

# Nomenclature

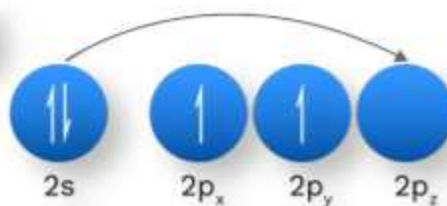


## Carbon ( ${}_6\text{C}^{12}$ )

Atomic number : 6

Electronic configuration :  $1s^2, 2s^2, 2p^2$

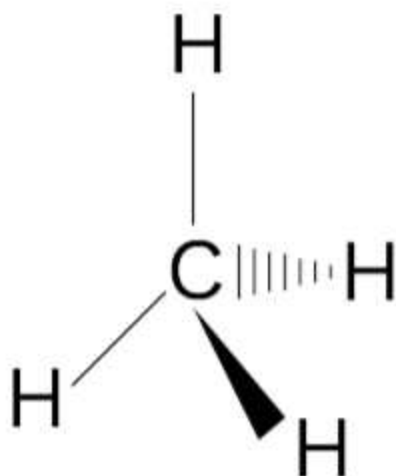
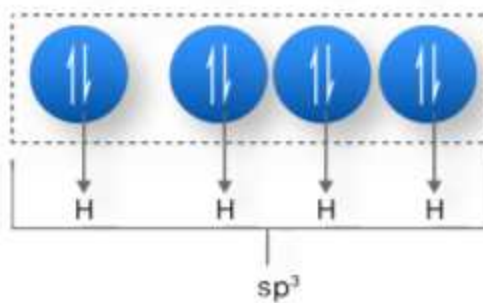
Ground state :



Excited state :



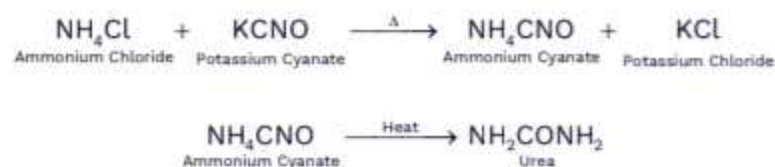
$\text{CH}_4$  Molecule :





## Organic Compound

Wohler prepared first man-made organic compound disapproving **Vital Force Theory** by preparing Urea. The following is the reaction showing the synthesis of Urea.



## Definitions

Hydrocarbon and its derivatives are known as Organic Compound and Study of Organic Compound is called as Organic Chemistry.

## Vital Force Theory/Berzelius Hypothesis :

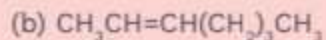
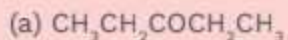
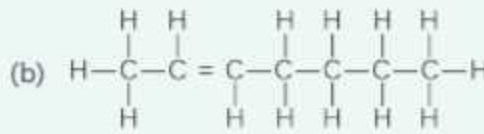
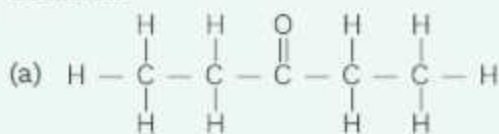
It states that Organic Compounds can only be prepared in living body.

### • Structural Representation of Organic Compound

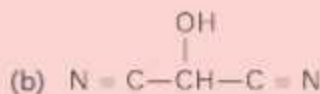
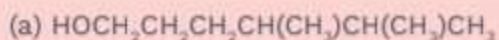
STRUCTURAL FORMULA	CONDENSED FORMULA	BOND LINE FORMULA
$  \begin{array}{c}  \text{H} \quad \text{H} \quad \text{H} \\    \quad   \quad   \\  \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\    \quad   \quad   \\  \text{H} \quad \text{H} \quad \text{H}  \end{array}  $	CH <sub>3</sub> CH <sub>2</sub> CH <sub>3</sub>	
$  \begin{array}{c}  \text{H} \quad \text{H} \quad \text{H} \\    \quad   \quad   \\  \text{H}-\text{C}-\text{C}-\text{C}-\text{S}-\text{H} \\    \quad   \quad   \\  \text{H} \quad \text{H} \quad \text{H}  \end{array}  $	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> SH	
$  \begin{array}{c}  \text{H} \quad \text{H} \quad \text{H} \\    \quad   \quad   \\  \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\    \quad   \quad   \\  \text{H} \quad \text{Br} \quad \text{H}  \end{array}  $	CH <sub>3</sub> CH(Br)CH <sub>3</sub>	
$  \begin{array}{c}  \text{H} \quad \text{H} \\    \quad   \\  \text{H}-\text{C}-\text{C}-\text{H} \\    \quad   \\  \text{H}-\text{C}-\text{C}-\text{H} \\    \quad   \\  \text{H} \quad \text{H}  \end{array}  $	$  \begin{array}{c}  \text{H}_2\text{C} - \text{CH}_2 \\    \quad   \\  \text{H}_2\text{C} - \text{CH}_2  \end{array}  $	

**NCERT PrepUp 12.4 (Pg. 337)**

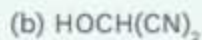
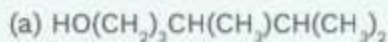
Expand each of the following condensed formulas into their complete structural formulas.

**Solution****NCERT PrepUp 12.5 (Pg. 337)**

For each of the following compounds, write a condensed formula and also their bond-line formula.

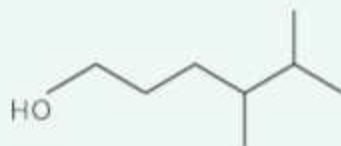
**Solution**

Condensed formula :

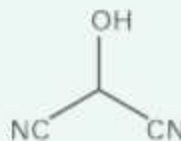


Bond-line formula:

(a)



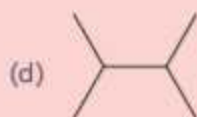
(b)



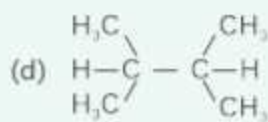
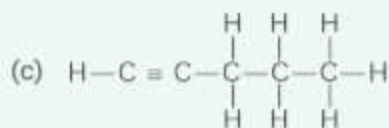
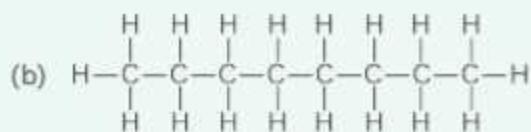
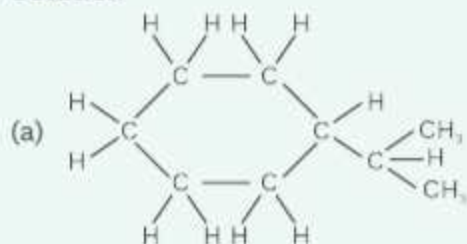


### NCERT PrepUp 12.6 (Pg. 337)

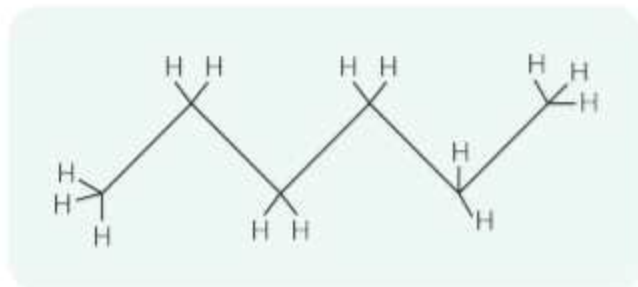
Expand each of the following bond-line formulas to show all the atoms including carbon and hydrogen



### Solution



## Catenation



Zig-Zag fashion chain



Buckminster Fullerene

## Hybridization

It is a phenomenon of mixing of atomic orbitals of different shape, size and energy to form new equivalent orbitals of same shape, size and energy is called hybridization.

### Types of Hybridization

- (1)  $sp^3$ -Hybridization (Tetrahedral shape)
- (2)  $sp^2$ -Hybridization (Trigonal planar)
- (3)  $sp$ -Hybridization (Linear shape)

### Concept Ladder

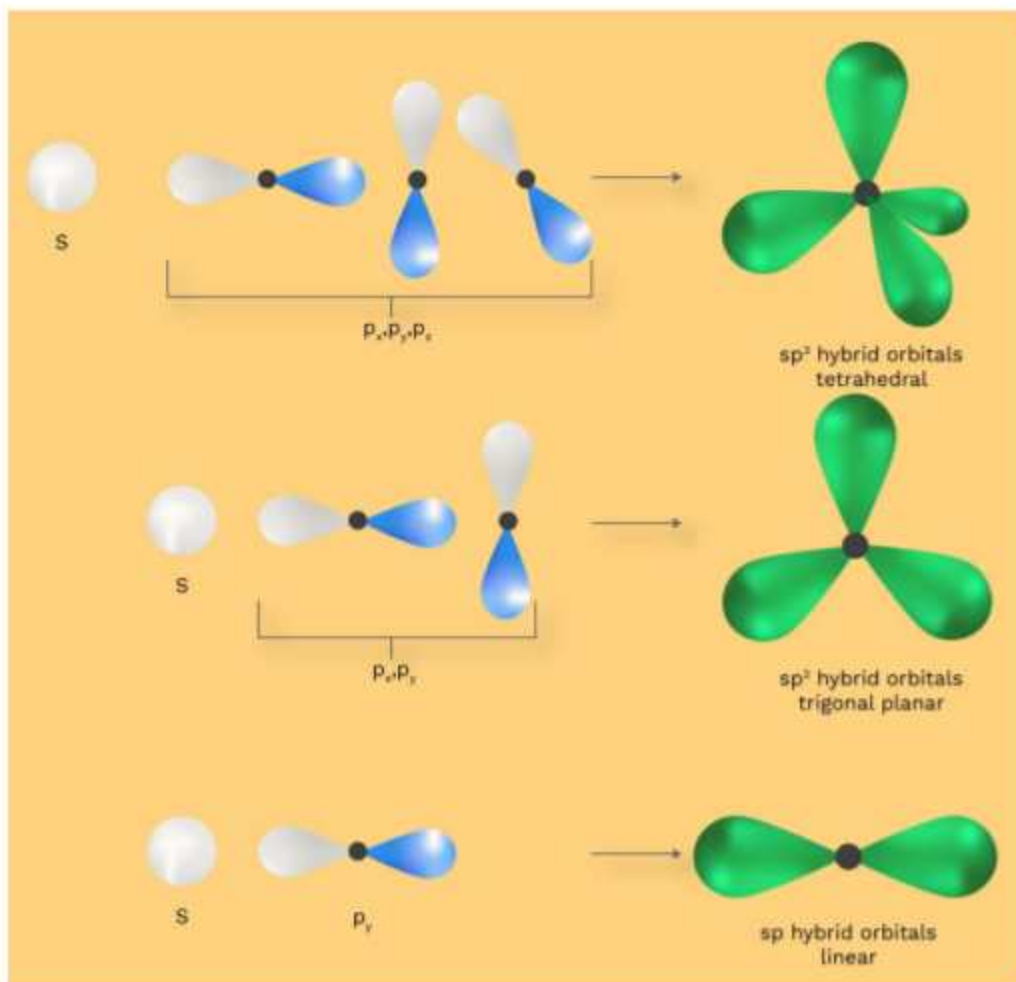
Self-linking property of C-atoms is known as catenation (due to bond energy-strong bond)



### Rack your Brain



Why Carbon forms large number of compounds?

