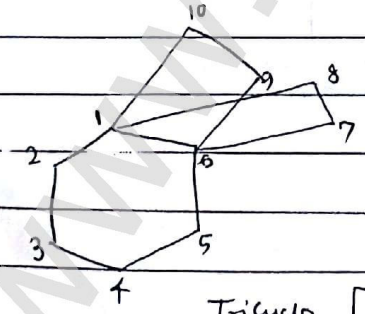


2,2-dimethyl Bicyclo [2,2,0] hexane

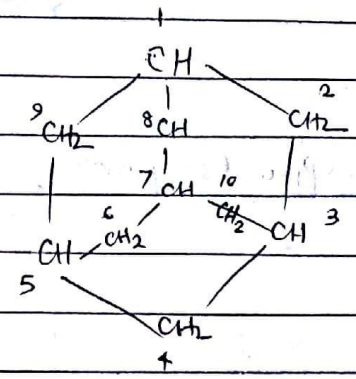


Tricyclo $[4,1,0,0^{2,5}]$

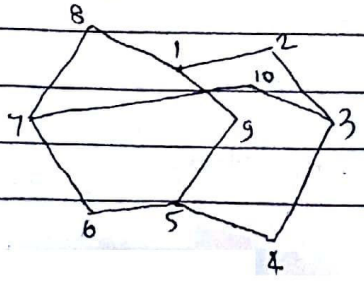


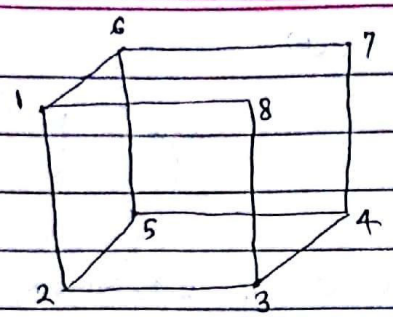


Tricyclo $[4,2,2,0^{1,6}]$



Tricyclo $[3,3,1,1^{3,7}]$ decane





Number of ring = No of H in Corresponding alkane
- No of Hydrogen in given MF

$= \frac{H_{18} - H_8}{2}$

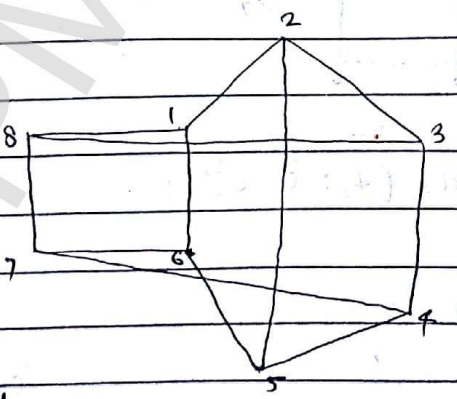
$= \frac{10}{2}$

$= 5$

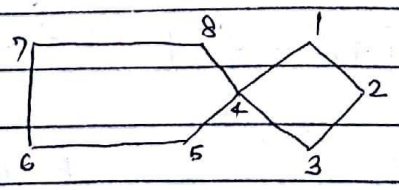
→ Pentacyclo

Pentacyclo $[4,2,1,0,0^{2,5},0^{3,8},0^{6,7}]$ ✗

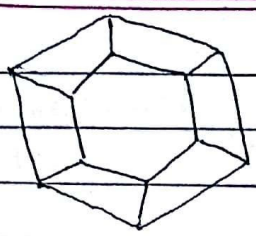
Pentacyclo $[4,2,1,0,0^{2,3}0^{4,5},0^{7,8}]$ ✓



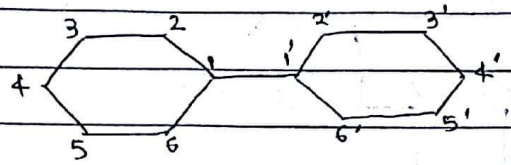
Spiro Compound



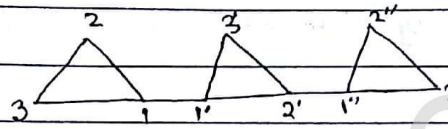
Spiro[3,4] Octane



2- Bicyclo
3- Tercyclo
4- Quate
5- Quinicques

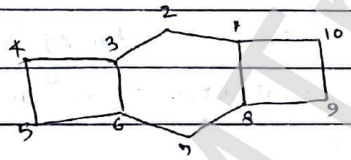


1,1'-bicyclohexane



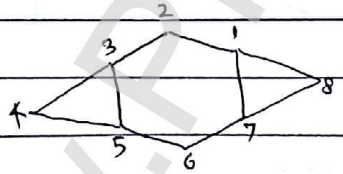
1, 1', 2', 1''-tercyclopropane

(i)



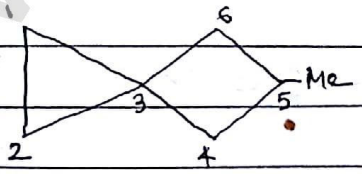
Tricyclo [6,2,0,$O^{3,6}$] decane

(ii)



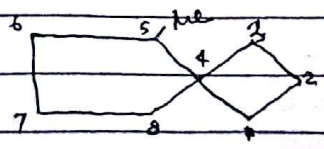
Tricyclo [5,1,0,$O^{3,5}$] octane

(iii)



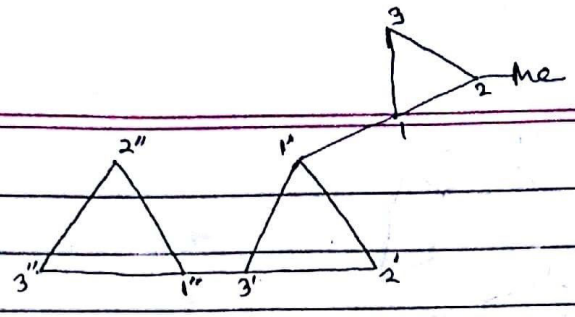
5-Methyl-Spiro [2,3] hexane

(iv)

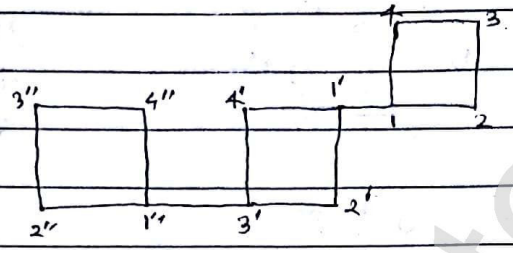


5-Methyl Spiro [3,4] octane

(v)



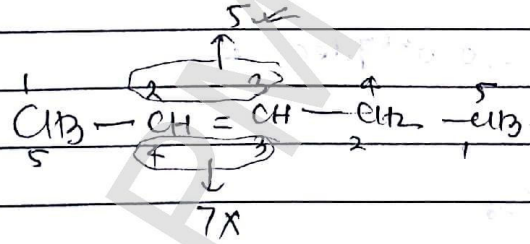
(vi)



1, 1', 3', 1" – tercyclobutane

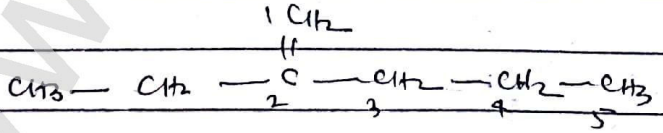
Alkene & Alkyne

1. Select the longest continuous chain containing multiple bond.
2. Multiple bond containing Carbon will keep the lowest position



7X

2-Pentene
Pent-2-ene
Pentene-2



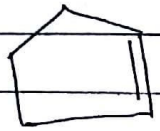
2-Ethyl-1-pentene

2 double bond – Alkadiene
3 Alkatriene

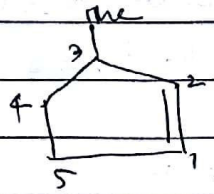
$CH_2 = CH - CH_2 - CH = CH_2$

1, 4 - Pentadiene

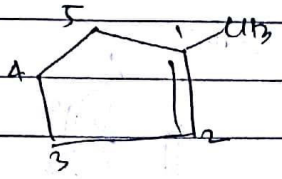
Pentene - 1, 4 - diene



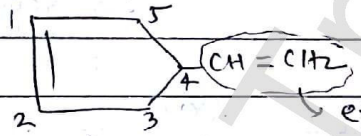
Cyclopentene



3- methyl cyclopentene

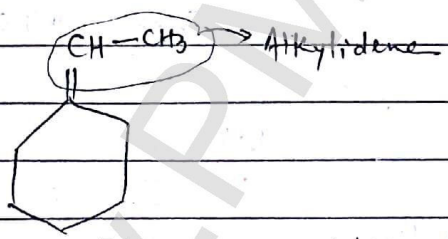


1- Methyl cyclo pentene



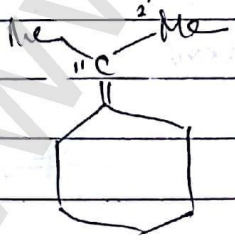
4 - ethenyl cyclopentane

(iv)



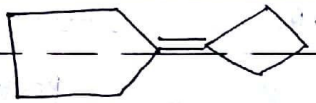
Ethylidene cyclohexane

(v)



(1' methylethylidene) cyclohexane

Isopropylidene cyclohexane



Cyclobutylidene cyclo[illegible]

(vi)

Methylenecyclohexane

$Me - C \equiv C - CH_2 - CH_3$

2-Pentyne

(x) $CH_3 - C \equiv C - CH_2 - C \equiv CH$

Hexane-1,4-diyne Hex-1,4-diyne

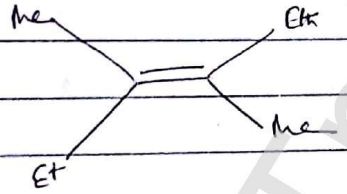
or

1,4-hexadiyne

(i) Me — — Me

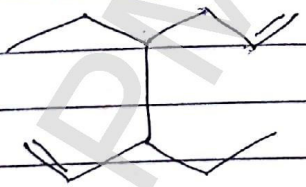
2-butene

(ii)



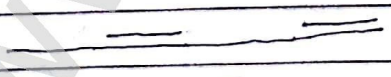
3,4-dimethyl-3-hexene

(iii)



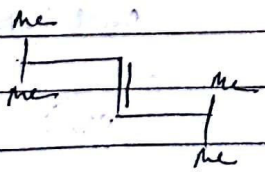
3,4-diethyl-1,6-heptadiene

(iv)



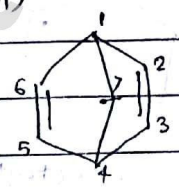
1,3-Pentadiene

(v)



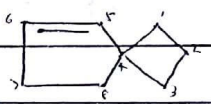
2,5-dimethyl-3-hexene

(xiii)



7,7-dimethyl bicyclo [2,2,1] -2,5-heptadiene

(xiv)

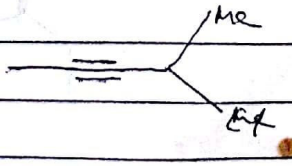


Spiro [3,4] 5-octene

(xv)

1-Propyne

(xvi)



4-methyl-2-hexyne

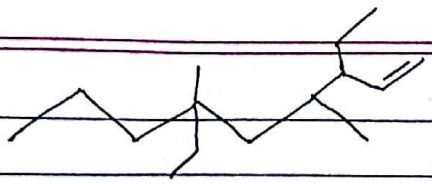
(xvii) Allyl + vinyl

Vinyl Allyl

$CH_2 = CH - CH_2 - CH = CH_2$

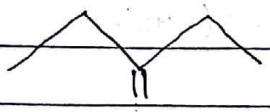
Pentane-1,4-diene

(vi)



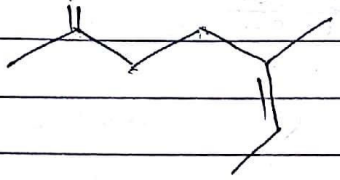
3,6-diethyl-4,6-dimethyl-1-nonene

(vii)



2-ethyl-1-butene

(viii)

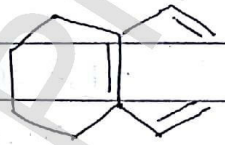


2,5-dimethyl-1,5-heptdiene

(ix)

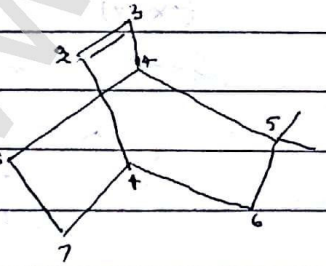
3-(1'-propenyl)cyclopentene

(x)



