

# Organic Chemistry

Carbon



Other Elements



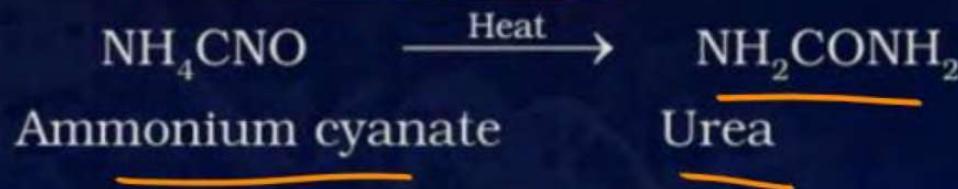


## General Introduction

PW

[Why organic chemistry?]

- Organic compounds are vital for sustaining life on earth and include complex molecules like genetic information bearing deoxyribonucleic acid (DNA) and proteins that constitute essential compounds of our blood, muscles and skin.
- Berzilius, a Swedish chemist proposed that a '**VITAL FORCE**' was responsible for the formation of organic compounds. However, this notion was rejected in 1828 when F. Wohler synthesized an organic compound urea from an inorganic compound ammonium cyanate.
- The pioneering synthesis of acetic acid by Kolbe (1845) that organic compounds could be synthesized from inorganic sources in a laboratory.



C. Q. 01



What was the major significance of Kolbe's synthesis of acetic acid?



- A It demonstrated that organic compounds could be synthesized from inorganic sources.
- B It proved that all acids are organic in nature.
- C It introduced the concept of polymers.
- D It was the first discovery of an organic molecule.

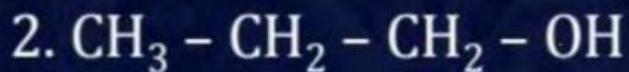


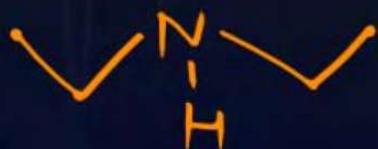
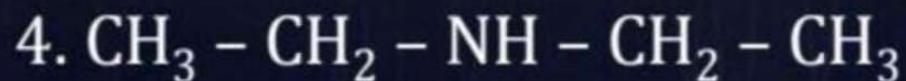
## Representation of Organic Compounds



### Definition: Bond Line Structure

- One C - C bonds are represented.
- Heteroatoms are always represented.
- Longest C - C chain is represented in Zig-Zag pattern.
- Double bonds are shown with two lines and triple bonds three lines.
- Example: 1.  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$





Bond line formula of  $\text{HOCH}(\text{CN})_2$  is:

- A *C ka 'h' represent nahikate*
- B X
- C
- D ✓



## Tetravalence of Carbon

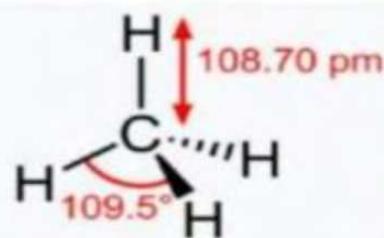
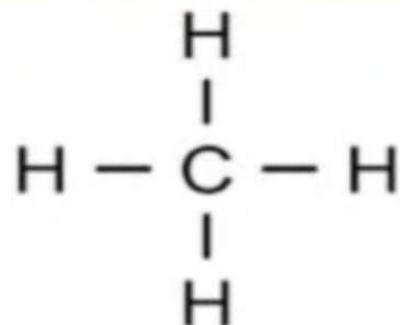


$$\begin{array}{ll} \text{SP} & \text{SP}^2 \\ \therefore s = \frac{1}{2} \times 100 = 50\% & \therefore s = \frac{1}{3} \times 100 = 33.33\% \\ \text{SP}^3 & s = \frac{1}{4} \times 100 = 25\% \end{array}$$

- Tetravalence of carbon and the formation of covalent bonds by it are explained in terms of its electronic configuration and the hybridization of s and p orbitals.
- The shapes of molecules like methane ( $\text{CH}_4$ ), ethene ( $\text{C}_2\text{H}_4$ ), ethyne ( $\text{C}_2\text{H}_2$ ) are explained in terms of the use of  $\text{sp}^3$ ,  $\text{sp}^2$  and sp hybrid orbitals by carbon atoms in the respective molecules.
- Hybridization influences the bond length and bond enthalpy (strength) in compounds.
- The change in hybridization affects the electronegativity of carbon. The greater the s character of the hybrid orbitals, the greater is the electronegativity. Thus, a carbon atom having a sp hybrid orbital with 50% s character is more electronegative than that possessing  $\text{sp}^2$  or  $\text{sp}^3$  hybridized orbitals.