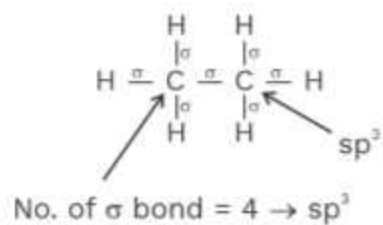
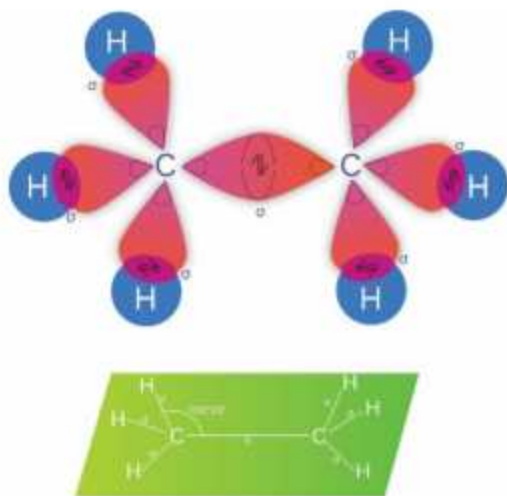


### Tricks for Determination of Hybridization

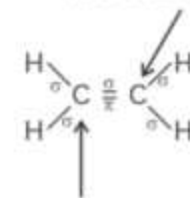
Carbon always form 4 bonds

EXAMPLE	NO. OF SIGMA BONDS	HYBRIDIZATION	BOND ANGLE	SHAPE
	4	$sp^3$	$109.28^\circ$	Tetrahedral
	3	$sp^2$	$120^\circ$	Trigonal Planar
	2	$sp$	$180^\circ$	Linear

(1) Ethane ( $\text{CH}_3\text{—CH}_3$ )

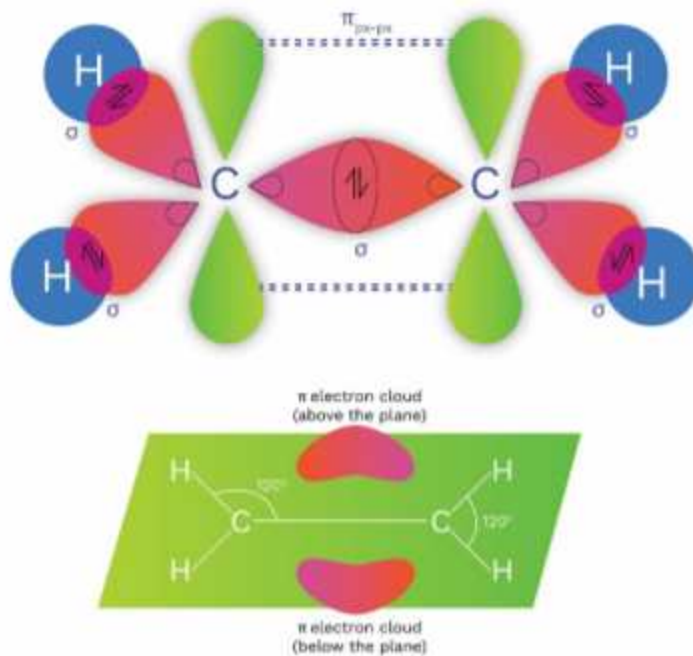


No. of  $\sigma$  bond = 3  $\rightarrow sp^2$



(2) Ethene ( $\text{CH}_2 = \text{CH}_2$ )

Ethene ( $\text{CH}_2 = \text{CH}_2$ )

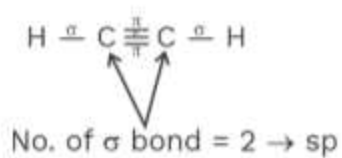
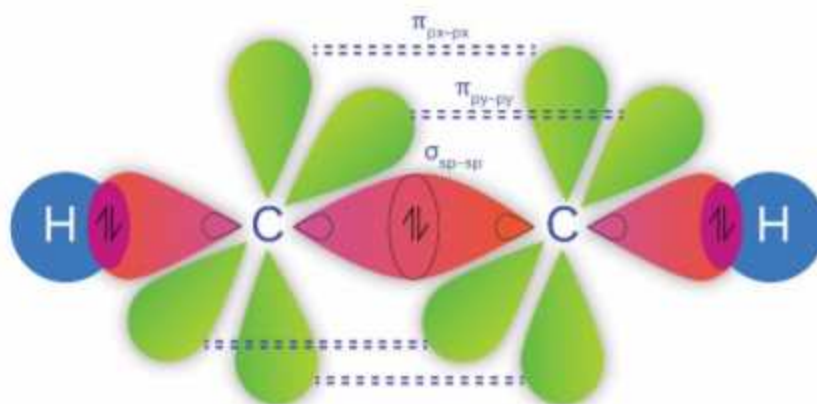




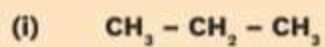


### (3) Ethyne (CH $\equiv$ CH)

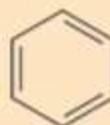
Ethyne (CH $\equiv$ CH)



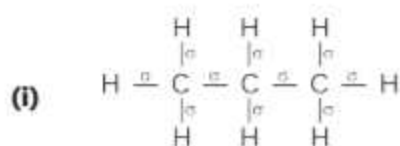
**Q1 Calculate Sigma and Pi Bond.**



(ii)

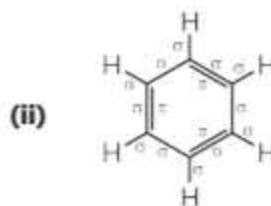


**A2**



$\sigma$  bond  $\rightarrow$  10

$\pi$  bond  $\rightarrow$  0

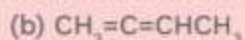
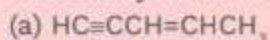


$\sigma$  bond  $\rightarrow$  12

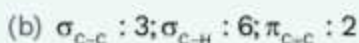
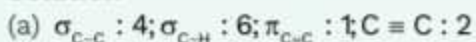
$\pi$  bond  $\rightarrow$  3

**NCERT PrepUp 12.1 (Pg. 335)**

How many  $\sigma$  and  $\pi$  bonds are present in each of the following molecules?

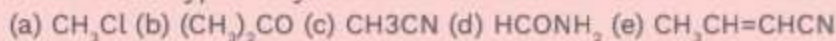


**Solution**

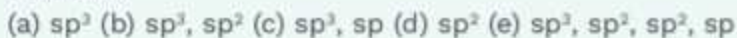


**NCERT PrepUp 12.2 (Pg. 335)**

What is the type of hybridisation of each carbon in the following compounds?

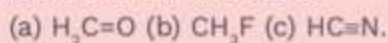


**Solution**



**NCERT PrepUp 12.3 (Pg. 335)**

Write the state of hybridisation of carbon in the following compounds and shapes of each of the molecules.





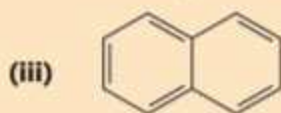
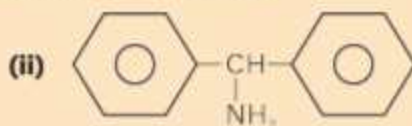
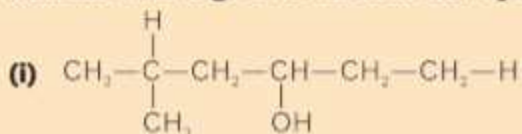
### Solution

- (a)  $sp^2$  hybridised carbon, trigonal planar;
- (b)  $sp^3$  hybridised carbon, tetrahedral;
- (c)  $sp$  hybridised carbon, linear.

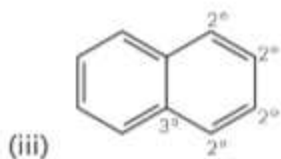
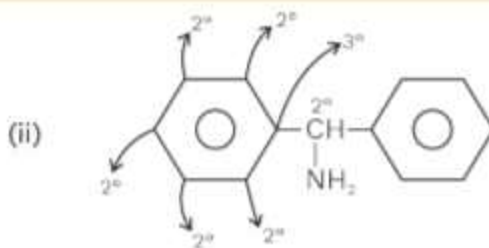
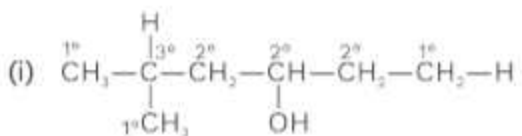
### Degree of Carbon and Hydrogen

- (1) **1° carbon atom** – Only one electronic valency of carbon atom is satisfied by the other carbon atoms.
- (2) **2° carbon atom** – Two electronic valency of carbon are satisfied by the other carbon atoms.
- (3) **3° carbon atom** – Three electronic valency of carbon atom are satisfied by the other carbon atoms.
- (4) **4° carbon atom** – Four electronic valency are satisfied by the other carbon atom.