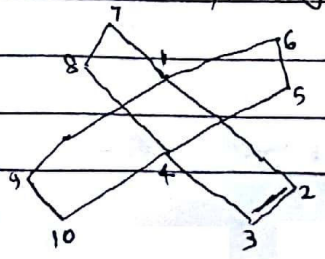
1,2-diethenyl cyclohexene

(xi)



5,5-dimethyl bicyclo[2,2,2]-2-octene

(xii)



(xviii) Allyl + isopropenyl

$CH_2=CH-CH_2-C(=CH_2)-CH_3$

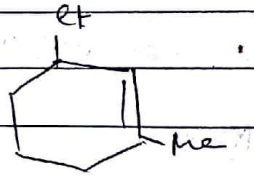
2-methyl-1,4-pentadiene

(xix) Allyl + t-butyl

$CH_2=CH-CH_2-C(CH_3)_2-CH_3$

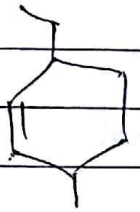
4,4-dimethyl-1-pentene

(xx)



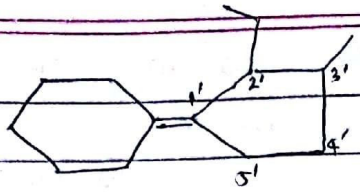
3-Ethyl-1-methyl cyclohexene

(xxi)



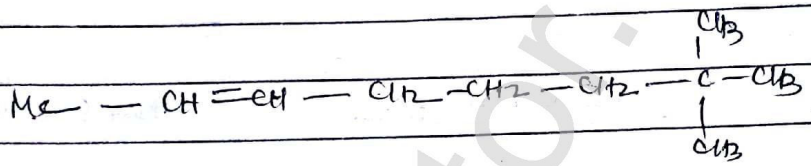
3-Ethyl-6-methyl cyclohex

(xxii)



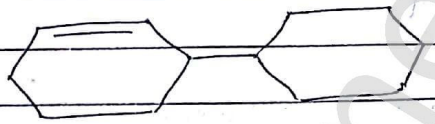
2'-ethyl-3'-methyl cyclopentyledene cyclohexane

(xxiii) $Me-(CH)_2-(CH_2)_3-C(CH_3)_3$



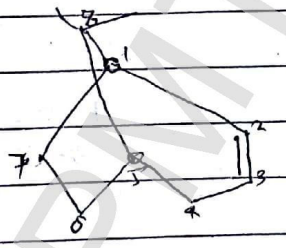
7,7-dimethyl-2-octene

(xxiv)



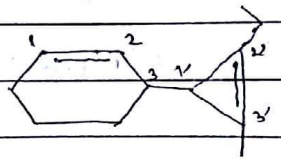
3-cyclohexyl cyclohexene

(xxv)



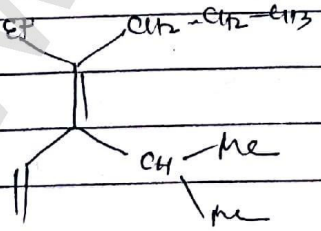
8,8-dimethyl

(xxviii)



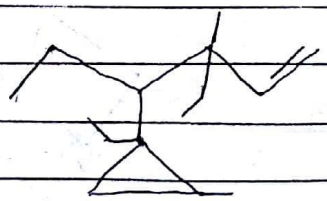
3[2'-ethyl-3'methyl-2'-cyclopropyl] cyclohexane

(xxvi)

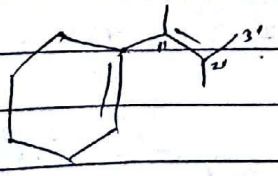


4-ethyl 3(1'

(xxix)

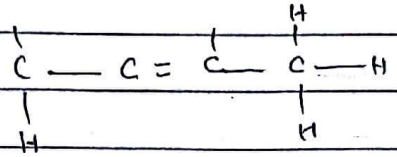


(xxvii)



1',2'-dimethyl-1'-propenyl cyclohexene

3- ethyl - 2 - butenyl + isopropenyl



Compound Containing both double & Triple bond.

Alkenyne

1. If the double & triple bond both having same position then double bond will kept keep lowest position
2. If the double & Triple bond have different position then priority on the basis of lowest position.

$\overset{1}{C}H_2 = \overset{2}{C}H - \overset{3}{C}H_2 - \overset{4}{C} \equiv \overset{5}{C}H$

Pent-1-en-4-yne

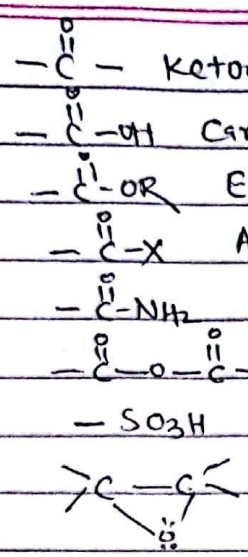
$\overset{6}{C}H_2 - \overset{5}{C}H = \overset{4}{C}H - \overset{3}{C}H_2 - \overset{2}{C} \equiv \overset{1}{C}H$

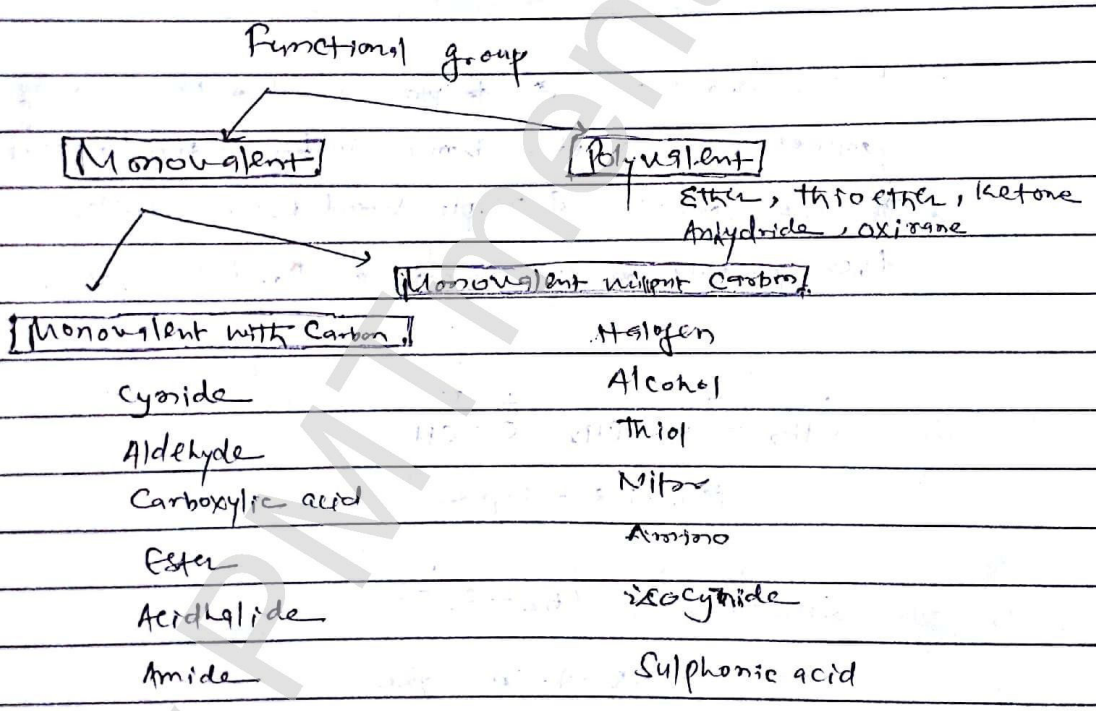
Hex-4-en-1-yne

Functional group

Atom or gr attached to the Compound which determine physical & chemical property

$-X$	Halogen	$-NO_2$	Nitro
$-\ddot{O}H$	Alcohol	$-\ddot{N}H_2$	Amino
$-\ddot{O}R$	Ether	$-CN$	cyanide
$-SH$	Thiol	$-\overset{\oplus}{N}\equiv\overset{\ominus}{C}$	iso cyanide
$-SR$	Thioether	$-\overset{O}{\overset{\|}{C}}-H$	Aldehyde

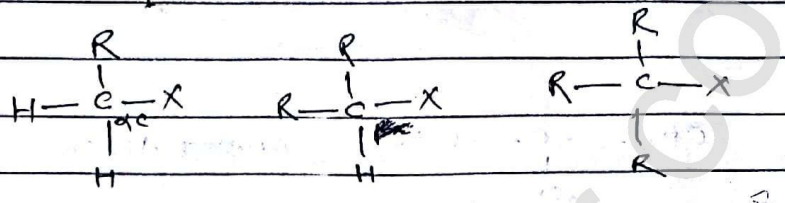




① Halogen (–X)

Alkyl Halide

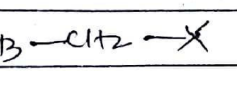
1° 2° 3°



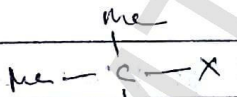
Primary Secondary Tertiary

Common name of monoalkyl halide :-

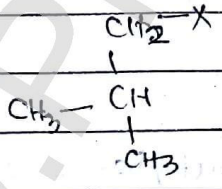
CH_3-CH_2-X Ethyl halide



isopropyl halide

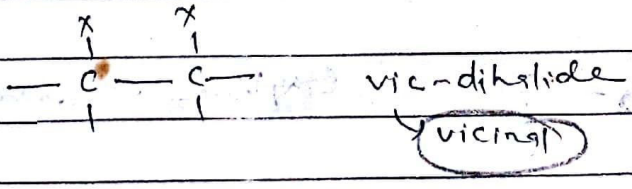


t-butyl halide



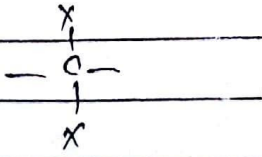
isobutyl halide

Dihalide



vic-dihalide

(vicinal) VC



gem-dihalide

(geminal) gm

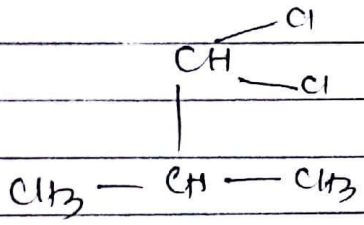
Gemini

Twin

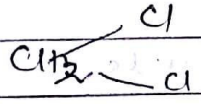
(*) $CH_3-CH(X)_2$ Ethylidene halide

Looks like $CH_3-CH=$

$CH_3-C(Cl)_2-CH_3$ Isopropylidene chloride

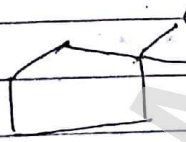


Isobutylidene chloride

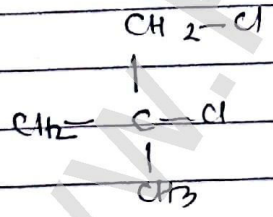


Methylidene chloride

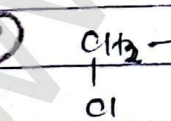
Methylene chloride



Cyclopentylidene chloride

(*) 

Isobutylene chloride

(*) 

Ethylene chloride

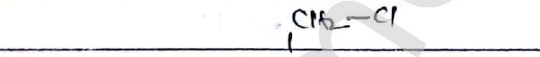
IUPAC name of Halogen Containing organic Compounds.

1. Select the continuous longest chain containing functional group.
2. Functional group containing Carbon atom will keep the lowest position.