## Tetravalence of Carbon



C. Q. 03



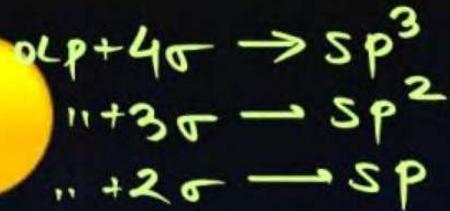
The order of bond strength among  $sp^3$ ,  $sp^2$ , and  $sp$  hybridized bonds is:

- A  $sp^3 > sp^2 > sp$
- B  $sp^2 > sp^3 > sp$
- C  $sp > sp^2 > sp^3$
- D  $sp^3 = sp^2 = sp$

1)  $\cdot/\cdot s \uparrow$  EN  $\uparrow$   
2)  $\cdot/\cdot s \uparrow$  strength  $\uparrow$   
3)  $\cdot/\cdot s \uparrow$  length  $\downarrow$



## Hybridization



$$3\sigma + 1\text{LP} = 4 \text{ sp}^3$$

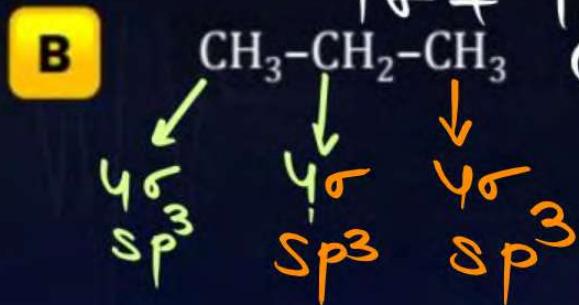
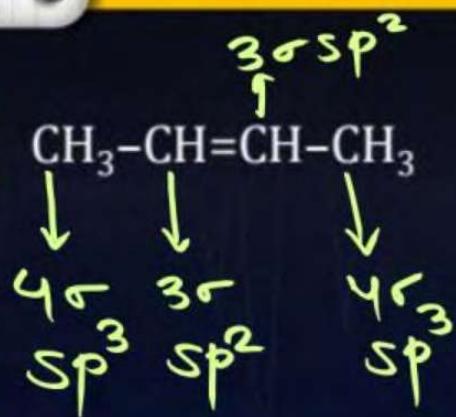
(Loca)  
(Not in res)

$$2\sigma + 1\text{LP} = 3 \text{ sp}^2$$

(Loca)

$$1\sigma + 1\text{LP} = 2 \text{ sp}$$

(Loca)



C. Q. 04 (NEET 2018)



Which of the following molecules represents the order of hybridization  $sp^2$ ,  $sp^2$ ,  $sp$ ,  $sp$  from left to right atoms?

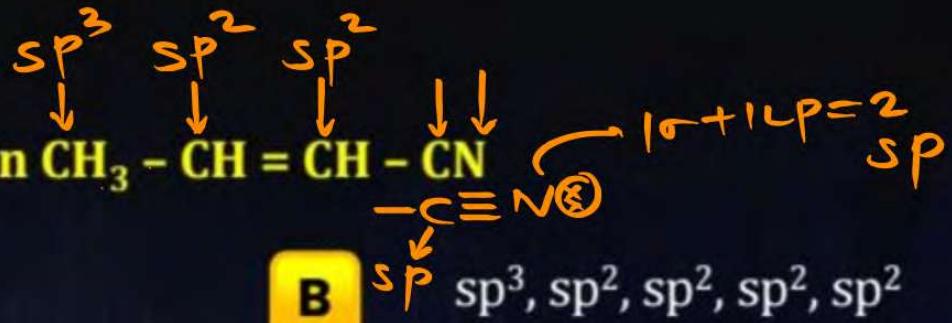
- A  $\begin{array}{cccc} sp & sp & sp & sp \\ HC \equiv C - C \equiv CH \end{array}$
- B  $\begin{array}{cccc} sp^2 & sp^2 & sp & sp \\ CH_2 = CH - C \equiv CH \end{array}$
- C  $\begin{array}{cccc} sp^3 & sp^2 & sp^2 & sp^3 \\ CH_3 - CH = CH - CH_3 \end{array}$
- D  $\begin{array}{cccc} sp^2 & sp^2 & sp^2 & sp^2 \\ CH_2 = CH - CH = CH_2 \end{array}$