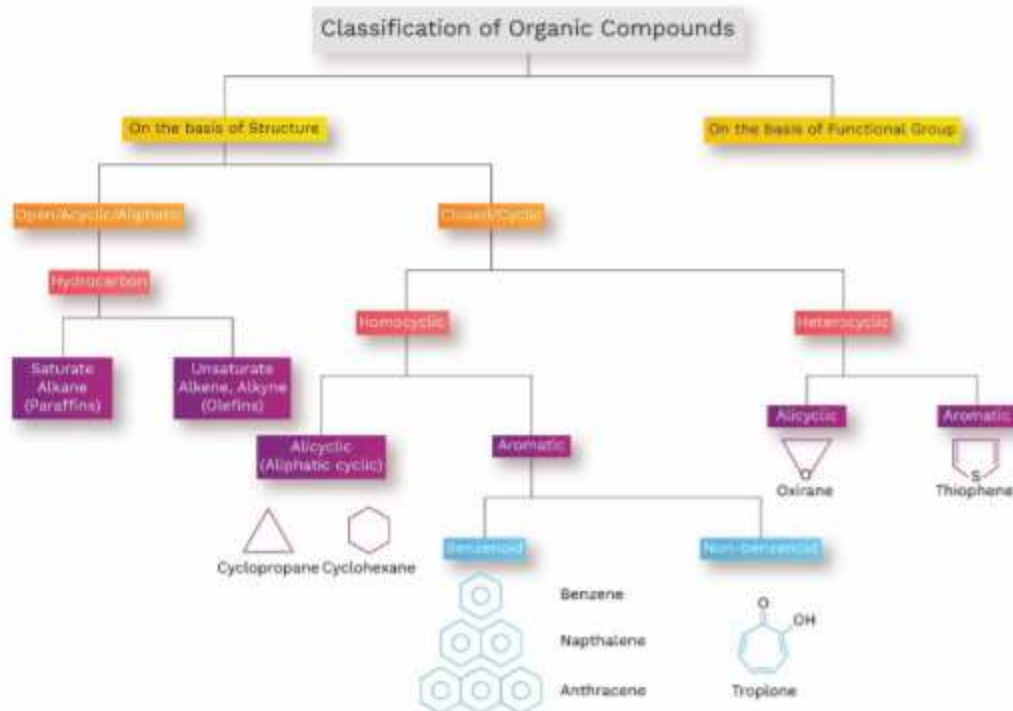
### Q2 Indicate the degree of Carbon and Hydrogen in the following.



### A2



• **Classification of Organic Compound**



**Previous Year's Questions**



An organic compound X (molecular formula  $C_6H_7O_2N$ ) has six carbon atoms in a ring system, two double bonds and a nitro group as substituent, X is

[NEET-1990]

- (1) homocyclic but not aromatic
- (2) aromatic but not homocyclic
- (3) homocyclic and aromatic
- (4) heterocyclic and aromatic

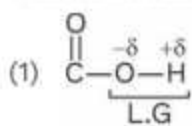
**Concept Ladder**

Alicyclic compounds are the combination of Aliphatic compounds enclosed in cyclic form.

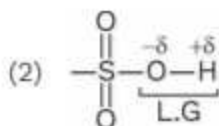




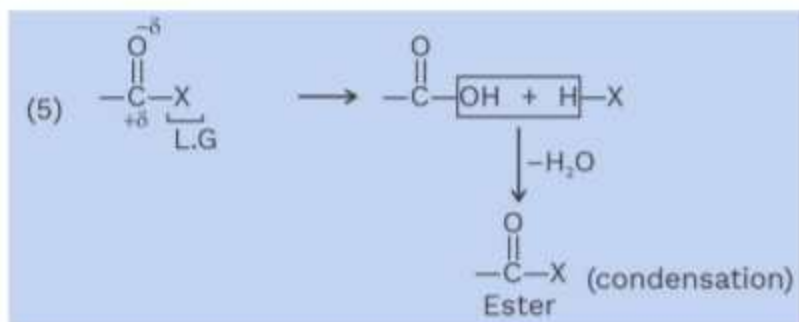
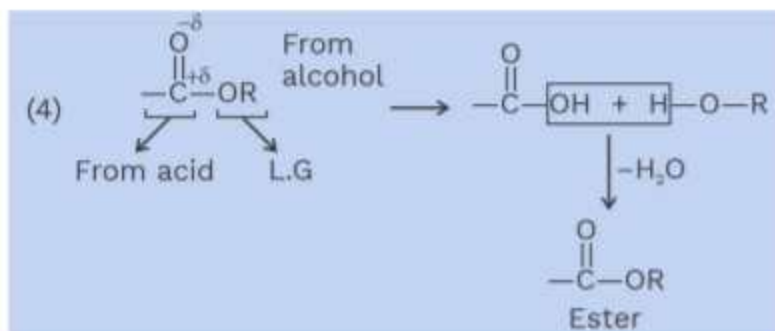
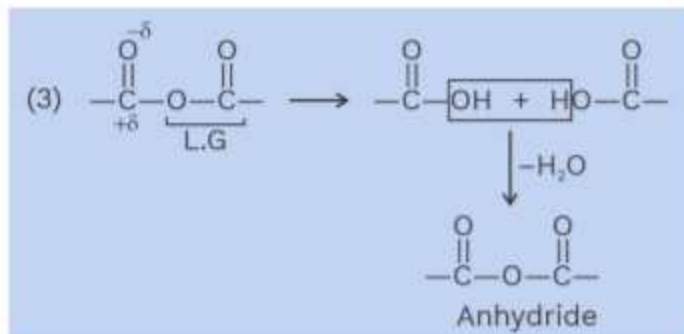
• **Functional Group**



Carboxylic acid



Sulphonic acid



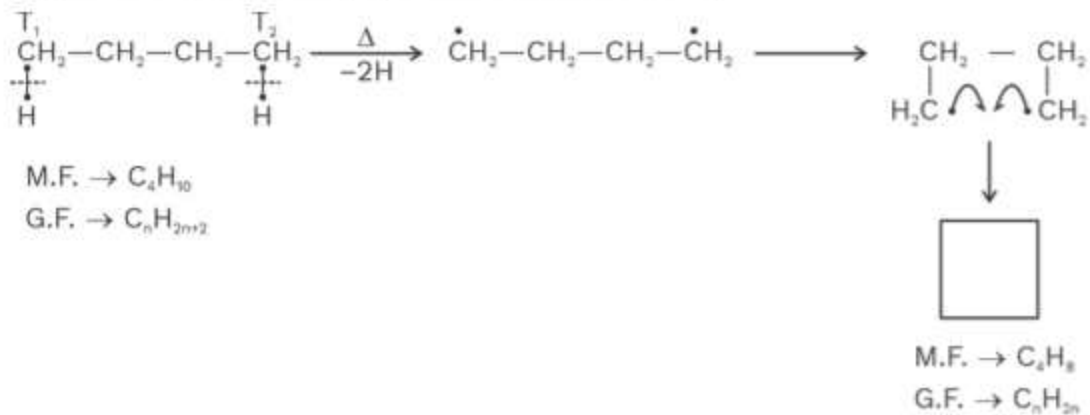




- **Homologous Series**

S. NO.	NAME OF SERIES	I-HOMOLOGUE	II-HOMOLOGUE
(i)	Alkane ( $C_nH_{2n+2}$ )	$CH_4$	$CH_3-CH_3$
(ii)	Alkene ( $C_nH_{2n}$ )	$CH_2=CH_2$	$CH_2=CH-CH_3$
(iii)	Alkyne ( $C_nH_{2n-2}$ )	$HC\equiv CH$	$HC\equiv C-CH_3$
(iv)	Halo alkane ( $C_nH_{2n+1}X$ )	$CH_3-X$	$CH_3-CH_2-X$
(v)	Alcohol ( $C_nH_{2n+2}O$ )	$CH_3-OH$	$CH_3-CH_2-OH$
(vi)	Ether ( $C_nH_{2n+2}O$ )	$CH_3-O-CH_3$	$CH_3-O-CH_2-CH_3$
(vii)	Aldehyde ( $C_nH_{2n}O$ )	$H-CHO$	$CH_3-CHO$
(viii)	Ketone ( $C_nH_{2n}O$ )	$CH_3-CO-CH_3$	$CH_3-CO-CH_2-CH_3$
(ix)	Carboxylic acid ( $C_nH_{2n}O_2$ )	$H-COOH$	$CH_3-COOH$
(x)	Ester ( $C_nH_{2n}O_2$ )	$HCOOCH_3$	$HCOOCH_2CH_3$
(xi)	Amide ( $C_nH_{2n+1}NO$ )	$H-CONH_2$	$CH_3-CONH_2$
(xii)	Nitro alkane ( $C_nH_{2n+1}NO_2$ )	$CH_3NO_2$	$CH_3CH_2NO_2$
(xiii)	Amine ( $C_nH_{2n+3}N$ )	$CH_3-NH_2$	$CH_3-CH_2-NH_2$

• Degree of Unsaturation (DU) or Index of H-deficiency



Concept Ladder

- (1) 1 Ring =  $2\text{H} = 1\text{H}_2$ , DU = 1
- (2) 1 Double bond =  $2\text{H} = 1\text{H}_2$ , DU = 1
- (3) 1 Triple bond =  $4\text{H} = 2\text{H}_2$ , DU = 2

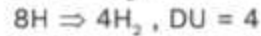
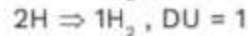
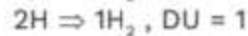
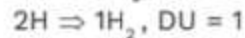
**Q3** Calculate Degree of Unsaturation.  
 $\text{C}_2\text{H}_2$ ,  $\text{C}_2\text{H}_4$ ,  $\text{C}_3\text{H}_6$ ,  $\text{C}_4\text{H}_6$ ,  $\text{C}_6\text{H}_6$ ,  $\text{C}_{10}\text{H}_{10}$

**A3**

M.F



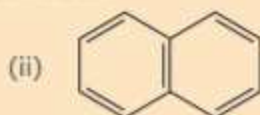
Alkane



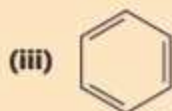




#### Q4 Calculate Degree of Unsaturation.



Napthalene



Anthracene

A4 (i) DU = 3  
(iii) DU = 4

(ii) DU = 7  
(iv) DU = 10

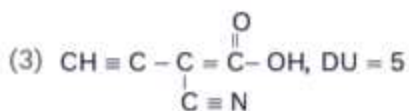
#### • Acyclic Alkane

$$DU = \frac{\left( \text{No. of H-atoms in acyclic alkane} \right) - \left( \text{No. of H-atoms in given compound} \right)}{2}$$

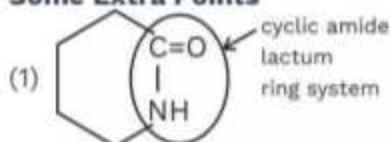
DU tells total number of double and triple bonds in a compound.