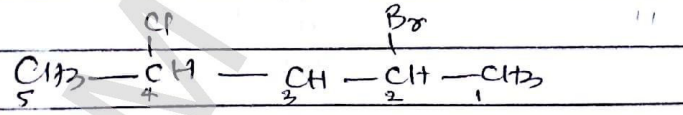
Note:— If the chain is longest without functional group then function go Can be excluded

Haloalkane

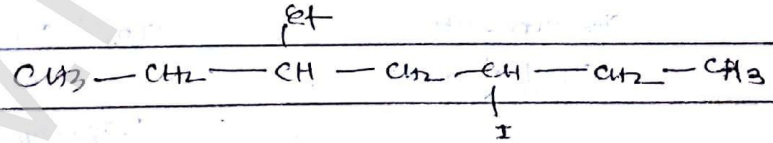
2-Chloro butane



3-Chloromethylpentane

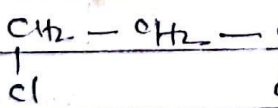


2-Bromo 4-Chloropentane



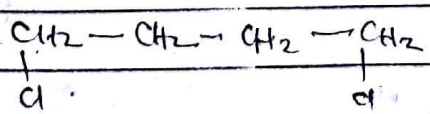
3-ethyl-5-iodoheptane

(x)



Trimethylene chloride

(xi)



Tetramethylene chloride

(2) Alcohol

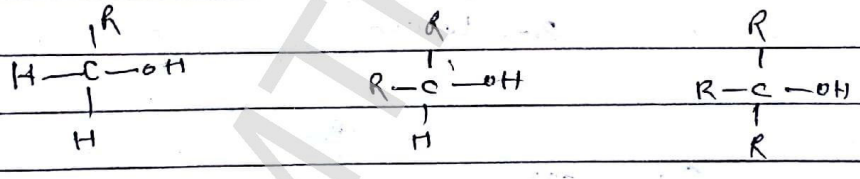
Monohydric — Polyhydric

$CH_3-CH_2-\ddot{O}H$

CH_2-OH
CH_2-OH
Glycol

CH_2-OH
$CH-OH$
CH_2-OH
Glycerol

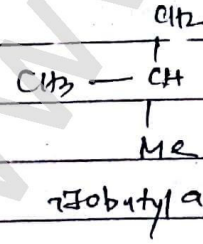
1° alcohol — Primary
2° alcohol — Secondary
3° alcohol — Tertiary

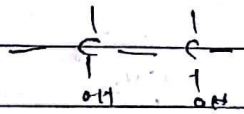


Common name

CH_3CH_2-OH
Ethyl alcohol

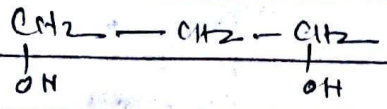
$CH_3-CH(OH)-CH_3$
Isopropyl alcohol


Isobutyl alcohol


Pinacol

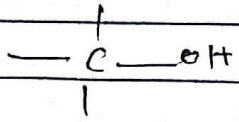
$CH_2(OH)-CH_2(OH)$
Ethylene glycol

$CH_3-CH(OH)-CH_2-OH$
Propylene glycol

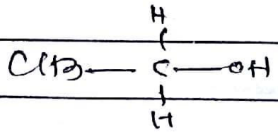


Trimethylene glycol

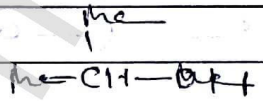
Nomenclature on the basis of Carbinol



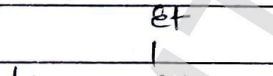
Carbinol



Methyl Carbinol



Dimethyl Carbinol

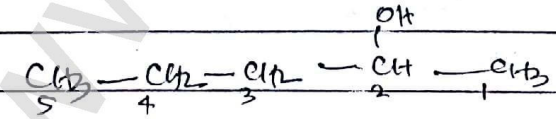


Ethyl methyl Carbinol

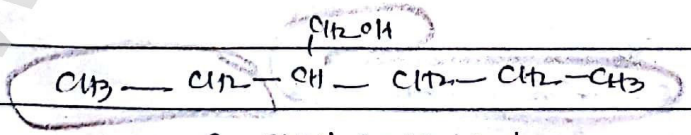
IUPAC

Suffix — ol

Alkanol



2-pentanol



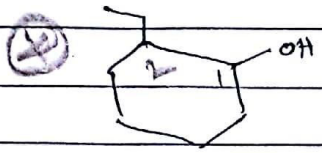
2-ethyl-1-pentanol

(1) $CH_2(OH)-CH_2(OH)$

Ethane-1,2-diol

(2) $CH_2(OH)-CH(OH)-CH_2(OH)$

Propane-1,2,3-triol

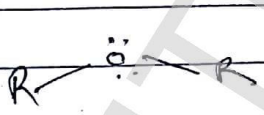
(3) 

2-ethylcyclohexanol

(3) Ether ($-\ddot{O}-$)

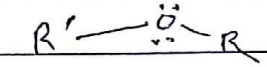
IUPAC = Alkoxyalkane

Symmetrical ether

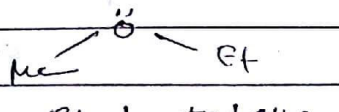


Dimethyl ether

Diethyl ether

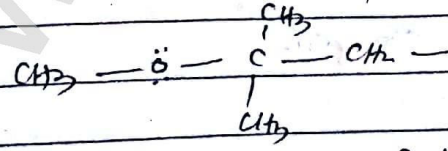


Ethyl methyl ether

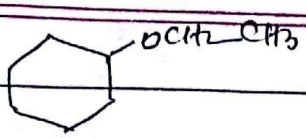


Unsymmetrical ether

2-ethoxy pentane (IUPAC)



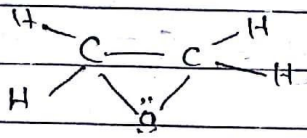
2-methoxy-2-methylpentane (IUPAC)



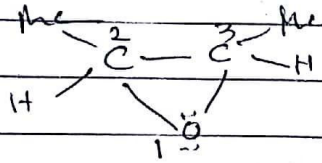
Ethoxy cyclohexane (IUPAC)

Oxirane / Cyclic ether / Epox

Nomenclature on the basis of oxirane

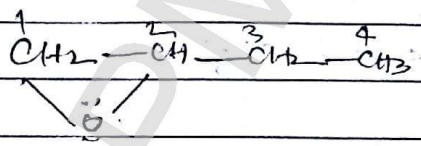


oxirane or ethylene oxide

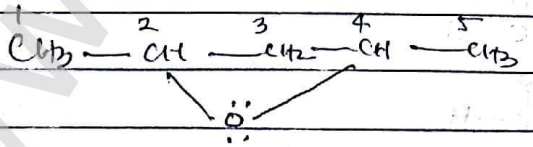


IUPAC name

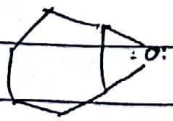
epoxyalkane



1,2-epoxybutane



2,4-epoxypentane



1,2-epoxycyclohexane

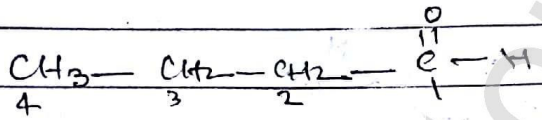
Carbonyl group

④ Aldehyde ⑤ Ketone

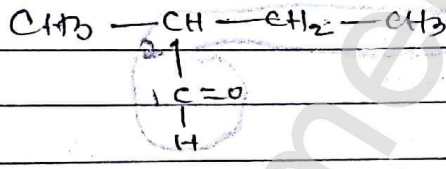
IUPAC name

Suffix – al

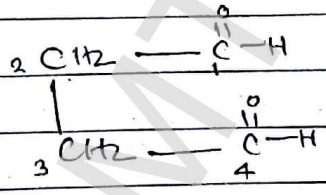
Alkanal



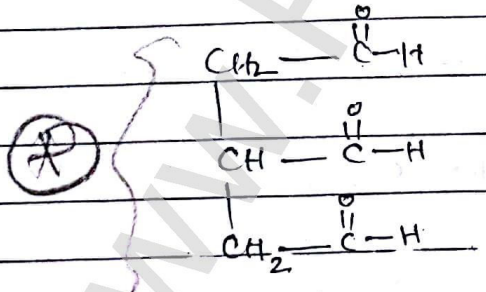
Butanal



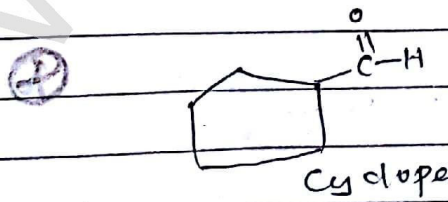
2-Methylbutanal



Butane-1,4-diol

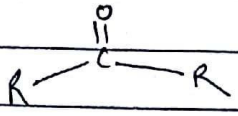


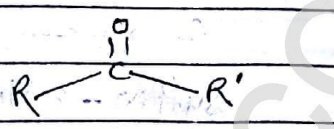
Propane-1,2,3-tricarbaldehyde

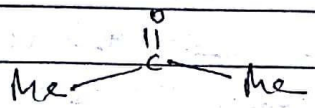


Cyclopentane Carbaldehyde

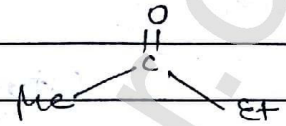
⑤ Ketone



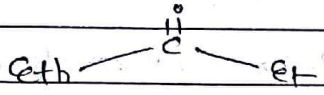




Dimethyl ketone



Ethyl methyl ketone

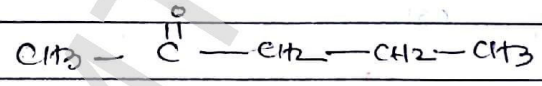


Diethyl ketone

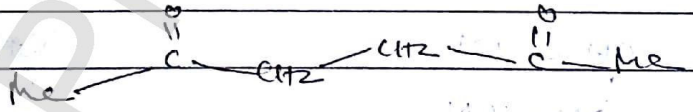
IUPAC

Suffix one

Alkanone

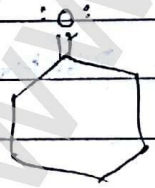


2-pentanone



Hexane-2,5-dione

⑥



Cyclohexanone

(6) Cyanide $-C \equiv \ddot{N}$

Monovalent with Carbon

IUPAC name

Suffix - nitrile

$CH_3-CH_2-CH_2-CH_2-CN$

Pentane nitrile

$^{2}CH_2-^{1}CN$
$|$
$^{3}CH_2-^{4}CN$

Butane-1,4-dinitrile

(7) CH_2-CN
$|$
$CH-CN$ — Cyano
$|$
CH_2-CN

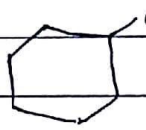
3-Cyano Pentane-1,5 dinitrile (Incorrectly)

CH_2-CN
$|$
$CH-CN$
$|$
CH_2-CN

1,2,3-tricyanopropane.

CH_2-CN
$|$
$CH-CN$
$|$
CH_2-CN

Propane-1,2,3-tricarbonitrile



Cyclohexane carbonitrile

Q. Number of possible vic-dihalide & gem-dihalide in $C_4H_8Cl_2$

Q. Number of possible gem dihalide & vic-dihalide in $C_4H_6Cl_2$

Q. No of possible 1°, 2° & 3° alcohol in $C_4H_{10}O$

Q. No of possible ether in $C_4H_{10}O$

Q. Write the IUPAC name

(i) Sec-butylidene chloride

(ii) Isobutylidene bromide

(iii) Neohexyl chloride

(iv) Diethyl Carbinol

(v) Ethyl isopropyl Carbinol

(vi) 2,2-dimethyl oxirane

(vii) Cyclohexylidene chloride

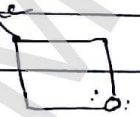
(viii) 2-ethyl-3-secbutyl oxirane

(ix) Ethyl isopropyl ether

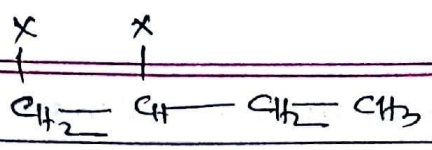
(x) Ethyl-t-butyl ketone

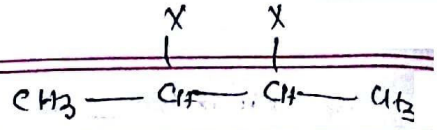
(xi)

(xii)

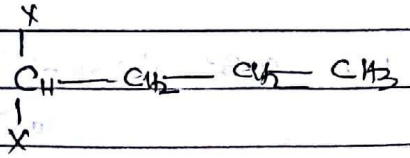


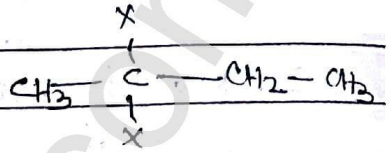
(1)





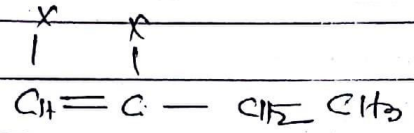
→ 2 vic-dihalide

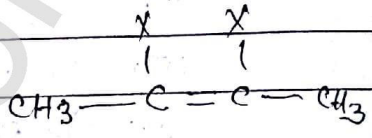


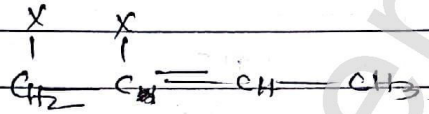


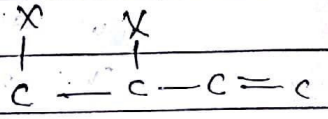
→ 2 gem-dihalide

(2)