C.Q. 05

PW

Sequence of hybridization in  $\text{CH}_3 - \text{CH} = \text{CH} - \text{CN}$



A sp<sup>3</sup>, sp<sup>2</sup>, sp, sp<sup>2</sup>, sp<sup>2</sup>

B sp<sup>3</sup> sp<sup>2</sup>, sp<sup>2</sup>, sp<sup>2</sup>, sp<sup>2</sup>

C ✓ sp<sup>3</sup>, sp<sup>2</sup>, sp<sup>2</sup>, sp, sp

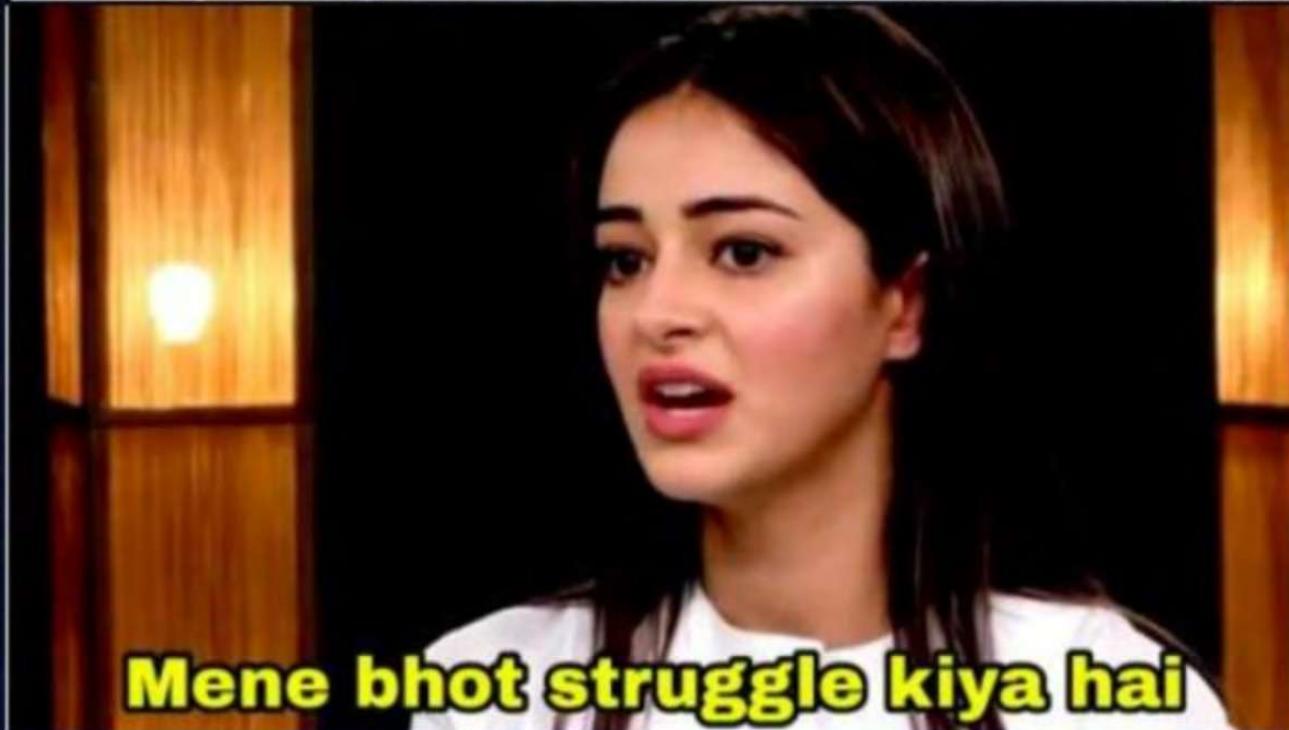
D sp<sup>3</sup>, sp<sup>2</sup>, sp<sup>2</sup>, sp, sp<sup>2</sup>