#### • Calculation of DU in Heteroatom containing compound Alkane

- (1)  $C_4H_{10}$  Alkane  
 $C_4H_{10} \Rightarrow C_4H_{10}$ , DU = 0
- (2)  $C_4H_8O$   $C_4H_{10}$ , DU = 1



#### • Some Extra Points

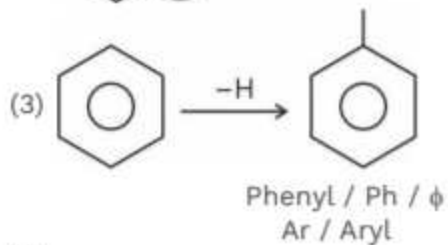
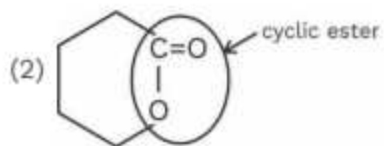


Nylon = Amide  
E.g. Caprolactam = Nylon-6

Concept Ladder

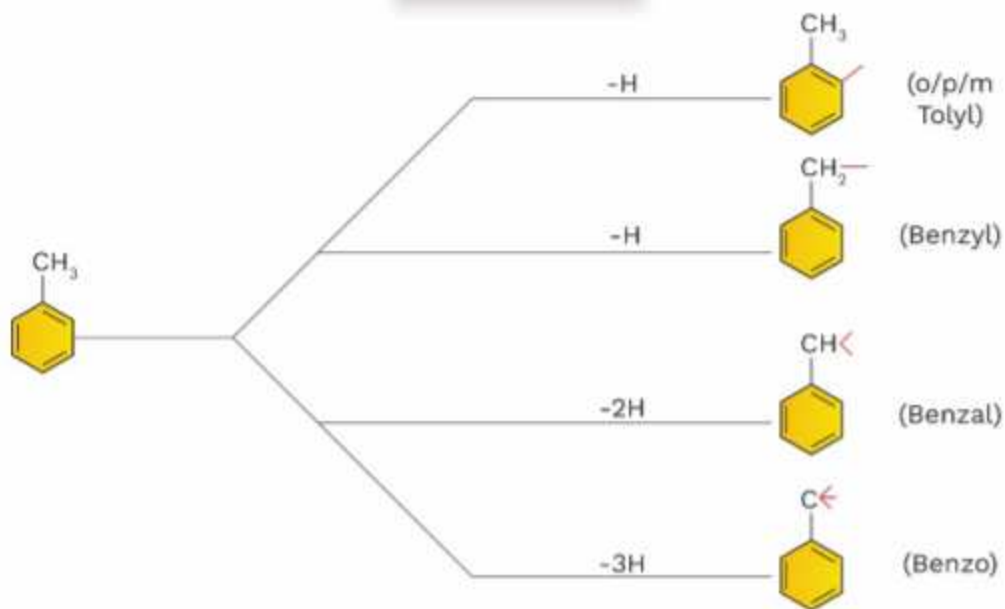
Deficiency of  $H_2$  molecule in given compound with respect to acyclic alkane is DU.



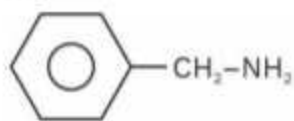


(4)

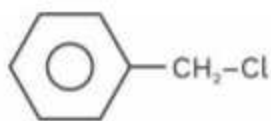
Aromatic Radical



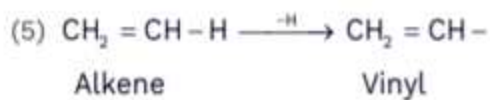
E.g.



Benzyl amide



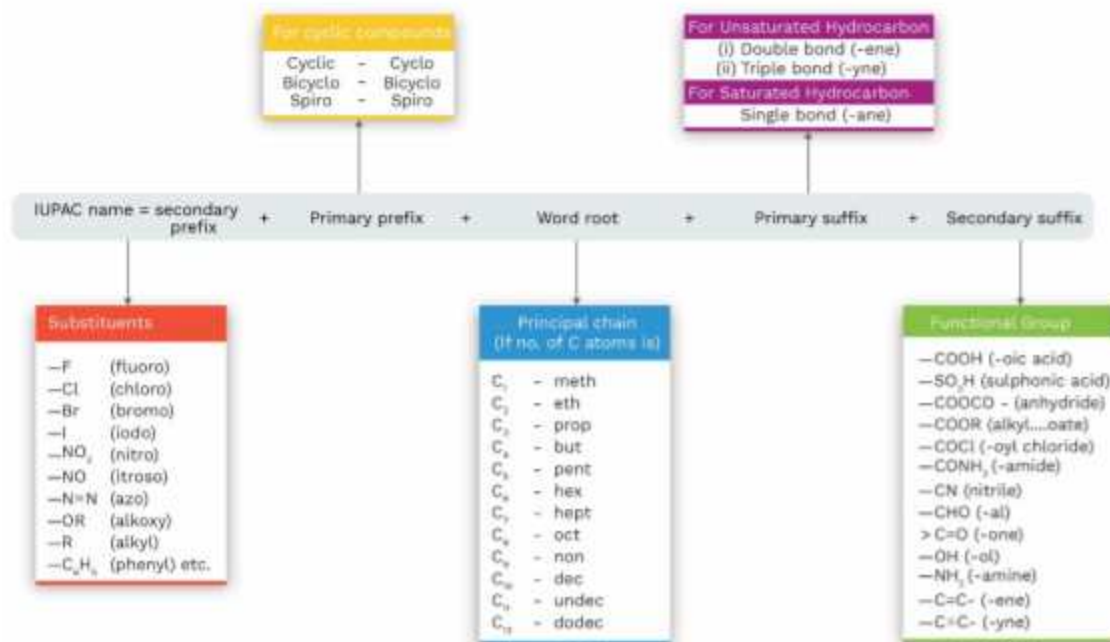
Benzyl chloride





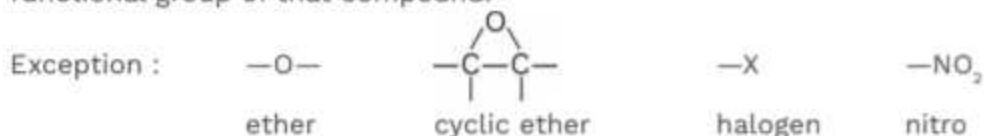
## IUPAC Naming

### 1. Format of IUPAC



### 2. Selection of Principle Functional Group

If compound is having a single functional group, then it is considered as the principle functional group of that compound.

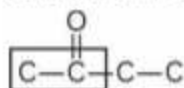


If compound having more than one functional group then select PFG according to given IUPAC series.

In this case rest of functional group behave as substituents & their prefix are used.

### 3. Selection of Principle C-chain (PCC)

If PFG having carbon then it considered as a first Carbon of PCC (except ketone).



If PFG not having carbon then consider that carbon which to PFG is directly attached. In this case that C-atom covered by both side of other C-atom. (including ketone)

Concept Ladder

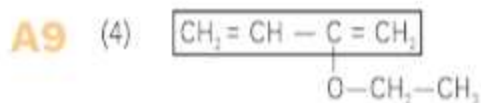
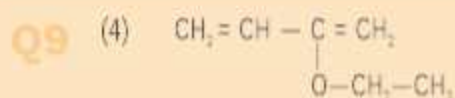
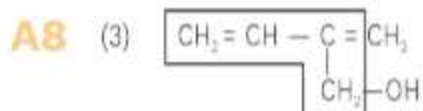
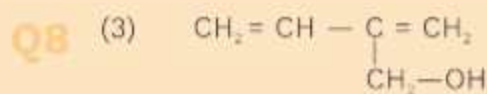
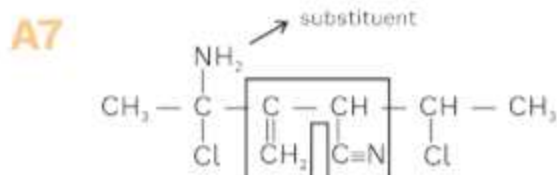
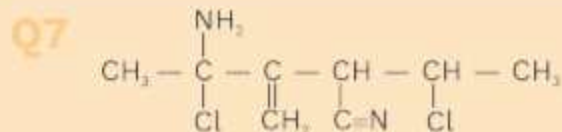
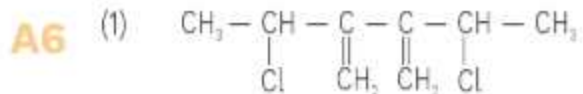
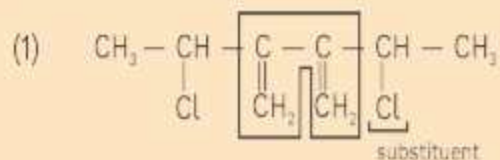
The sum of Locants Rule is preferred over lowest sum of locants irrespective of length of carbon chain.

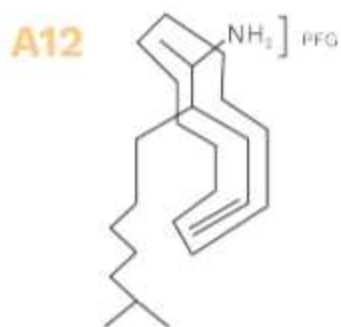
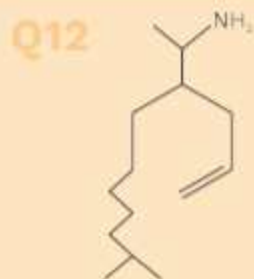
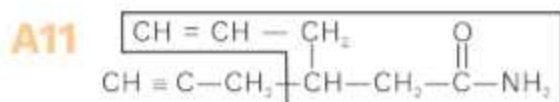
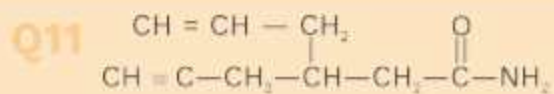
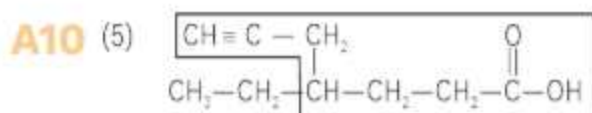
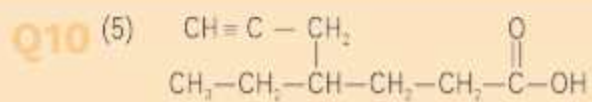


**Principle FG > Multiple bond (= or  $\equiv$ ) > No. of C- atoms in PCC > No. of substituents**



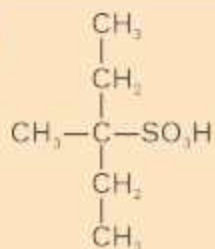
**Q6** Select the longest chain of carbon atom.