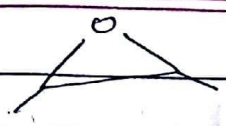




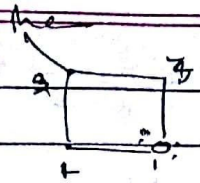




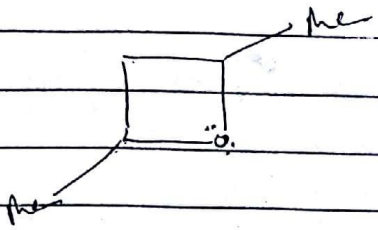
(x)

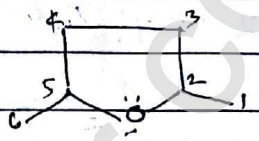


2,3-epoxybutane



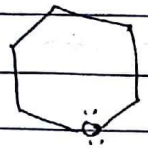
1,3-epoxy-2-methylpropane



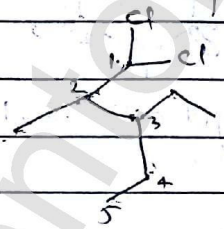


2,5-epoxyhexane

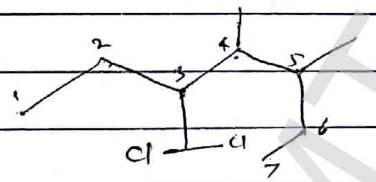
(x)



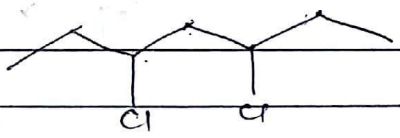
1,5-epoxypentane



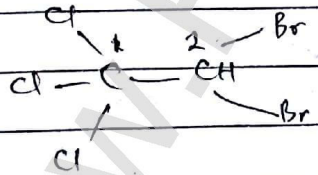
1,1-dichloro-3-ethyl-2-methylpentane



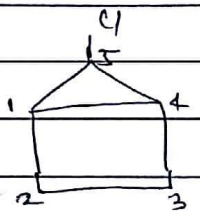
3-(Dichloromethyl)-4,5-dimethylheptane



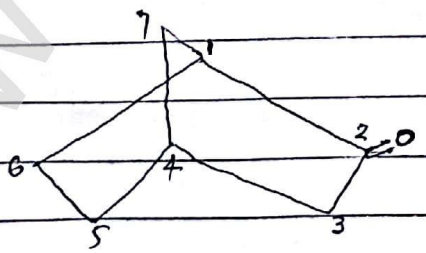
3,5-dichloroheptane



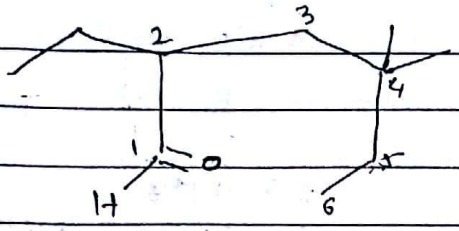
2,2-dibromo-1,1,1 trichloroethane



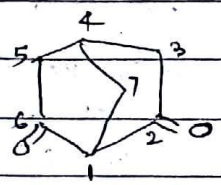
5-chlorobicyclo[2,1,0]pentane



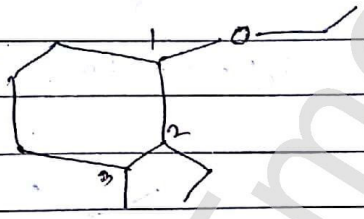
Bicyclo[2,2,1]heptan-2-one



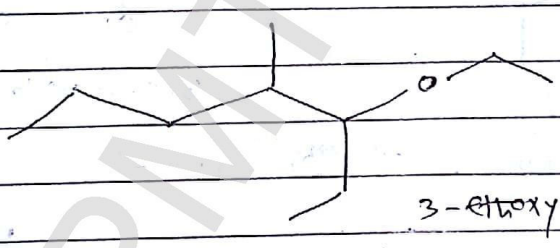
2-ethyl-4,4-dimethyl-1-hexanal



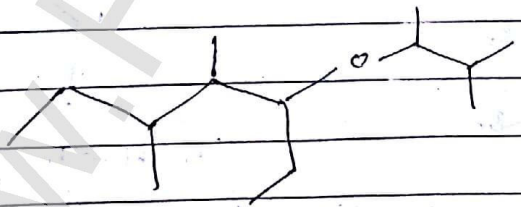
Bicyclo[2,2,1]- .heptane-2,6-dione



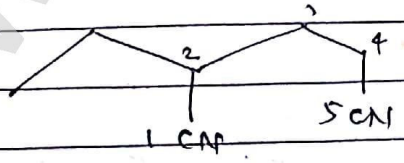
1-ethoxy-2-ethyl-3-methyl



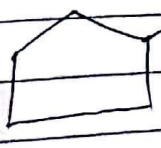
3-ethoxy-4-methyl heptane



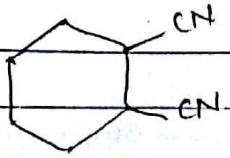
4,5-dimethyl-3-[1',1'-dimethyl propoxy] hexane

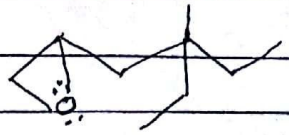


2-ethyl

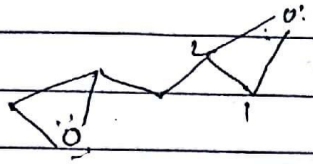


cyclopentane Carbaldehyde

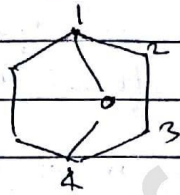




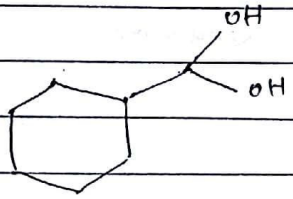
1,2-epoxy



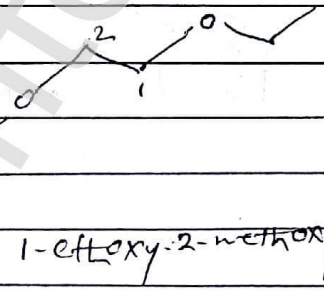
1,2,4,5-diepoxy



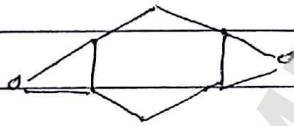
1,4-epoxy cyclohexane



Diethoxy methyl cyclohexane

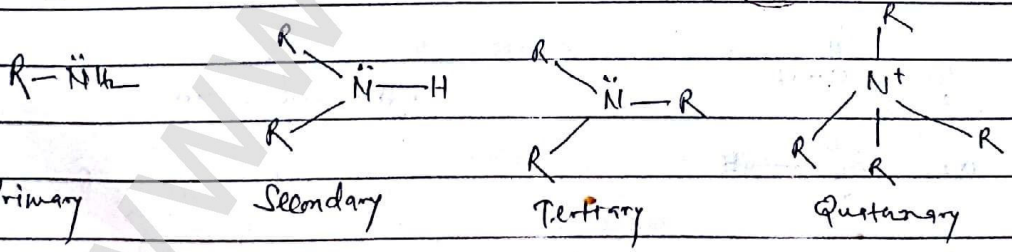


1-ethoxy-2-methoxy ethane



AMINE

1° Amine — 2° Amine — 3° Amine — 4° Amine



Primary — Secondary — Tertiary — Quaternary

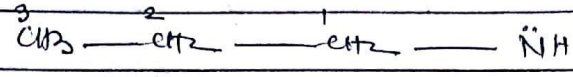
Me—NH₂
Methyl amine

Me—NH—Me
Dimethyl amine

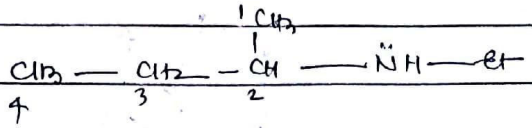
Et—NH—Me
Ethyl methyl amine

IUPAC

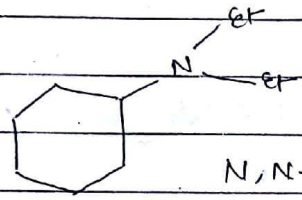
Alkanamine



N-methyl-1-propanamine



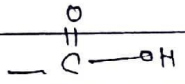
N-ethyl-2-butanamine



N,N-diethylcyclohexamine

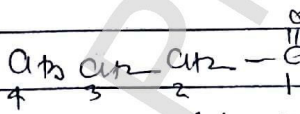
Eg

Carboxylic acid & Derivatives of Carboxylic acid.

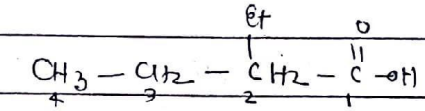


Monovalent with Carbon

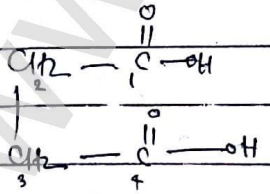
IUPAC Alkanoic acid



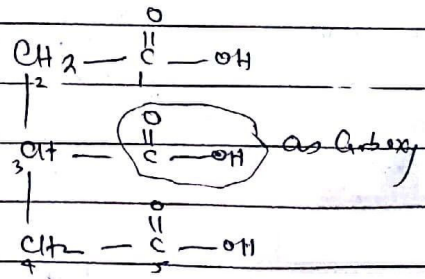
Butanoic acid



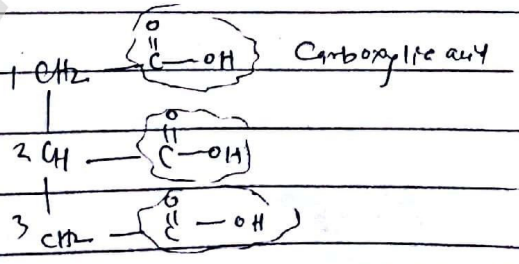
2-ethyl butanoic acid



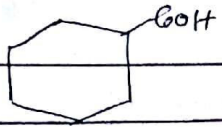
Butane-1,4-dioic acid



3-Carboxy Pentane-1,5-dioic acid

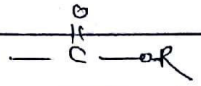


Propane-1,2,3-tricarboxylic acid

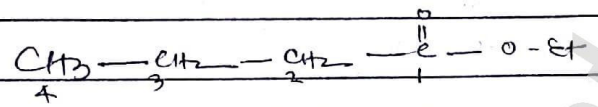


Cyclohexane Carboxylic acid

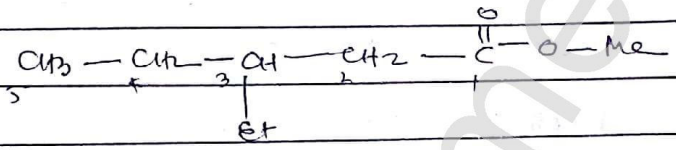
Carboxylic ester :



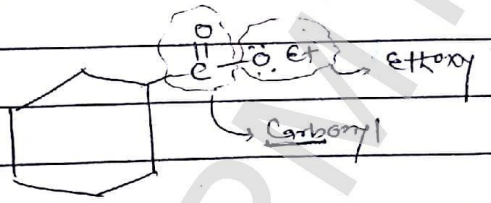
IUPAC Alkyl alkanoate



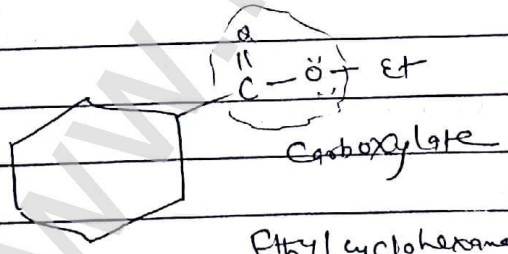
Ethylbutanoate



Methyl - 3 - ethylpentanoate

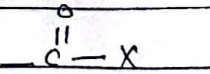


Carbethoxy cyclohexane (Old name)