$A-\sigma B$

$A=\frac{\pi}{\sigma} B$

$A\overset{2\pi}{=}B$

Jab aapse Hybridization ka sawal shi ho jaye



**Mene bhot struggle kiya hai**

## E.N. of hybrid orbitals:

E.N.  $sp > sp^2 > sp^3$

[ $\gamma$ . s↑ EN↑]



## OP Points:

### Electronegativity

F > O > C<sub>sp</sub> > N > C<sub>sp</sub><sup>2</sup> > C<sub>sp</sub><sup>3</sup>

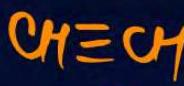
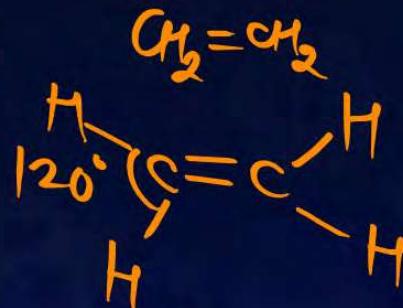
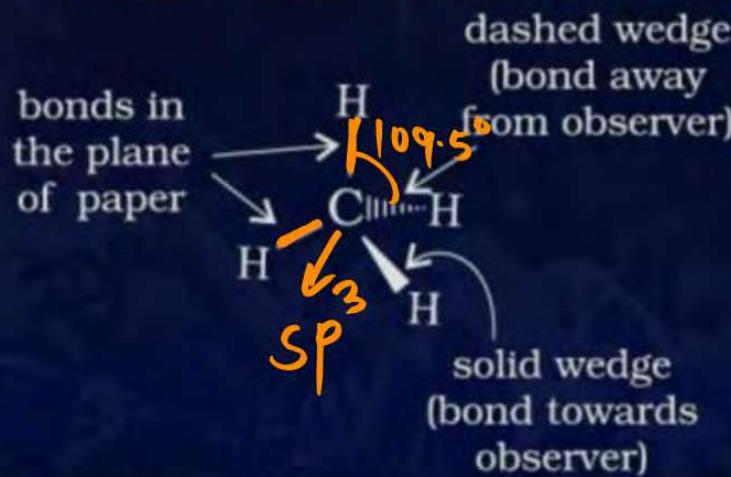


## 3D representation of Organic Compounds

SP<sup>3</sup> Tetrahedral  
SP<sup>2</sup> planar  
SP linear

PW

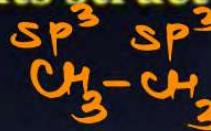
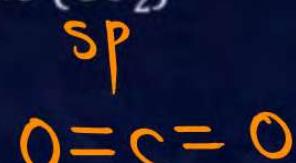
- The three-dimensional (3-D) structure of organic molecules can be represented on paper by using certain conventions. For example, by using solid (—) and dashed (.....) wedge formula.
- In these formulas the solid-wedge is used to indicate a bond projecting out of the plane of paper, towards the observer.
- The dashed-wedge is used to depict the bond projecting out of the plane of the paper and away from the observer.
- Normal line (—) Represents bonds lying in the plane of the paper.



C.Q. 06



Which of the following molecules does NOT require a wedge-dash representation for its structure?