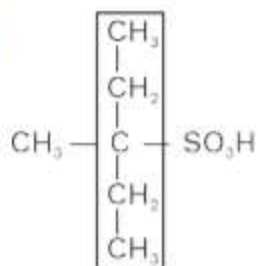




Q13



A13



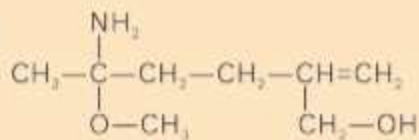
Q14



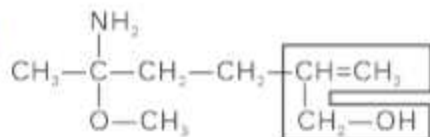
A14

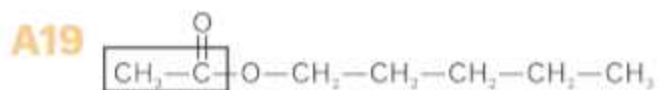
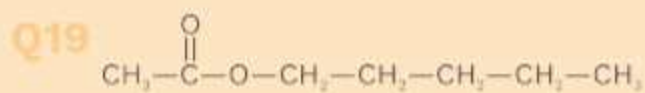
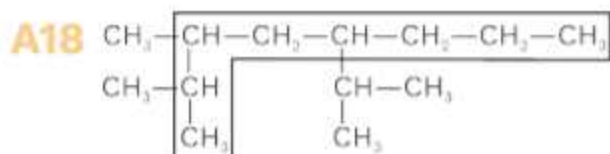
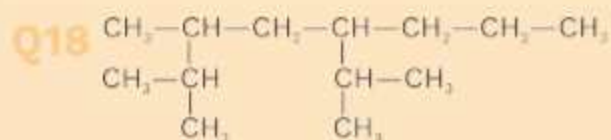
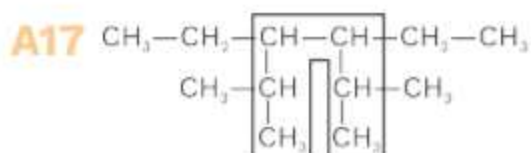
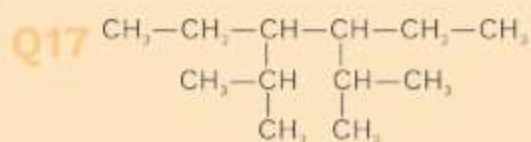


Q15

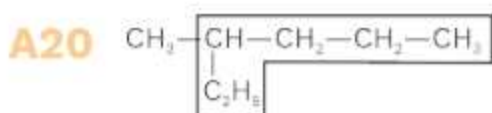
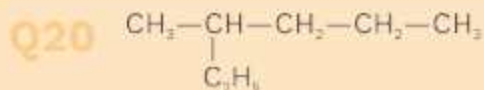


A15





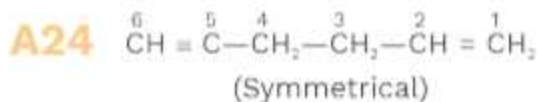
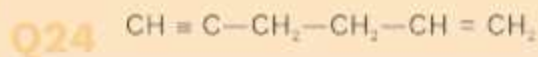
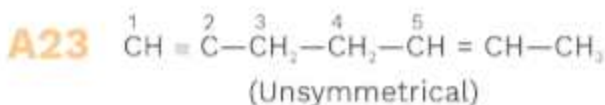
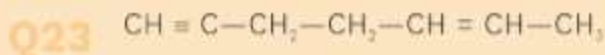
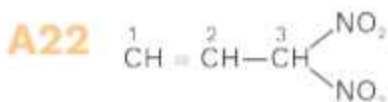
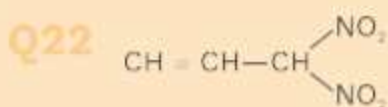
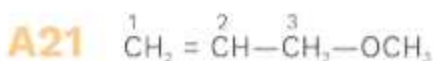
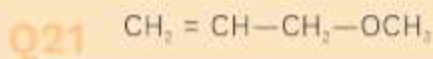


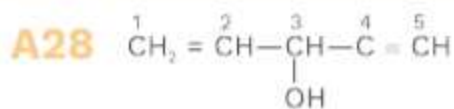
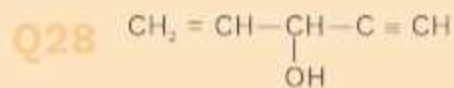
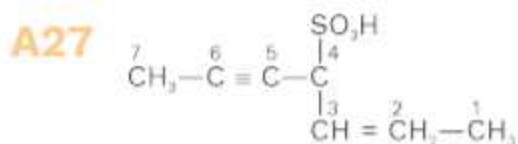
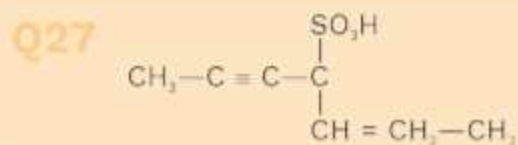
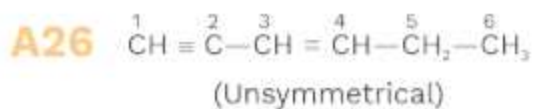
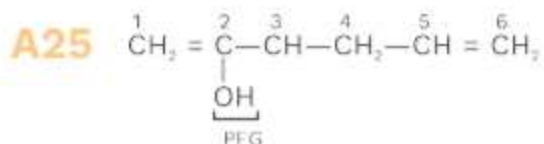
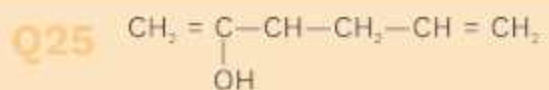


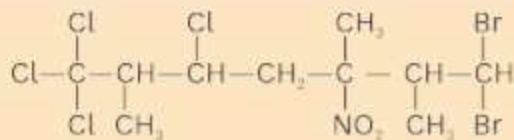
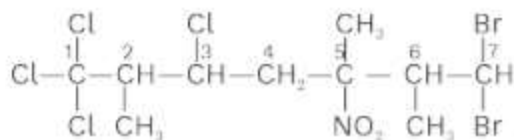
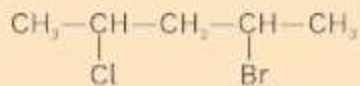
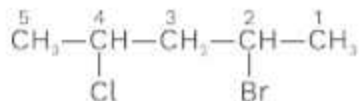
#### 4. Numbering in Selected PCC

If PFG having carbon then it considered as a first Carbon of PCC (except ketone).

**PFG > Multiple (= or  $\text{O}$ ) > Locant rule > Alphabetical order**

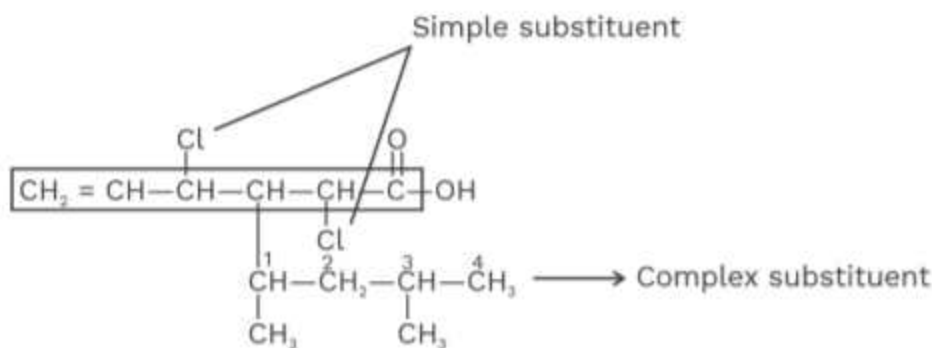




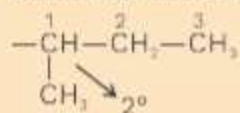
**Q29****A29****Q30****A30****5. Use of numerical prefix**

di, tri ..... is used for simple substituents.

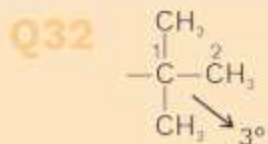
bis, tris, tetrakis used for complex substituents.



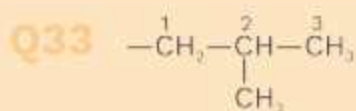
Substituted substituent is known as complex substituent.

**Q31****Write the IUPAC name of complex substituent.****A31**

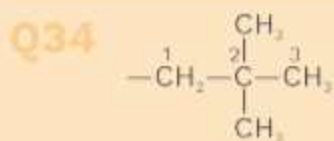
1-Methyl propyl or sec-butyl



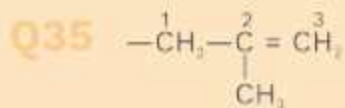
**A32** 1-dimethyl ethyl or tert-butyl



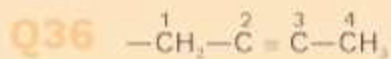
**A33** 2-Methyl propyl or iso-butyl



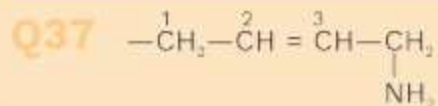
**A34** 2,2-dimethyl propyl or neo-pentyl



**A35** 2-Methyl-prop-2-enyl



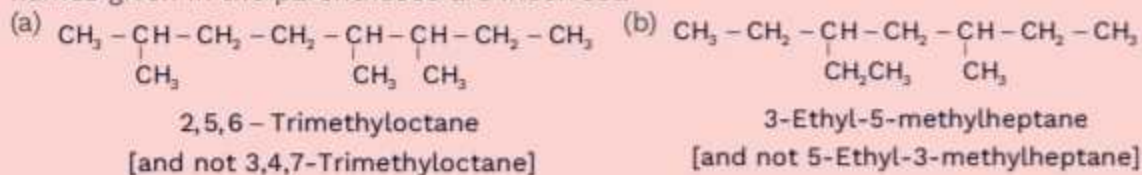
**A36** But-2-ynyl



**A37** 4-Amino-but-2-enyl

**NCERT PrepUp 12.7 (Pg. 343)**

Structures and IUPAC names of some hydrocarbons are given below. Explain why the names given in the parentheses are incorrect.



**Solution**

- (a) Lowest locant number, 2,5,6 is lower than 3,5,7,  
 (b) substituents are in equivalent position; lower number is given to the one that comes first in the name according to alphabetical order.

**Previous Year's Questions**



**Previous Year Question's**

The structure of isobutyl group in an organic compound is

[NEET-2013]

- (1)  $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-$   
 (2)  $\text{CH}_3-\underset{\text{CH}_3}{\overset{\text{CH}_3}{\text{C}}}-$       (3)  $\text{CH}_3-\underset{\text{CH}_3}{\text{C}}\text{H}-\text{CH}_2-$   
 (4)  $\text{CH}_3-\underset{\text{CH}_3}{\text{C}}\text{H}-\text{CH}_2-\text{CH}_3$

**Concept Ladder**

MIC (Methyl isocyanate) is extremely poisonous gas, which related to Bhopal Gas tragedy in 1984.



**Rack your Brain**



Why  $sp$ -hybridization is more electronegative as compared to  $sp^2$  and  $sp^3$ -hybridization?