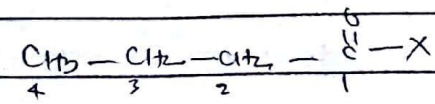


Ethyl cyclohexane Carboxylate

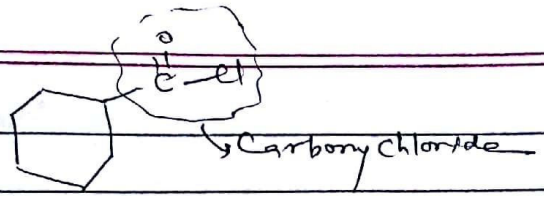
Acid halide



IUPAC Alkanoyl halide



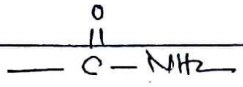
Butanoyl chloride



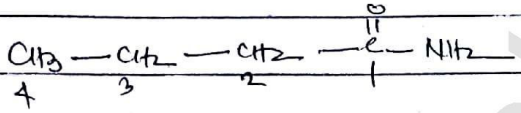
↳ Carbonyl Chloride

Cyclohexane carbonyl Chloride

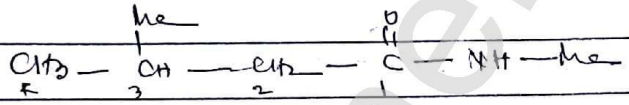
AMIDE



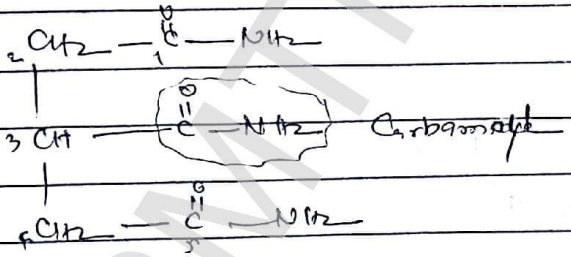
Alkanamide



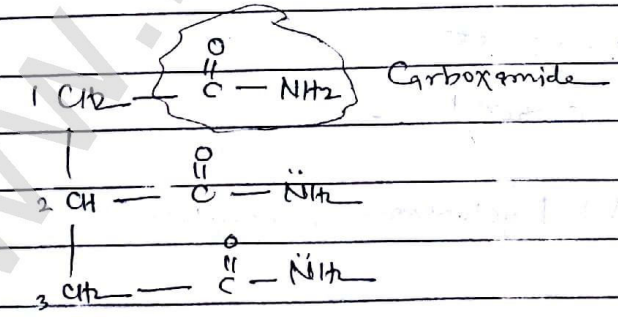
Butanamide



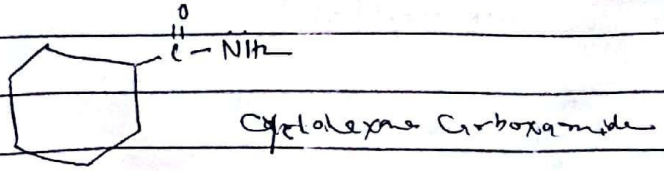
N,3-dimethyl butanamide



3-Carbamoyl Pentane-1,5-diamide

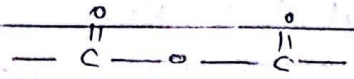


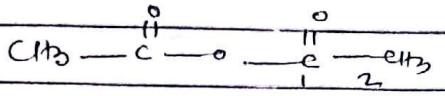
Propane-1,2,3-tricarboxamide



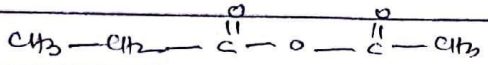
Cyclohexane Carboxamide

Acid anhydride :



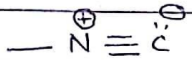


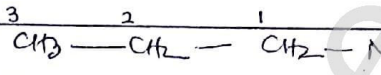
Ethanoic anhydride



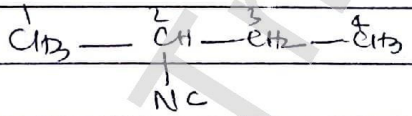
Ethanoic propanoic anhydride.

Isocyanide





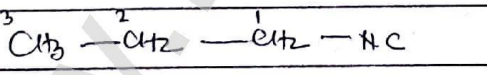
1-Propane isonitrile



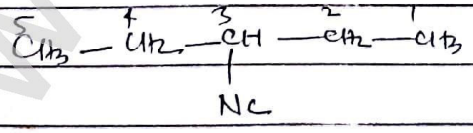
2-butane isonitrile

New name :

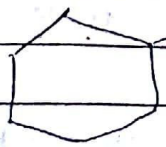
Carbylamino alkane



1-Carbylamino propane



3-Carbylamino pentane



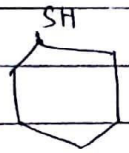
Carbylaminocyclohexane

$-\ddot{S}H$ (thioalcohol)

Common name — Alkyl Mercaptans

IUPAC name — Alkanethiol

	Common name	IUPAC
$CH_3-CH_2-CH_2-SH$	n-propyl mercaptan	1-Propanethiol
$CH_3-CH(SH)-CH_3$	isopropyl mercaptan	2-Propanethiol

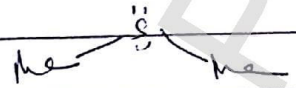


Cyclohexanethiol

Thioether

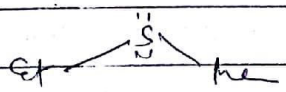
Common name : dialkyl sulphide

IUPAC name : dialkyl thioether



Dimethyl Sulphide

Dimethyl thioether



Ethyl methyl sulphide

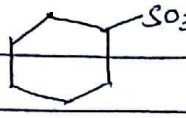
Ethyl methyl thioether

Sulphonic acid

$-SO_3H$

IUPAC Alkane Sulphonic acid

$CH_3-CH_2-CH_2-SO_3H$	$CH_3-CH(SO_3H)-CH_2-CH_3$
1-Propane Sulphonic acid	2-Butane Sulphonic acid



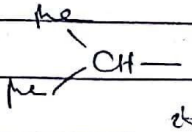
Cyclohexane sulphonic acid

Not IUPAC

$Me-OSO_3H$

↳ Hydrogen sulphate

Methyl hydrogen sulphate



Isopropyl hydrogen sulphate.

$(Me)_2\ SO_4$

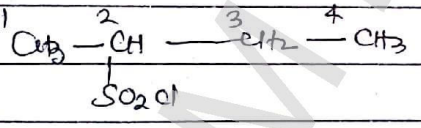
Dimethyl sulphate

$(Et)_2\ SO_4$

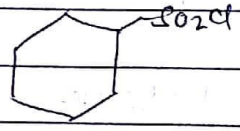
Diethyl sulphate

$CH_3-CH_2-CH_2-SO_2Cl$

1-propane sulphonyl chloride



2-butane sulphonyl chloride

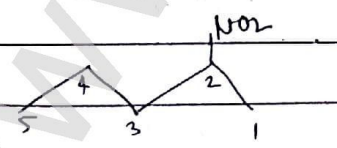


Cyclohexane sulphonyl chloride

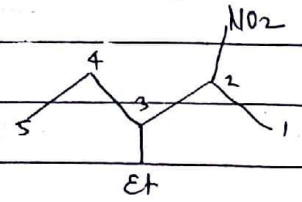
Nitro

$-NO_2$

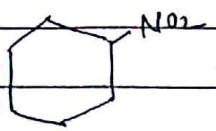
IUPAC = Nitroalkane



2-nitropentane



3-Ethyl-2-nitropentane



Cyclohexane

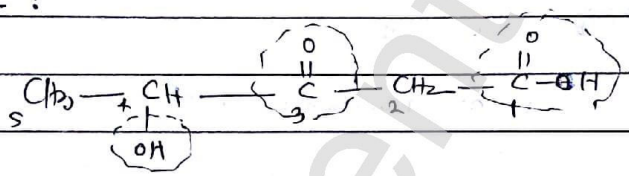
Compound Containing More than one functional gr.

Seniority table

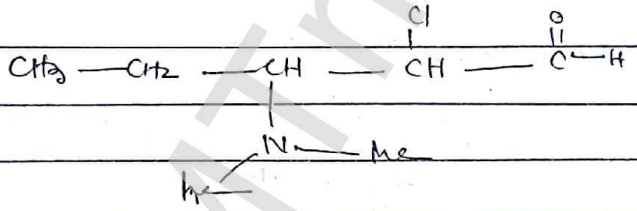
		Prefix	Suffix
Carboxylic acid	$-COOH$	Carboxy	oic acid
Sulphonic acid	$-SO_3H$	Sulpho	Sulphonic acid
Anhydride	$-C(=O)-O-C(=O)-$	——	oic anhydride
Ester	$-C(=O)-OR$	Alkoxy carbonyl	oate
Acid halide	$-C(=O)-X$	Haloformyl	oylhalide
Amide	$-C(=O)-NH_2$	Carbamoyl	amide
Cyanide	$-C\equiv N$	Cyano	nitrile
Isocyanide	$-NC$	Carbylamino	——
Aldehyde	$-C(=O)-H$	Formyl	-al
Ketone	$-C(=O)-$	oxo/keto	one
Alcohol	$-\ddot{O}H$	hydroxy	ol
thioalcohol	$-SH$	Mercapto	thiol
Amine	$-\ddot{N}H_2$	Amino	Amine
Alkene	$>C=C<$	——	ene

Alkyne	$-C\equiv C-$	—	yne
Ether	$-O-$	alkoxy	—
Halogen	$-X$	halo	—
Nitro	$-NO_2$	Nitro	—

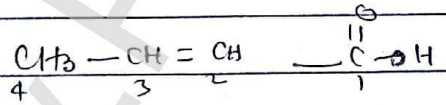
Example :



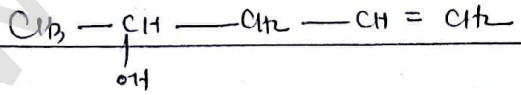
4-hydroxy-3-oxopentanoic acid



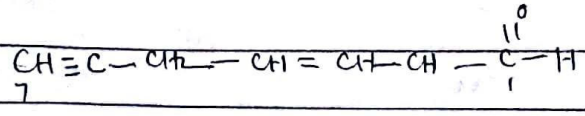
3-[N,N-dimethyl amino]-2-chloropentanal



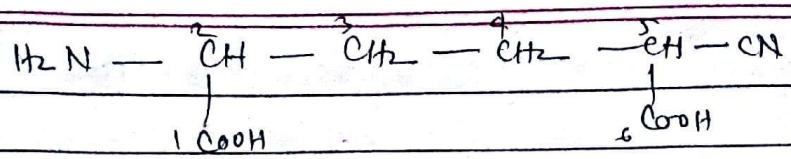
2-butenoic acid



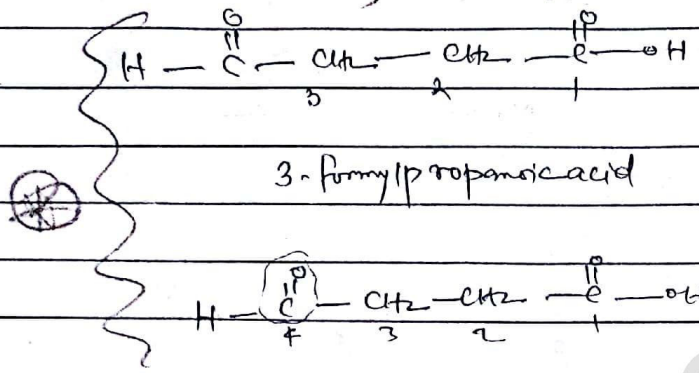
Pent-4-en-2-ol



Hept-3-en-6-ynal

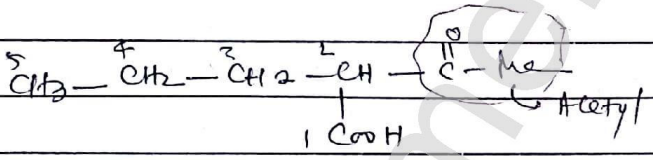


(2) amino (5) cyano hexanedioic 6-dioic acid

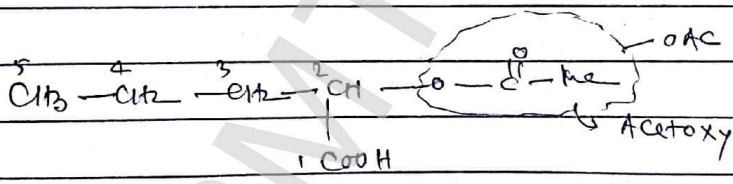


3-formylpropanoic acid

4-oxo butanoic acid



2-acetyl pentanoic acid

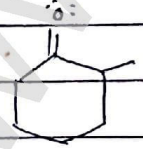


2-acetoxy pentanoic acid

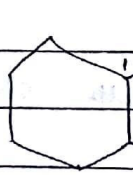
Pg-41
Q.(1-22)

Page 42
Q.(1-37)
Page-48
Q.(1-46)