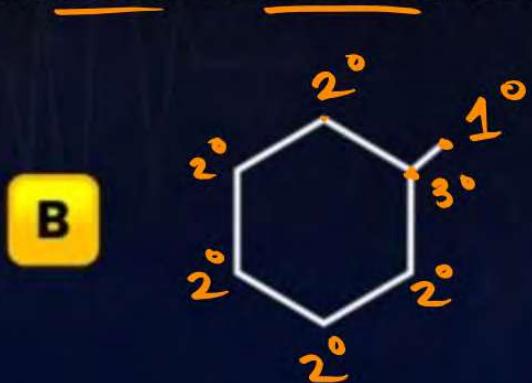
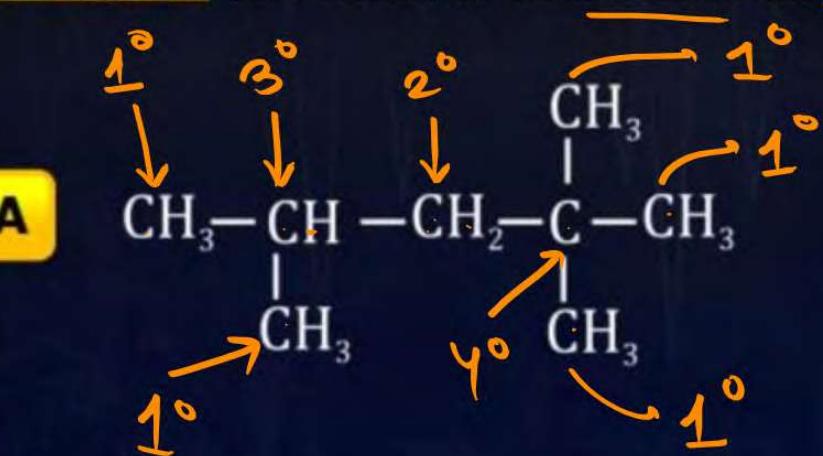
- A Ethane ( $\text{C}_2\text{H}_6$ ) 
- B Methane ( $\text{CH}_4$ ) 
- C Water ( $\text{H}_2\text{O}$ ) 
- D Carbon dioxide ( $\text{CO}_2$ ) 



## Degree of Carbon



Definition: The number of C atoms directly attached with the carbon.





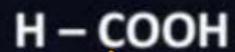
## Degree of Carbon



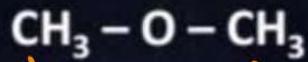
Example:



## OP Point: Super Primary Carbon



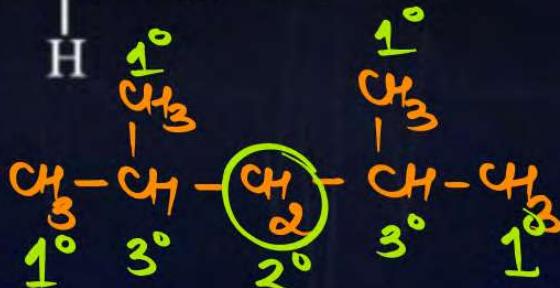
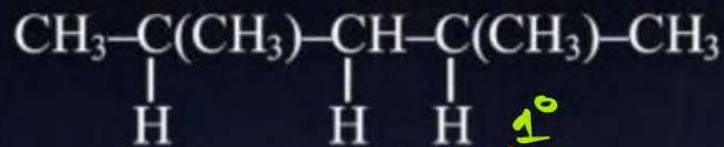
↓  
Super 1°



↓  
Super 1°

**C. Q. 07 (JEE Mains 8th April 2024, Morning Shift)**

In the given compound, the number of  $2^\circ$  carbon atom/s is \_\_\_\_.