## 6. Alphabetical order of Substituents

### In case of simple substituents :

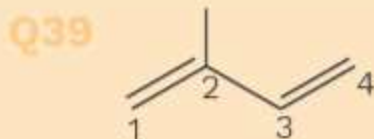
Cyclo, iso, neo are considered in alphabetical order rest all like di, tri, sec, tert are avoided.

### In case of complex substituent :

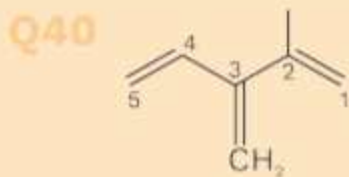
First alphabet decide alphabetical order.



**A38** Pent-1-en-3-yne



**A39** 2-Methyl-buta-1,3-diene



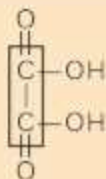
**A40** 2-Methyl-3-methylidene-penta-1,4-diene



**A41** Methanoic Acid

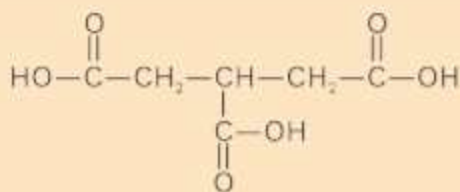


Q42



A42 Ethane-3,2-dioic acid [Oxalic acid]

Q43



A43 Propane-1,2,3-tricarboxylic acid

• **Special Rule**

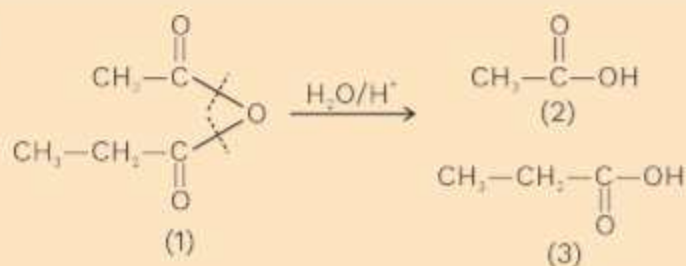
F.G.	SUFFIX
-COOH	Carboxylic acid
-SO <sub>3</sub> H	Sulphonic acid
-COOR	Alkyl carboxylate
-COX	Carboxyl halide
-CONH <sub>2</sub>	Carboxamide
-C≡N	Carbonitrile
-CHO	Carbaldehyde

## 7. IUPAC name of Anhydride



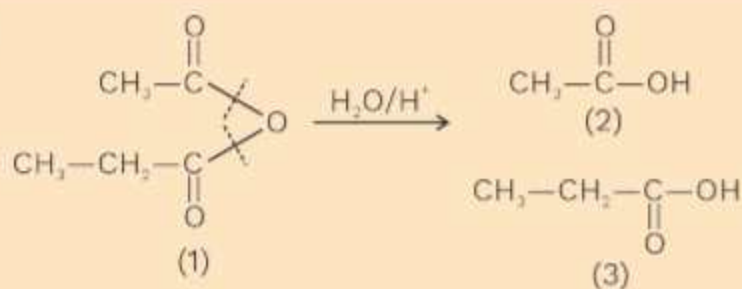
IUPAC of Anhydrides always given w.r.t. their respective acids & follow alphabetical order rule.

**Q44**



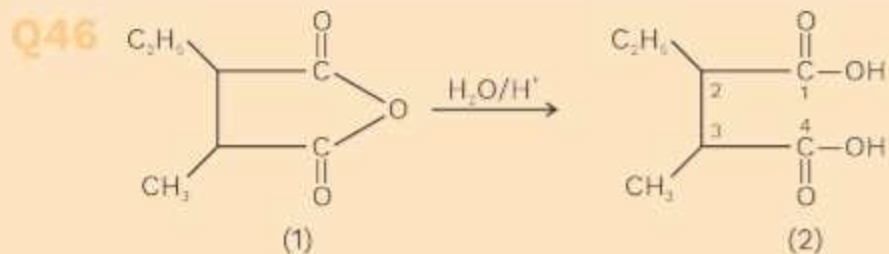
- A44** (1) Ethanoic-Propanoic anhydride  
(2) Ethanoic acid  
(3) Propanoic acid

**Q45**



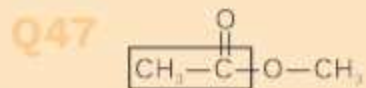
- A45** (1) Methanoic anhydride  
(2) Ethanoic acid  
(3) Propanoic acid



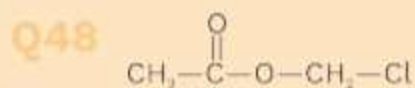


**A46** (1) 2-Ethyl-3-methyl-butan-1,4-dioic anhydride  
 (2) 2-Ethyl-3-methyl-but-1,4-dioic acid

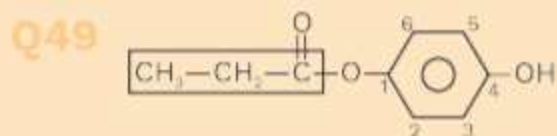
### 8. IUPAC name of ester



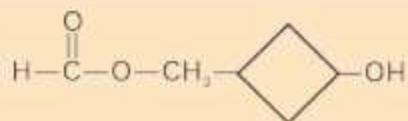
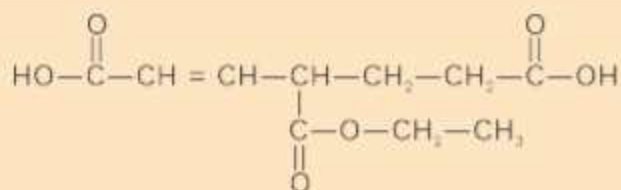
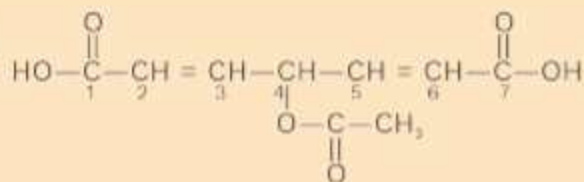
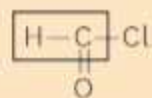
**A47** Methyl ethanoate

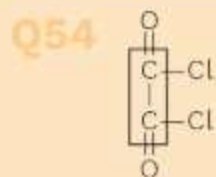


**A48** Chloromethyl ethanoate

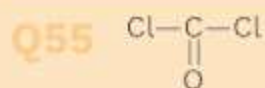


**A49** 4-Hydroxy-phenyl-propanoate

**Q50****A50** 4-Hydroxy cyclobutylmethyl Methanoate**9. Ester as a Substituent****Q51****A51** 4-Ethoxy-carbonyl-hept-2-en-1,7-dioic acid**Q52****A52** 4-Ethoxy-oxy-hepta-2,5-diene-1,7-dioic acid**Q53****A53** Methanoyl chloride



**A54** Ethan-1,2-dioylchloride



**A55** Chloro methanoyl chloride [Phosgene gas]



**A56** 1,1,1-tetrachloro methane

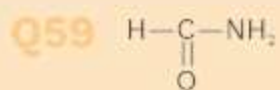
#### 10. IUPAC name of Amide



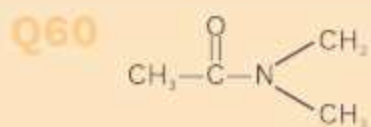
**A57** 1,1,1-trichloro methane (chloroform)



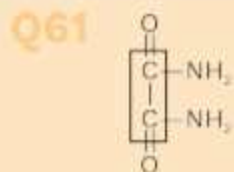
**A58** 1,1,1-triiodo methane



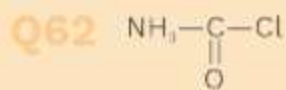
**A59** Methanamide



**A60** N,N-dimethylethanamide



**A61** Ethan-1,2-diamide



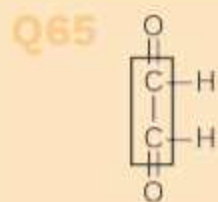
**A62** Aminomethanoyl chloride



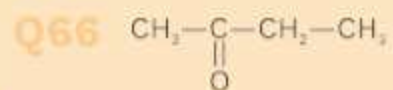
**A63** Ethan-1,2-dinitrile



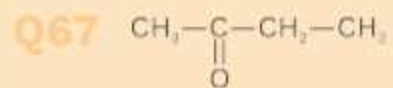
**A64** Formaldehyde



**A65** Ethan-1,2-dial



**A66** Butan-2-one

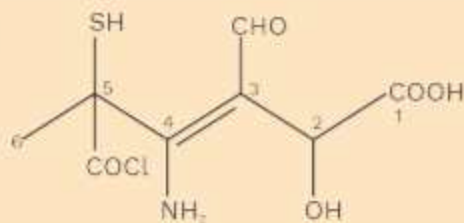


**A67** Butan-2-one



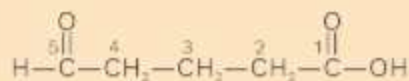
**A68** 4-hydroxy-butane-2-one

Q69



A69 4-Amino-5-chloroformyl-3-formyl  
2-hydroxy-5-mercapto-hex-3-enoic acid

Q70

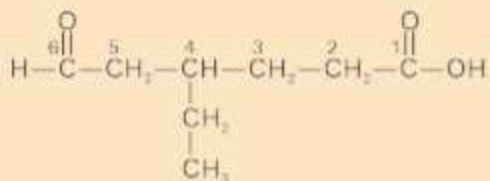


5-oxo-pentanoic acid

A70 5-oxo-pentanoic acid

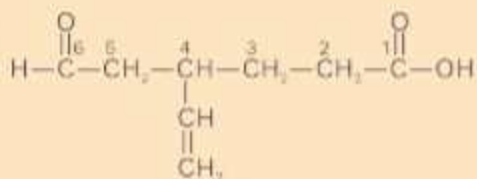
#### Special case for aldehyde & ketone

Q71

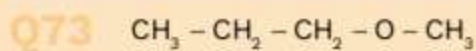


A71 4-Ethyl-6-oxo-hexan-1-oic acid

Q72



A72 4-Ethyl-6-formyl hexan-1-oic acid

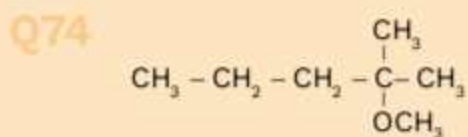


**A73** 1-Methoxy propane

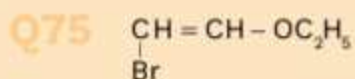
### 11. Naming of Ether

Ether can never be PFG. It always behaves as a substituent & alkoxy prefix is used.