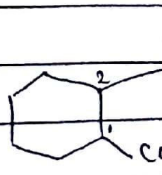
Page 63-67
study

① 

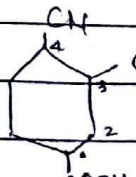
2-oxocyclohexanoic acid
2-oxo cyclohexane carboxylic acid

② 

2-ketoethyl cyclohexane ethoxycarbonyl
2-diethoxy hexan cyclohexane carboxylate
carboxylic acid

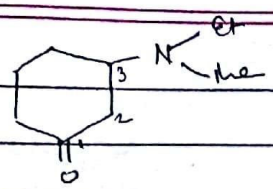
③ 

2[1',1'-diethoxy methyl] cyclohexanoic acid
3 Acetoxy-4-cyano carboxylic acid

④ 

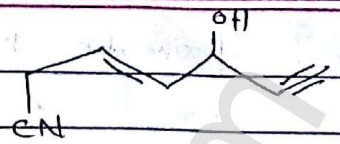
4-cyano-3-methoxycarbonyl cyclohexane

(5)



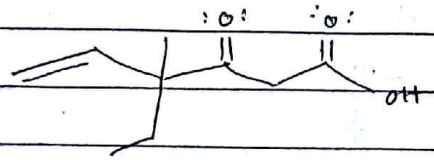
3[N-ethyl-N-methyl cyclohexanol

(6)



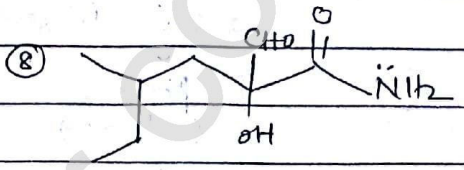
5-hydroxy-hep-3-ene-6yne nitrile

(7)



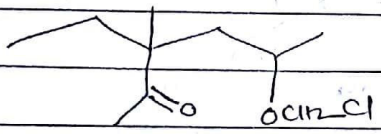
4-ethyl-4-methyl-3-oxo 5-hexenoic acid

(8)



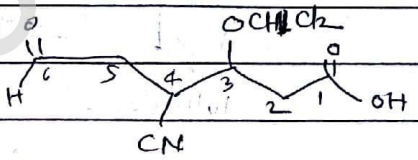
2-Formyl-2-hydroxy-4-methyl hexanamide

(9)



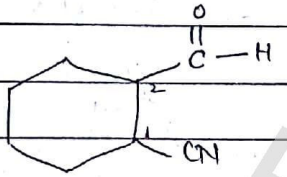
5chloromethoxy-3-ethyl-3-methyl-2-hexanone

(10)



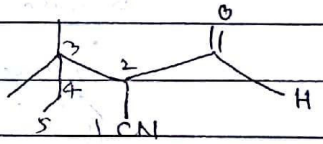
3-dichloro methoxy-4-cyano-6-oxo hexanoic acid

(11)



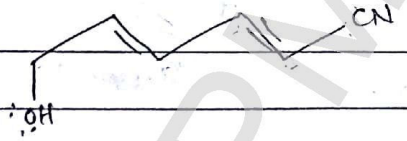
2-Formyl Cyclohexane Carbonitrile

(12)



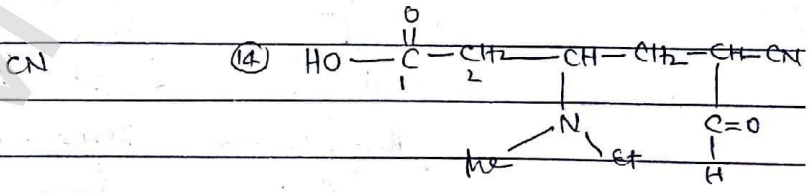
2-Formyl-3,3-dimethyl pentane nitrile

(13)

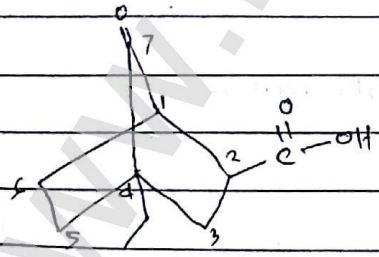


6-Hydroxy hex-4-en-2yne nitrile

(14)

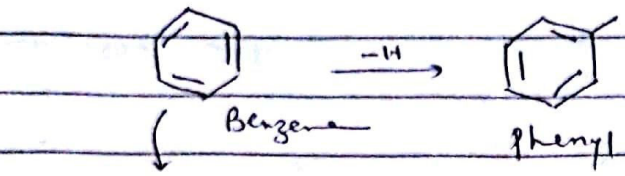


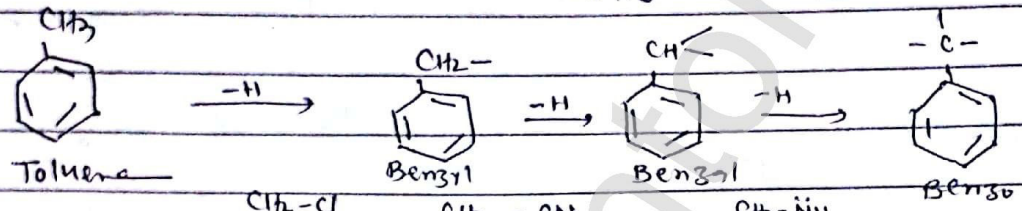
3[N-ethyl-N-methyl amino]5-cyno-6-oxo hexanoic acid

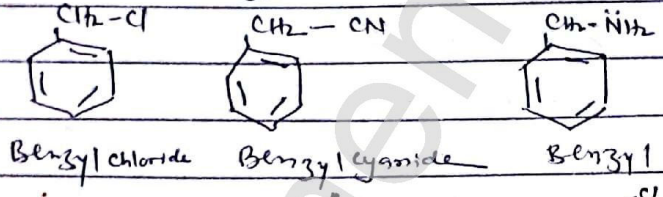


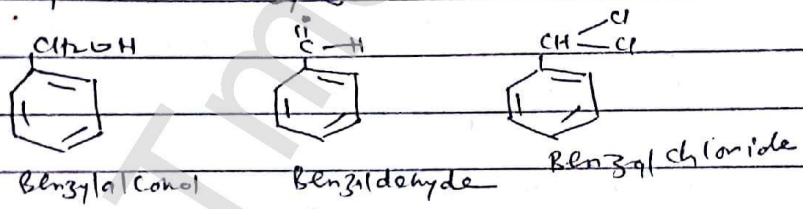
4-ethyl-7-oxo bicyclo [2,2,1] heptane-2-carboxylic acid

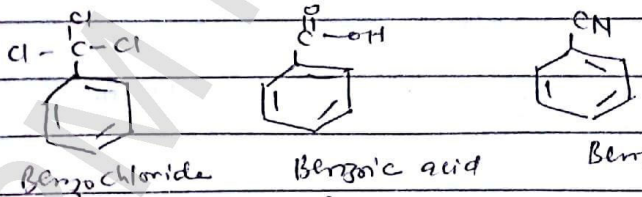
Aromatic HydroCarbon

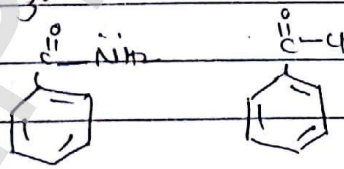


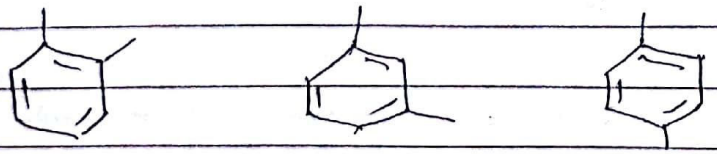


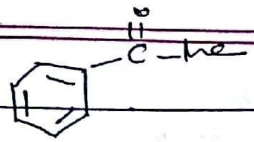




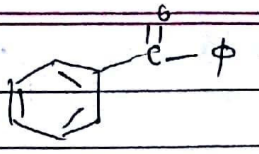




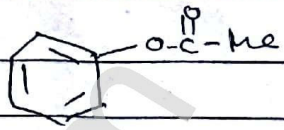




Acetylbenzene
or Acetophenone

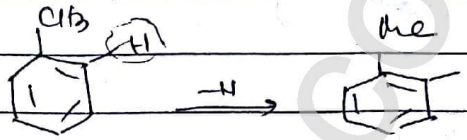


Benzophenone

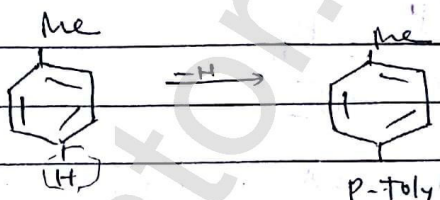


Acetoxy benzene

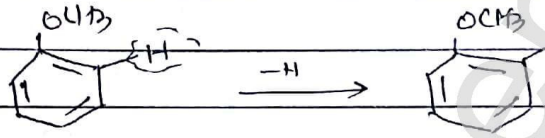
Methoxy benzene
(Anisole)



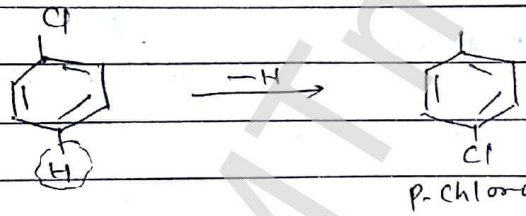
o-Tolyl



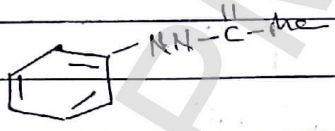
p-Tolyl



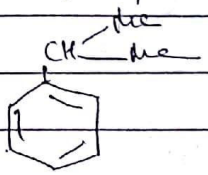
o-Anisyl



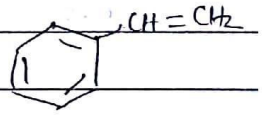
p-Chlorophenyl



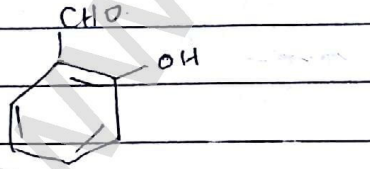
N-phenylacetamide



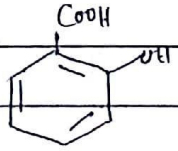
isopropylbenzene
(Cumene)



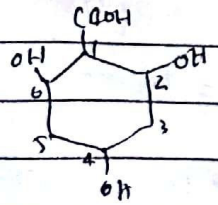
Styrene



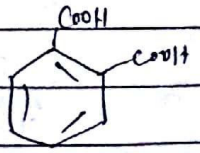
o-hydroxybenzaldehyde
(Salicylaldehyde)



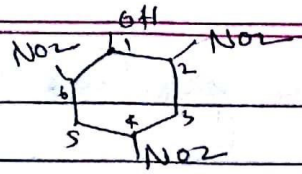
o-hydroxybenzoic acid
(Salicylic acid)



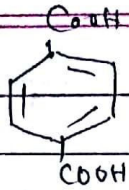
2,4,6-trihydroxybenzoic acid



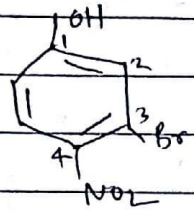
Phthalic acid



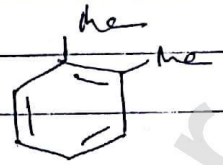
2,4,6-trinitrophenol
(Picric acid)