A Three

B One

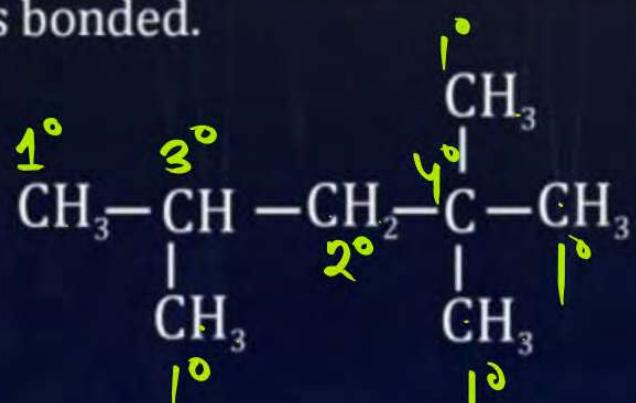
C Two

D Four

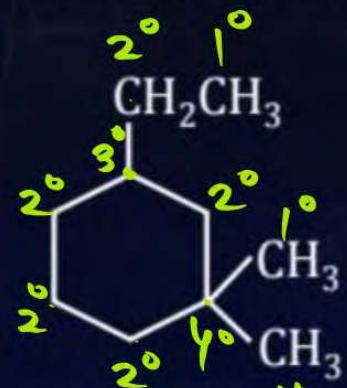


## Degree of Hydrogen

**Definition:** Degree of hydrogen refers to the type of carbon atom to which a hydrogen atom is bonded.

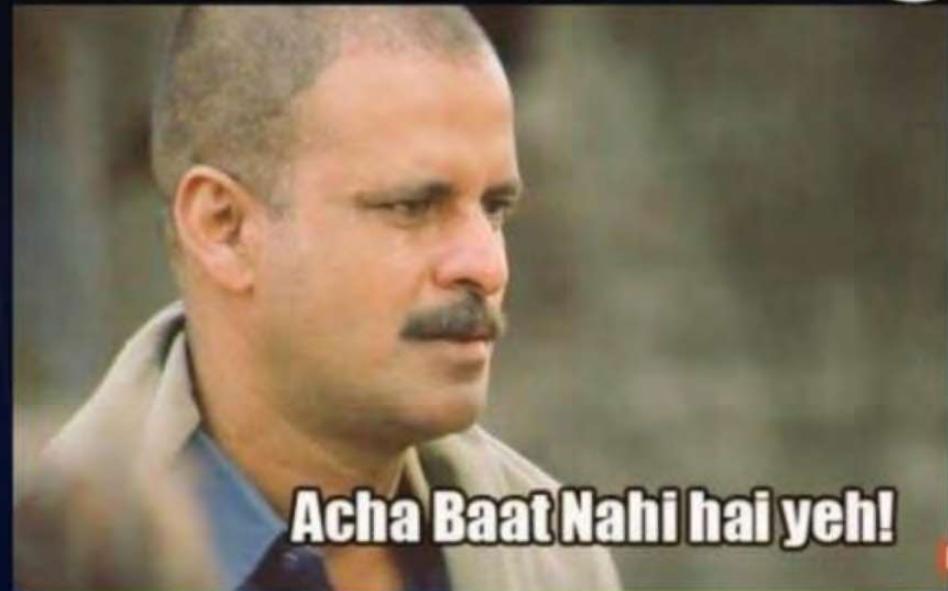
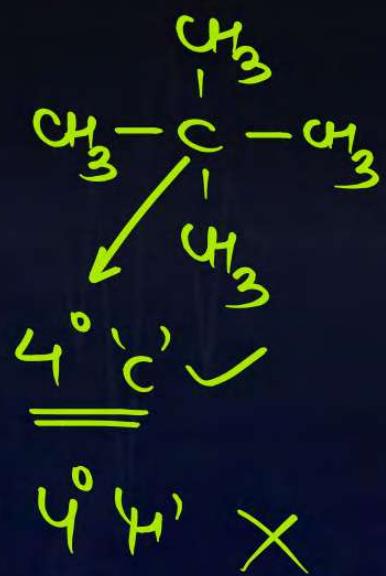
**A**

$$\begin{array}{l} \text{ } \\ \text{ } \\ \text{ } \\ \text{ } \end{array}$$
$$\begin{array}{l} 1^\circ \text{H}' = 15 \\ 3^\circ \text{H}' = 1 \\ 2^\circ \text{H}' = 2 \end{array}$$

**B**

$$\begin{array}{l} \text{ } \\ \text{ } \\ \text{ } \\ \text{ } \end{array}$$
$$\begin{array}{l} 1^\circ \text{H}' = 9 \\ 3^\circ \text{H}' = 1 \\ 2^\circ \text{H}' = 10 \end{array}$$