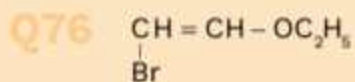
**Note :** All ethers are polar aprotic solvent



**A74** 2-Methoxy-2-methyl pentane



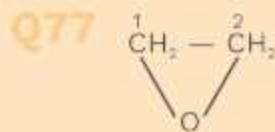
**A75** 1-Bromo-2-ethoxy ethene



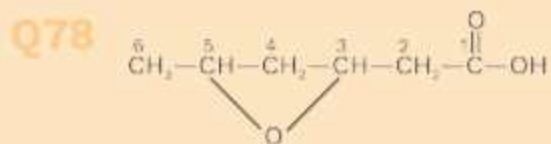
**A76** 1-Ethoxy-methan-1-ol

## 12. IUPAC name of cyclic ether

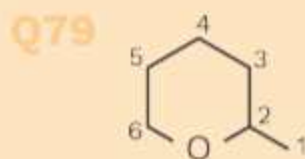
In case of cyclic ether to give IUPAC name compound heated as a open chain compound & this case epoxy prefix used.



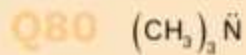
**A77** Epoxy ring system  
1,2-epoxy ethane



**A78** Epoxy ring system  
3,5-epoxy hexanoic acid

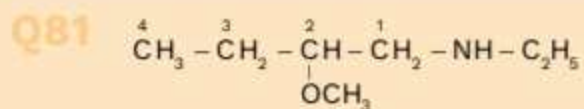


**A79** 2,6-epoxy hexane



**A80** N,N,N-tri methyl amine

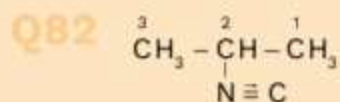




**A81** N-Ethyl-2-Methoxy-butan-1-amine

### 13. IUPAC name of Isocyanide

In case of isocyanide even C-atom present in isocyanide, still we select PCC assuming that there is no carbon in it.



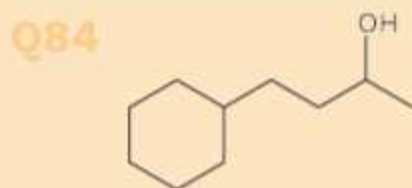
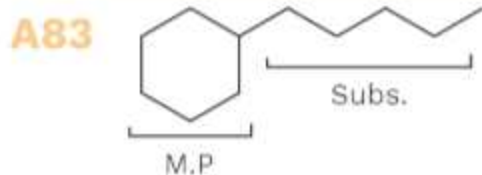
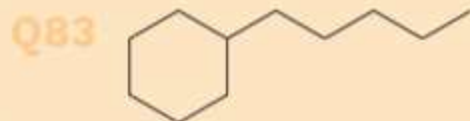
**A82** Propan-2-isonitrile (old system)  
2-carbylamino propane (new system)

### IUPAC name of Cyclic compounds

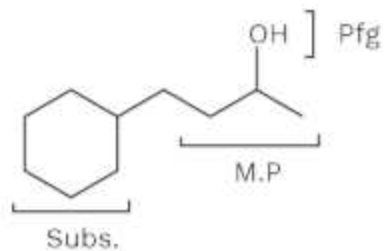
**Rule 1 :** If given compound is combination of open & closed chain hydrocarbon part then their principal part is selected according to given IUPAC series.

If C-atom equal same-same

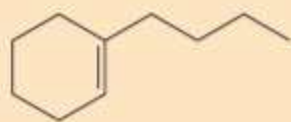
[PFG > M.B. > No. of C-atoms in PCC > Ring]



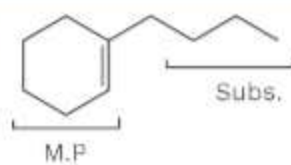
A84



Q85



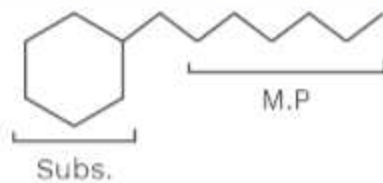
A85



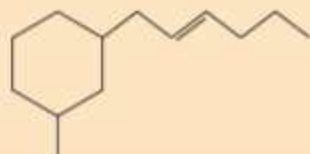
Q86



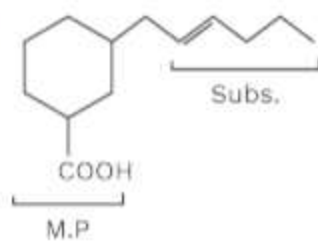
A86



Q87

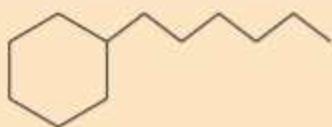


A87

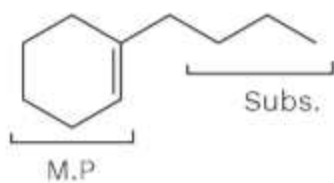




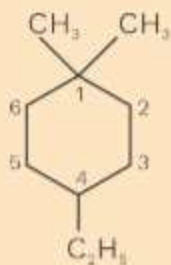
Q88



A88



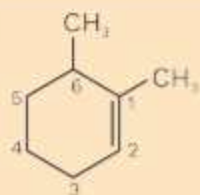
Q89



A89 4-Ethyl-1,1-dimethyl cyclohexane

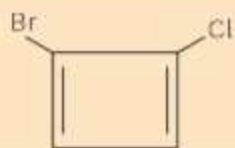
**Rule 2 :** If PFC directly attached to C-atom of ring then it is considered as a part of ring, not a separate part, but in case of ketone, it may present inside a ring.  
In case of cyclic compound 'cyclic' prefix used.

Q91



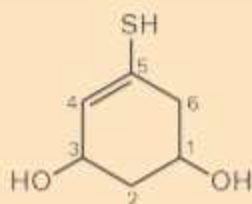
A91 1,6-dimethyl cyclohex-1-ene

Q92



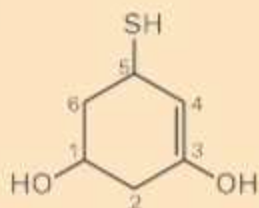
A92 1-Bromo-4-chloro cyclobut-1,3-diene

Q93



A93 5-Mercapto cyclohex-4-ene-1,3-diol

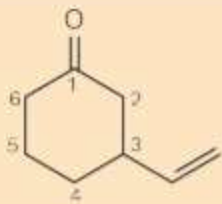
Q94



A94 5-Mercapto cyclohex-3-ene-1,3-diol

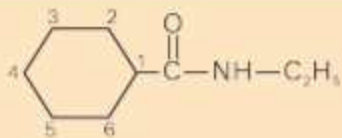


**Q95**



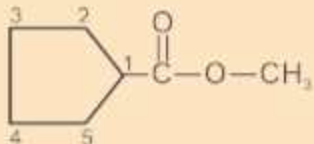
**A95** 3-Vinyl cyclo hexan-1-one

**Q96**



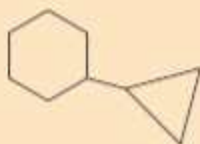
**A96** N-ethyl cyclohexan-1-carboxamide

**Q97**



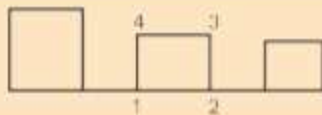
**A97** Methyl cyclopentan carboxylate

**Q98**



**A98** 1-Cyclopropyl cyclohexane

**Q99**



**A99** 1,2-dicyclobutyl cyclobutane

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### IUPAC name of Aromatic Compound

**Rule 1 :** Common name of some compounds has been written in IUPAC system.

Q100



A100 Benzene

Q101



A101 Phenol

Q102



A102 Toluene

Q103



A103 Anisole

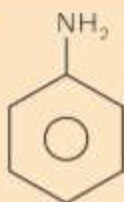


**Q104**



**A104** Benzaldehyde

**Q105**



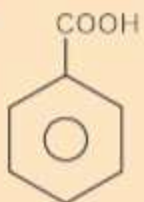
**A105** Aniline

**Q106**



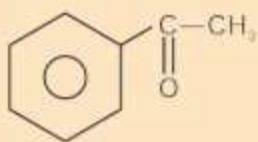
**A106** Nitrobenzene

**Q107**



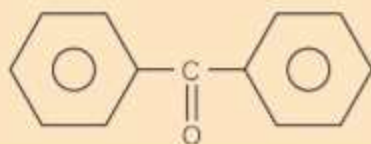
**A107** Benzoic acid

Q108



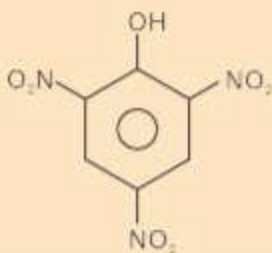
A108 Acetophenone

Q109



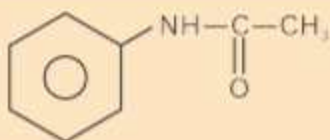
A109 Benzophenone

Q110



A110 Picric Acid

Q111

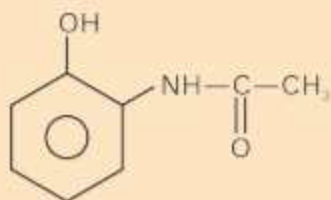


A111 Acetanilide



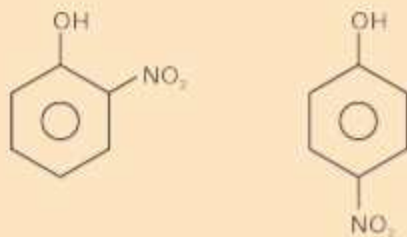


Q112



A112 Acetaminophen

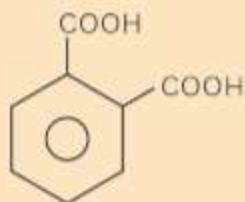
Q113



A113 O-nitrophenol, p-nitrophenol  
Hint : Separation by steam distillation method

**Rule 2 :** If more than one principle functional group are present then suffix is used according to IUPAC rule.

Q114



A114 Benzene-1,2-dicarboxylic acid

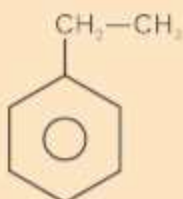
**Rule 3 :** If given compound is combination of open chain & closed chain hydrocarbon part then except ethyl & methyl benzene open chain part is considered as main part. In this case benzene behaves as a substituent & phenyl propene used.