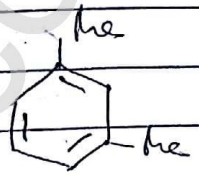
terephthalic acid



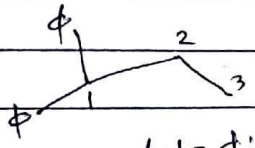
3-Bromo-4-nitrophenol



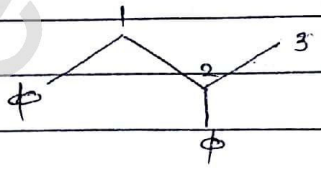
o-Xylene



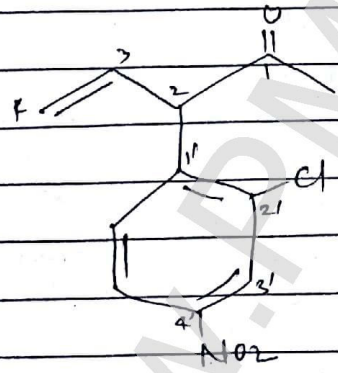
m-Xylene



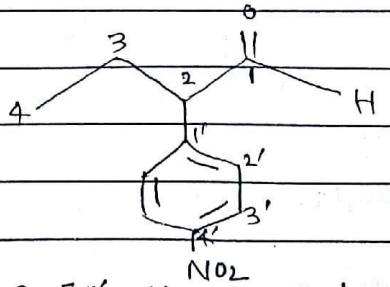
1,1-diphenyl Propane



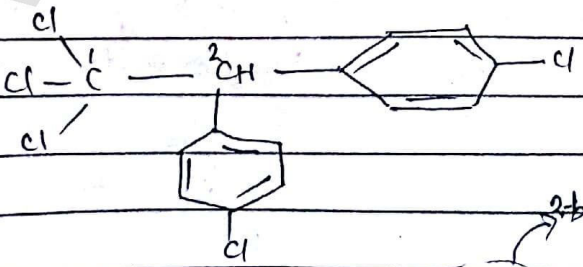
1,2-diphenyl Propane



2-[α-chloro-4'-nitrophenyl]-3-butenoic acid

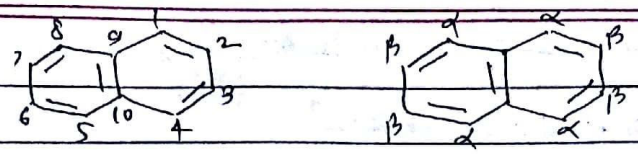


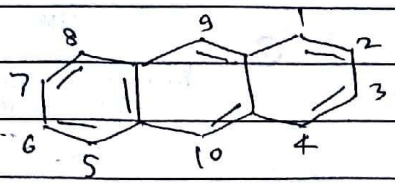
~~2-[4'-nitrophenyl] butanal~~
or p-nitrophenyl

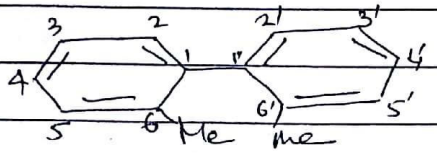


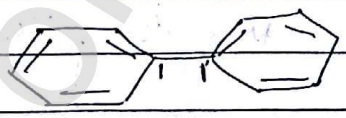
1,1,1-trichloro-{2,2-di}[p-chlorophenyl] ethane

2-bis = biosubstituted



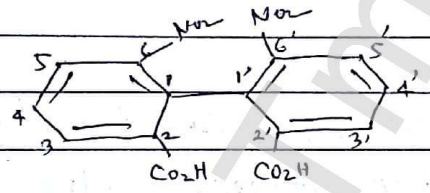






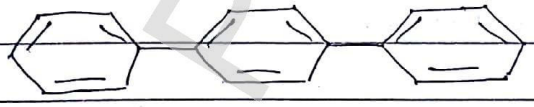
Biphenyl

2,2'-dibromo-6,6'-dimethyl biphenyl



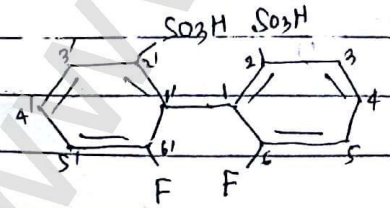
6,6'-dinitro-

①



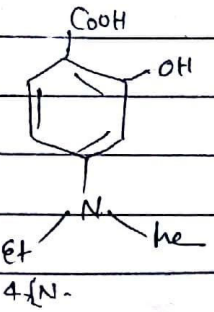
1,1',4',1''-terphenyl

②



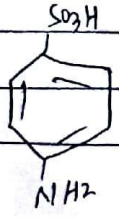
6,6'-difluoro.biphenyl 2,2' disulphonic acid

③

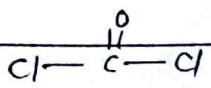


4-(N-

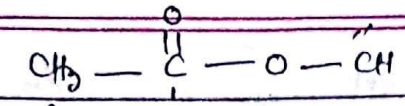
④



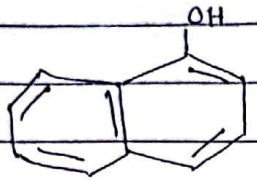
⑤



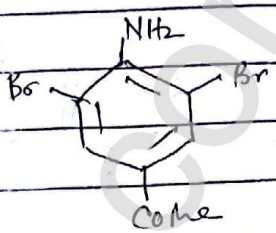
Chloromethenoyl chloride

(6) 

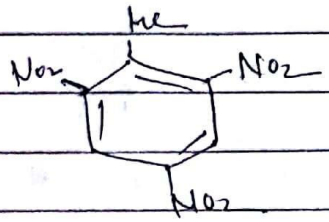
1'-butenyl ethanoate

(7) 

α-nepthol

(8) 

4-acetyl-2,6-dibromo aniline

(9) 

2,4,6-trinitrotoulene

- strong acid
- explosive

Analysis of Mdecular Structure (or) unsaturation factor (or) unsaturation index (or) Hydrogen deficient index

⇒ Unsaturation factor represent how many no of H-atom are present in a given molecular formula when it is compared with alkane of same C-atom.

Unsaturation factor = No. of Hydrogen in Alkane − No. of Hydr in given for

$$U.F = \frac{\text{No of H in alkane} - \text{No of Hydrogen in given formula}}{2}$$

Eg:- (i) C_4H_8

$$UF = \frac{H_{10} - H_8}{2} = 1$$

(ii) C_4H_6

$$UF = \frac{H_{10} - H_6}{2} = 2$$

(iii) C_6H_6

$$UF = \frac{H_{14} - H_6}{2} = 4$$

U.F. of a functional group

[1]⇒ If the functional group is monovalent then it can be replaced by Hydrogen

C_4H_9-X

$$UF = \frac{H_{10} - H_{10}}{2} = 0$$

C_4H_7X

$$UF = \frac{H_{10} - H_8}{2} = 1$$

C_4H_9OH

$$UF = \frac{H_{10} - H_{10}}{2} = 0$$

$C_4H_{11}N$ — C≡N

C

$C_4H_9 - NH_2$

C_4H_{10}

U.F = 0

(ii)⇒ If the compounds containing polyvalent atom or groups then it can be replaced without addition of Hydrogen

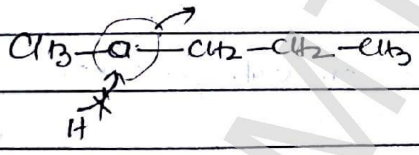
$C_4H_{10}O$

C_nH_{2n+2} = C_4H_{10}

$CH_3-CH_2-CH_2-CH_2-\ddot{O}H$

C_4H_{10}

U.F = 0



C_4H_{10}

U.F = 0

$C_4H_8O_2$ → =O

→ —OH

C_4H_8 U.F = 1

C_4H_7OCl → =O C_4H_8

→ —Cl C_4H

Unsaturation factor may be fraction (in case of carbocation, carbanion and free radical)

$CH_3-\overset{\oplus}{C}H_2$

$UF = \frac{H_6 - H_5}{2} = 1/2$

$CH_3-\overset{\ominus}{C}H_2$

$UF = \frac{H_6 - H_5}{2} = 1/2$

$$UF = \frac{2C + 2 + N + P - \text{hydrogen} - \text{halogen}}{2}$$

Q. Calculate UF of following?

(i) C_6H_5OH (vii) $C_{12}H_{10}$ (xiii) C_2H_4N

(ii) C_6H_5CHO (viii) $C_{10}H_{16}$ (xiv) CH_3O

(iii) C_2H_3N (ix) $C_3H_5NO_2$ (xv) $C_2H_5N_2$

(iv) $C_4H_{11}N$ (x) $C_6H_{10}I_2$

(v) C_2H_4O (xi) $C_8H_{14}O_3$

(vi) $C_4H_8O_2$ (xii) $C_{14}H_{12}NO_2Cl$

✓(i) $\frac{2\times6+2+0+0-6-0}{2} = \frac{8}{2} = 4$

✓(ii) $\frac{2\times7+2+0+0-6-0}{2} = \frac{10}{2} = 5$

✓(iii) $\frac{2\times2+2+1+0-3-0}{2} = \frac{4}{2} = 2$

✓(iv) $\frac{2\times4+2+1+0-11-0}{2} = 0$

✓(v) $\frac{2\times2+2+0+0-4-0}{2} = \frac{2}{2} = 1$

✓(vi) $\frac{2\times4+2+0+0-8-0}{2} \quad \frac{2}{2} = 1$

(viii) $\frac{2\times12+2+0+0-10-0}{2} = \frac{16}{2} = 8$

(ix) $\frac{2\times3+2+1+0-5-0}{2} = \frac{4}{2} = 2$

(x) $\frac{2\times6+2+0+0-10-2}{2} = \frac{2}{2} = 1$

(xi) $\frac{2\times8+2+0+0-14-0}{2} = \frac{4}{2} = 2$

(xii) $\frac{2\times14+2+1+0-12-1}{2} = \frac{18}{2} = 9$

(xiii) $\frac{2\times2+2+1+0-4-0}{2} = \frac{3}{2} = 1.5$

(xiv) $\frac{2\times1+2+0+0-3-0}{2} = \frac{1}{2} = .5$

(xv) $\frac{2\times2+2+2+0-5-0}{2} = 1.5$

Meaning of unsaturation factor

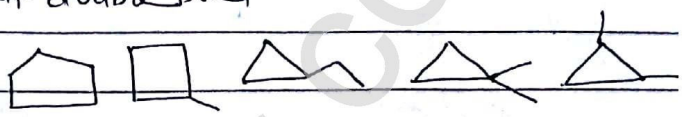
Unsaturation factor = 1

eg:- C_5H_{10}

UF=1

Open with one double bond

Ring without double bond



$CH_3-CH_2-CH_2-CH=CH_2$

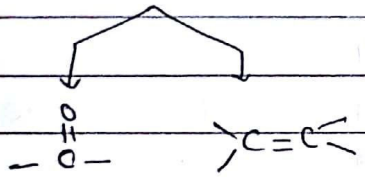
C_4H_8O

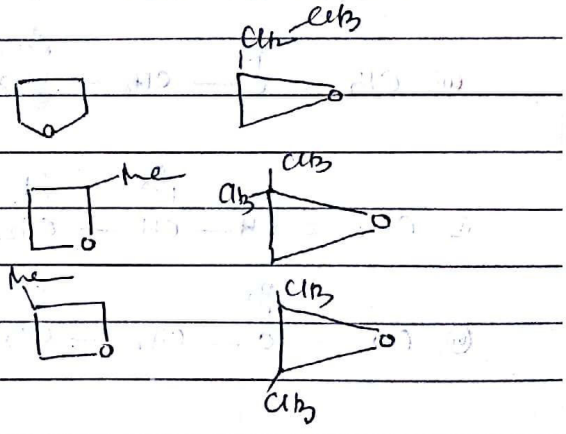
Open with one double bond

Ring

Ring with oxygen

Ring without oxygen



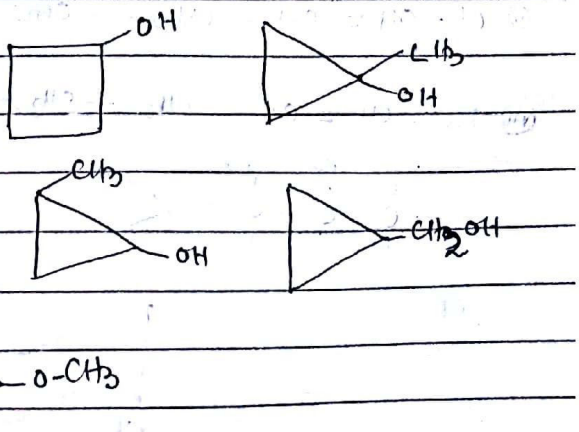


$CH_3-CH_2-CH_2-C(=O)-H$

$CH_3-CH_2-C(=O)-CH_3$

$CH_2=CH-CH_2-CH_2-\ddot{O}H$

$CH_2=CH-CH_2-\ddot{O}-CH_3$



Q. Write the possible no of structures of the molecular formula C_4H_6ClBr

$$\frac{2\times4+2+0+0-6-2}{2}$$

$$= 1$$

C_4H_6ClBr

Open chain with one double bond — Ring

(i) $CH_2=CH-CH_2-\underset{Br}{\overset{Cl}{\underset{|}{\overset{|}{CH}}}}$

(ii) $CH_2=CH-\underset{Cl}{\overset{|}{CH}}-\underset{Br}{\overset{|}{CH_2}}$

(iii) $CH_2=\underset{Cl}{\overset{|}{C}}-CH_2-\underset{Br}{\overset{|}{CH_2}}$

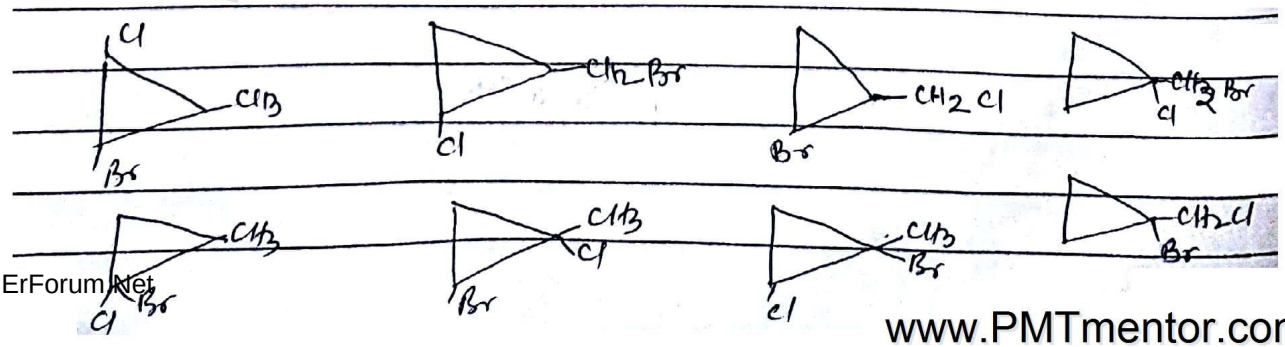
(iv) $CH_2=CH-\underset{Br}{\overset{|}{CH}}-\underset{Cl}{\overset{|}{CH_2}}$