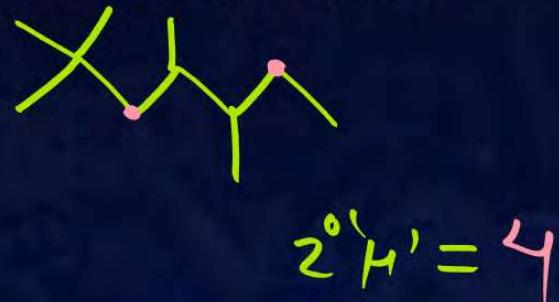
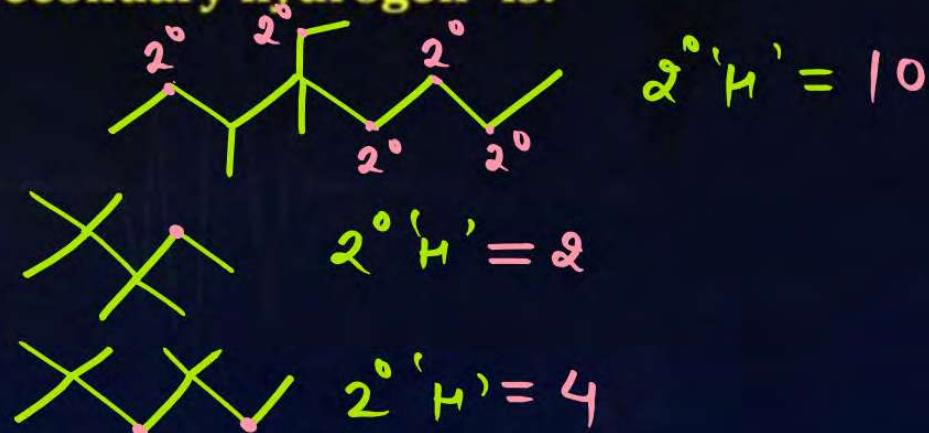
## 4 Degree Hydrogen:



Acha Baat Nahi hai yeh!

The alkane from below having “two secondary hydrogen” is:

- A** 4-Ethyl-3, 4-dimethyloctane
- B** 2, 2, 3, 3-Tetramethylpentane
- C** 2, 2, 4, 4-Tetramethylhexane
- D** 2, 2, 4, 5-Tetramethylheptane



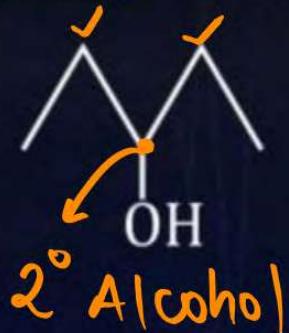


## Degree of Alcohols

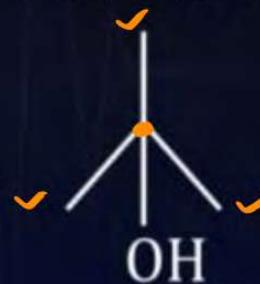


**Definition:** The degree of carbon at which the -OH group is present.

A

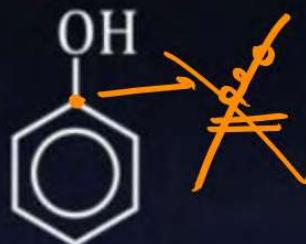


B



3° Alcohol

## OP Point: Degree of Phenol



Phenol Phenol hai  
koi degree nahi hoti

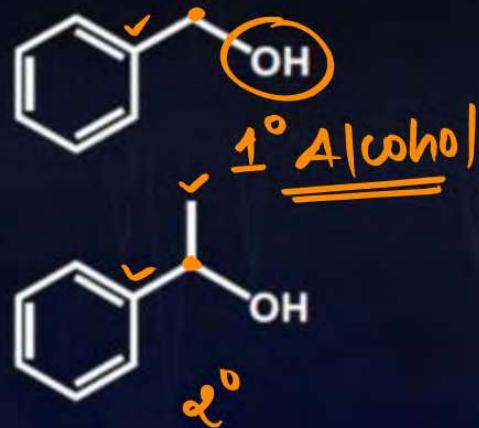


C. Q. 09

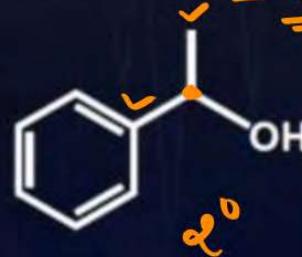
PW

Which of the following compounds is a secondary alcohol?