Q115



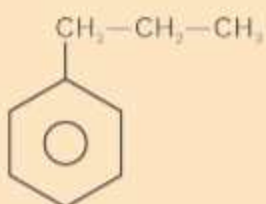
A115 Methyl benzene

Q116



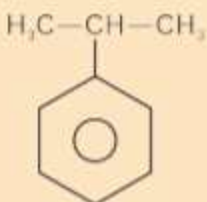
A116 Ethyl benzene

Q117



A117 1-Phenyl propane

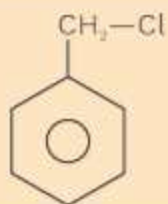
Q118



A118 2-Phenyl propane



Q119



A119 1-Chloro-1-phenyl methane

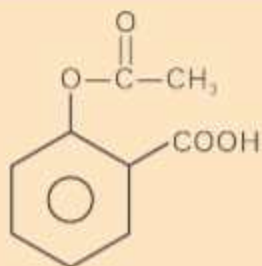
**Rule 4 :** If any part having functional group then it is considered as main part.

Q120



A120 4[1-Methyl ethyl] Phenol-1-ol  
OR 4-Isopropyl Benzene-1-ol

Q121



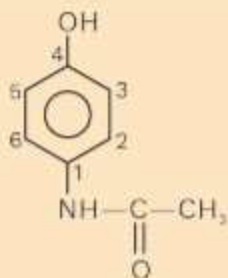
A121 Aspirin  
Acetyl Salicylic acid (Chemical name)  
Or 2-Ethanoyl-oxy-benzene carboxylic acids

### Use of Aspirin

- (i) Analgesic (pain )
- (ii) Antipyretic
- (iii) Anti coagulation
- (iv) Anti inflammatory

Aspirin } alcohol addicts should not use it (causes peptic ulcers)  
Paracetamol }

Q122

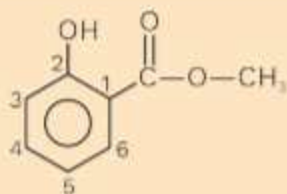


A122 Paracetamol (PCM)  
N-(4-hydroxyphenyl) ethanamide

### Use of Paracetamol :

- (i) Analgesic
- (ii) Antipyretic
- (iii) Anti inflammatory

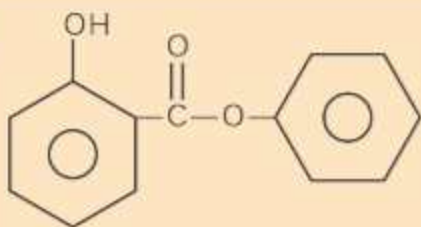
Q123



A123 Methyl salicylate  
(Oil of winter green)  
Use — Joint pain  
Methyl-2-hydroxy benzene carboxylate



Q124



A124

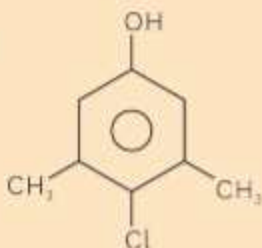
Salol

Use — Antiseptic

Action — Astringent

Phenyl-2-hydroxy benzoate

Q125



A125

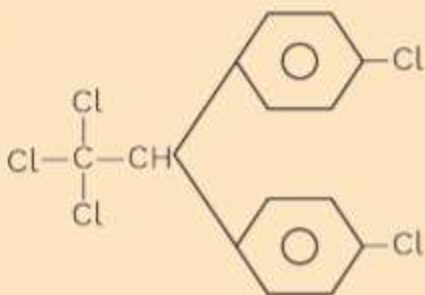
Chloroxylenol

Dettol — Chloroxylenol + Terpinol

Use — Antiseptic

4-Chloro-3,5-dimethyl benzen-1-ol

Q126



A126

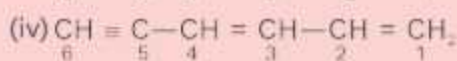
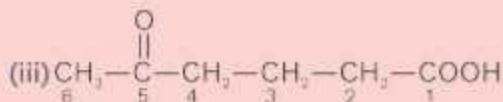
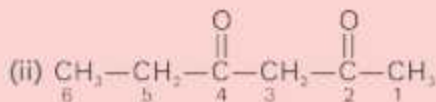
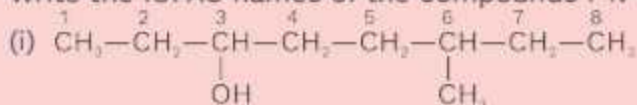
DDT

Non-biodegradable

1,1,1-Trichloro-2,2-Bis[4-chlorophenyl]ethane

**NCERT PrepUp 12.8 (Pg. 344)**

Write the IUPAC names of the compounds i-iv from their given structures.

**Solution**

(i)

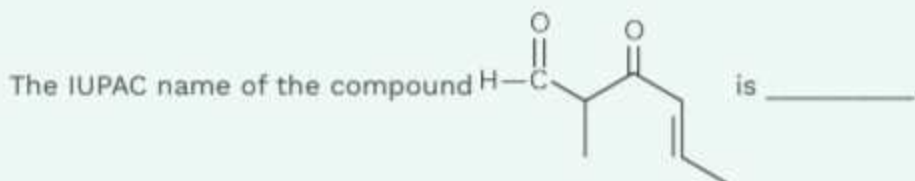
- The functional group present is an alcohol (OH). Hence the suffix is '-ol'.
- The longest chain containing -OH has eight carbon atoms. Hence the corresponding saturated hydrocarbon is octane.
- The -OH is on carbon atom 3. In addition, a methyl group is attached at 6th carbon.

Hence, the systematic name of this compound is 6-Methyloctan-3-ol.

(ii) Hexane-2,4-dione

(iii) 5-Oxo-hexanoic acid

(iv) Hex-1-en-5-yne

**Previous Year's Questions**

[NEET-2017]

- (1) 5-formylhex-2-en-3-one      (2) 5-methyl-4-oxohex-2-en-5-al  
(3) 3-keto-2-methylhex-5-enal      (4) 3-keto-2-methylhex-4-enal

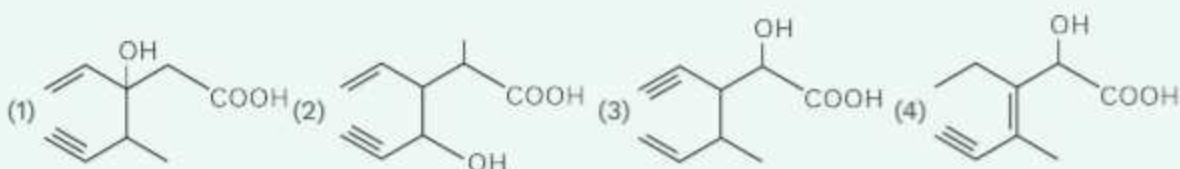


### Previous Year's Questions



Structure of the compound whose IUPAC name is 3-ethyl-2-hydroxy-4-methylhex-3-en-5-ynoic acid is

[NEET-2013]

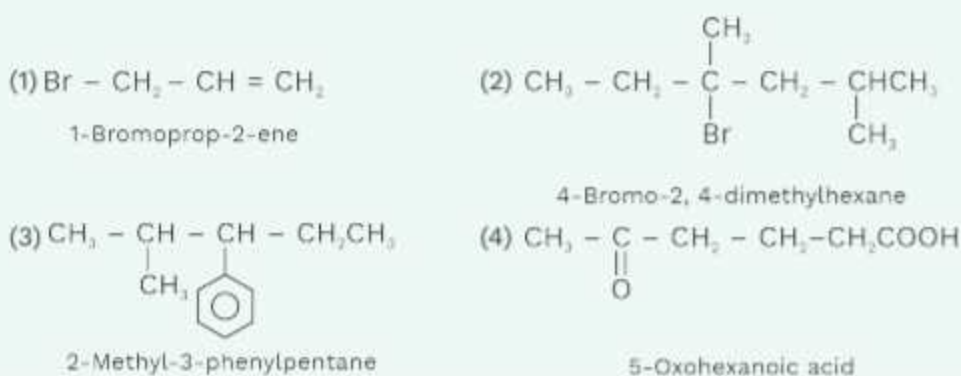


### Previous Year's Questions

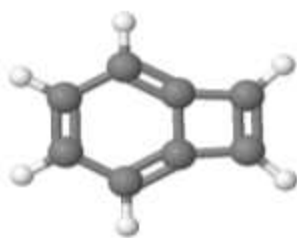


Which nomenclature is not according to IUPAC system?

[NEET-2012]



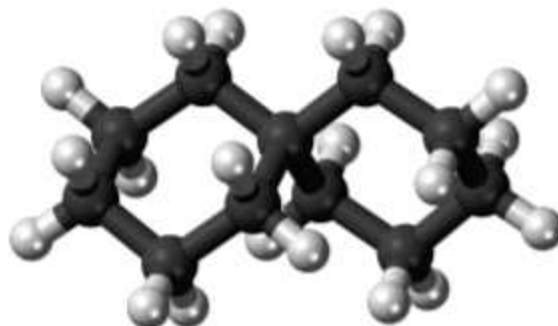
#### • Bicyclo Compounds



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Bicyclo [4.2.0] octane

#### • Spiro Compounds



Spiro [5.5] decane

## Chapter Summary



- A carbon atom can share 4 electrons with other carbons & can form multiple bond. The bonds formed are single, double and triple by sharing of 2, 4 & 6 electrons respectively.
- Priority order of functional group :
  - $-\text{COOH} > -\text{SO}_3\text{H} > -\text{COOR} > -\text{COX} > -\text{CONH}_2 > -\text{CN} > -\text{NC} > -\text{CHO} > \text{>C}=\text{O} > -\text{OH}$
  - $-\text{SH} > -\text{NH}_2 > -\text{OR} > \begin{array}{c} \text{C} \quad \text{C} \\ \diagdown \quad / \\ \text{O} \end{array} > \begin{array}{c} | \quad | \\ \text{C}=\text{C} \\ | \quad | \end{array} > -\text{C}\equiv\text{C}- > -\text{N}=\text{N}- > -\text{NO}_2 > -\text{NO} > -\text{X}$
- IUPAC name = sec. prefix + primary prefix + word root + primary suffix + sec. suffix.
- IUPAC system of nomenclature is valid for various types of organic compounds such as : Complex branched chain, cyclic compound, polyfunctional groups compounds, bicyclo and spiro compounds.
- If a hydrocarbon has both double and triple bond, it is named as alkyne. While numbering of double bond is preferred over triple bond.
- If more than two carbon containing functional groups are directly attached to unbranched alkane then that carbon chain is considered as principle carbon chain and we use special 2° suffix.
- When two similar functional groups are present at the ends of chain, then carbon of both functional groups is counted in chain.
- When two different carbon containing functional groups are present at the ends of carbon chain, only one carbon atom of principal functional groups is considered in parent chain.
- If two atoms or group of atoms of same priority occupy identical positions from either end of the parent chain, the lower number must be given to atom/group which comes first in alphabetic order.
- Bicyclo compounds contain two fused or infused rings.
- Spiro compounds contain one common carbon.