(v) $CH_2=\underset{Br}{\overset{|}{C}}-CH_2-\underset{Cl}{\overset{|}{CH_2}}$

(vi) $Cl-CH=CH-CH_2-CH_2-Br$

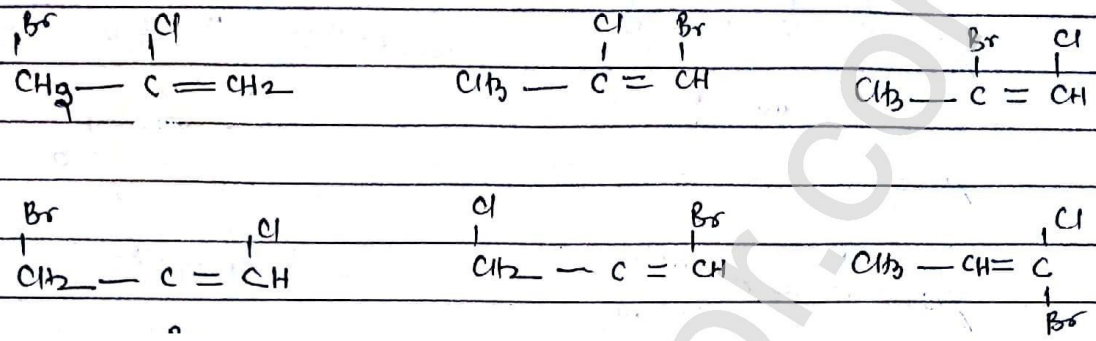
(vii) $Br-CH=CH-CH_2-CH_2-Cl$

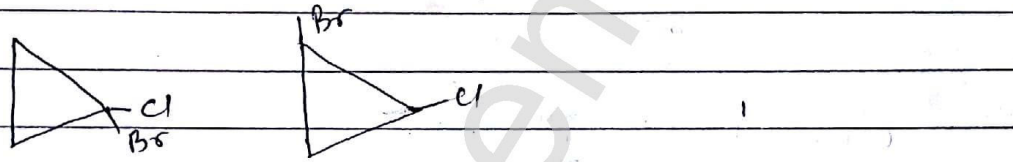
$-\underset{|}{\overset{|}{C}}-\underset{Br}{\overset{|}{\underset{|}{C}}}-\underset{Cl}{\overset{|}{\underset{|}{C}}}=C-$



C_3H_4ClBr

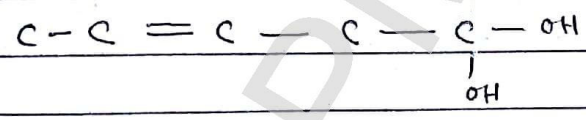
$$\frac{2\times3+2+0+0-4-2}{2} = 1$$

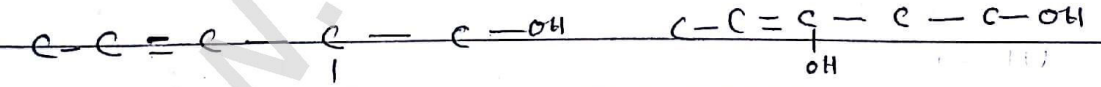


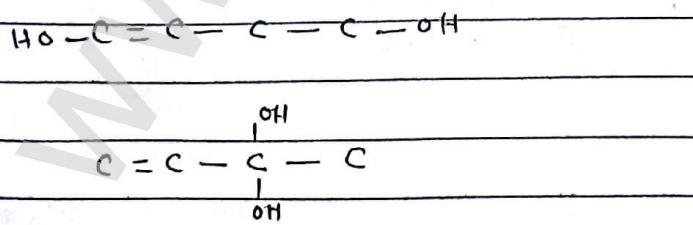


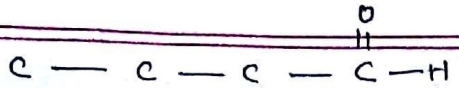
Q. Write the possible structure having different functional group of the mol. formula $C_5H_{10}O_2$

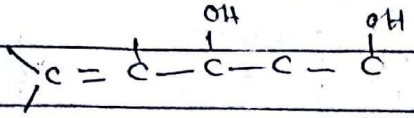
$$UF = \frac{2\times5+2+0+0-10-0}{2} = \frac{2}{2} = 1$$

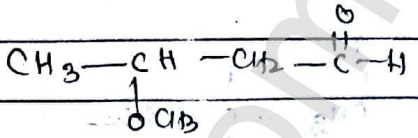




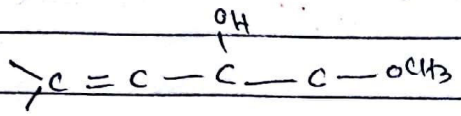


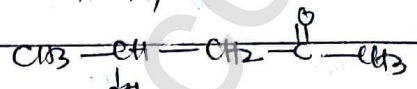




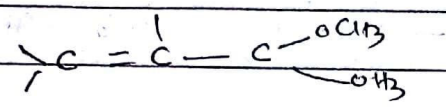


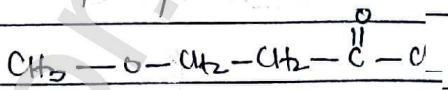
alkoxy alkanol



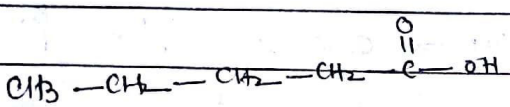


hydroxy alkane

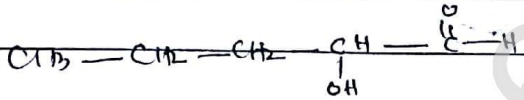




alkoxy alkane



acid



hydroxy alkanol

Ring

Ring with two oxygen

epoxy

Ring with one oxygen

epoxy + alcohol

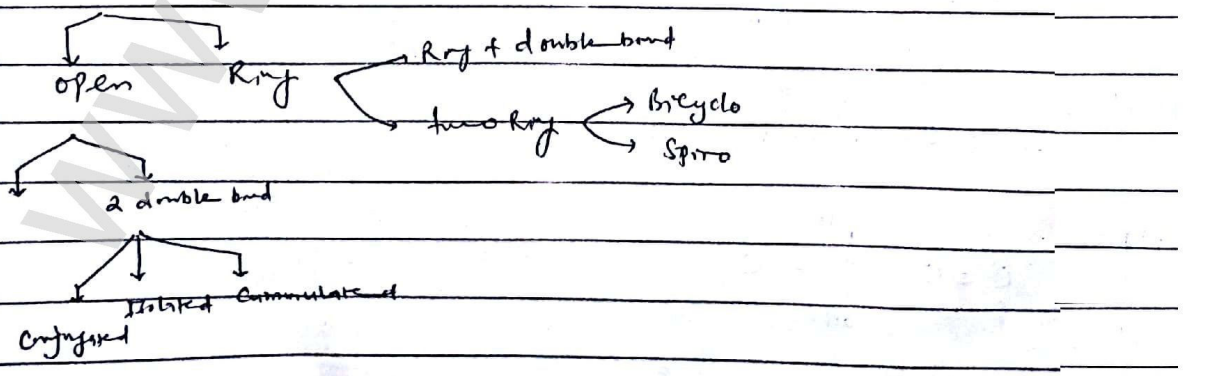
" + ether

2 OH

1 OH + 1 OR

2 OR

UF = 2



An organic compound X having molecular formula $C_6H_4Cl_2$ Compound A having benzoid ring and all the carbon atoms are sp^2 hybridized. A undergoes monosubstitution with Cl to yeilds only one product Y. X is —

(a) Ortho-dichloro benzene
(b) meta dichloro benzene
(c) para dichlorobenzene
(d) None of these.

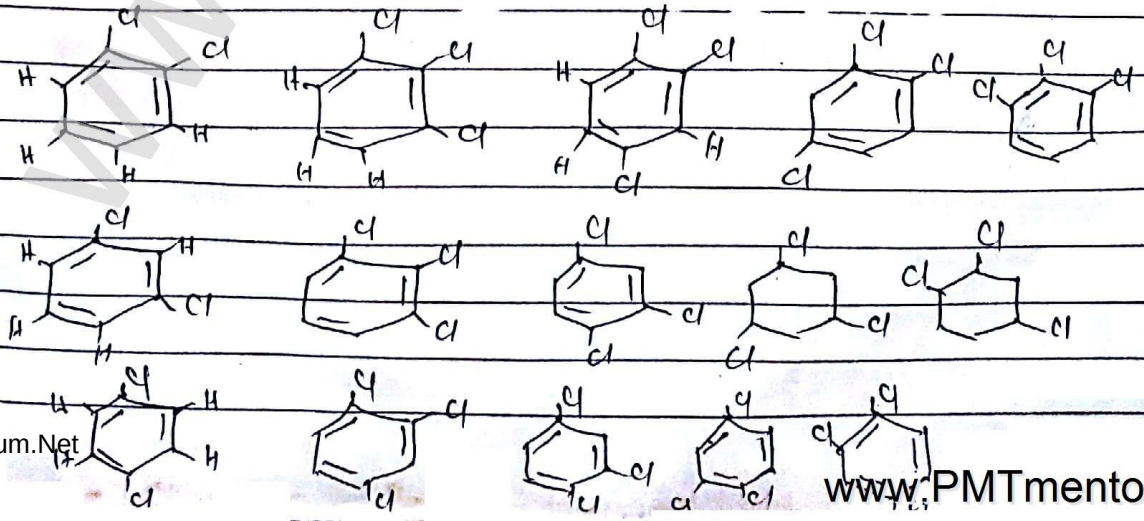
An organic Compounds X and Y having molecular formulae $C_6H_4Cl_2$, both having benzoid ring and sp^2 hybridized Carbon X undergoes monochlorination to gives Compound X'. X' having two possible Str. Y undergoes mono substitution with Cl to give Compound Y'. X' having three possible structures.

X is —

(a) orthodichlorobenzene
(b) Meta dichlorobenzene
(c) para dichloro benzene
(d) none of these

Y is —

(a) ortho dichlorobenzene
(b) meta dichloro benzene
(c) paradichlorobenzene
(d) All of them.



C_8H_{10} (A)

Benzoid ring

↓ monochlorination

C_8H_9Cl

↳ 5 product

C_8H_{10} (B)

↓

C_8H_9Cl

1 product

C_8H_{10} (C)

↓

C_8H_9Cl

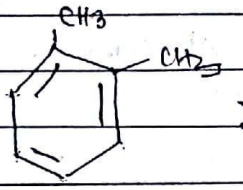
3 product

C_8H_{10} (D)

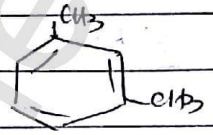
↓

C_8H_9Cl

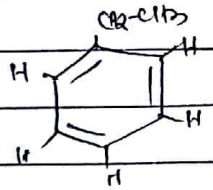
2 product



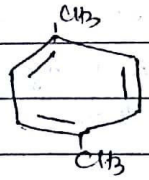
3 product



4 product



5 product



C_8H_{16} (E)

—0—