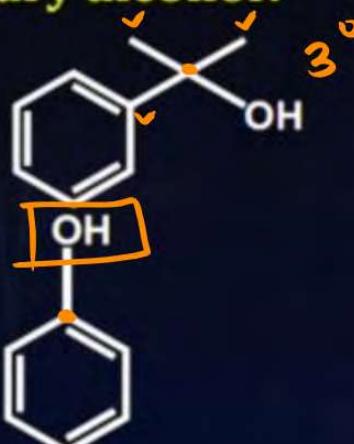
A



C



B



D



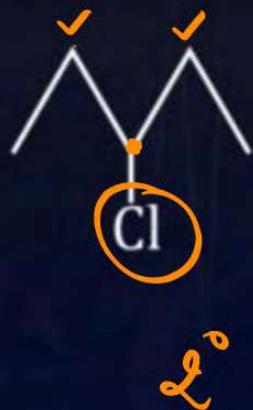


## Degree of Halogens



Definition: Degree of carbon at which X group is present.

A



B

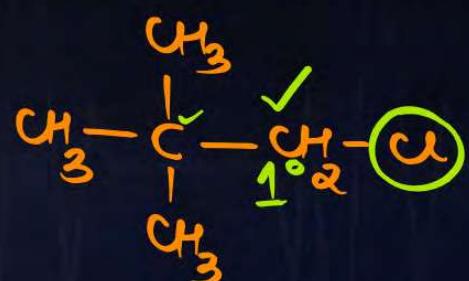


C. Q. 10



Which of the following is the correct classification for neopentyl chloride ( $\text{C}(\text{CH}_3)_3\text{CH}_2\text{Cl}$ )?

- A Primary ( $1^\circ$ )
- B Secondary ( $2^\circ$ )
- C Tertiary ( $3^\circ$ )
- D Quaternary ( $4^\circ$ )

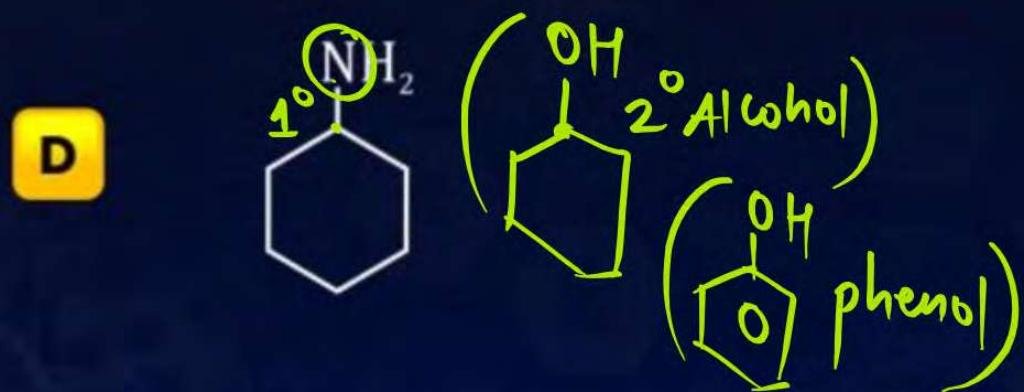
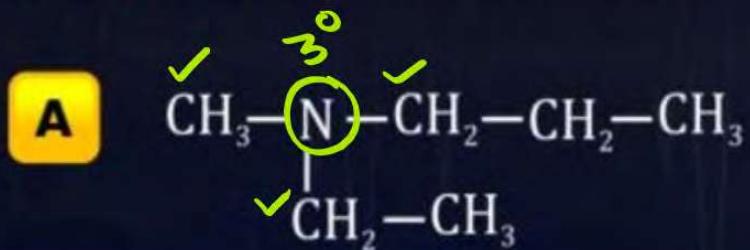




## Degree of Amine



Definition: The number of carbon atoms directly connected with the N.



## OP Point: Degree of Aniline



yes degree hoti hai

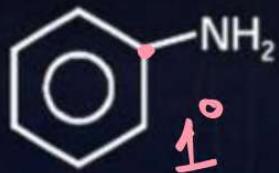
$1^\circ$  amine

C. Q. 11

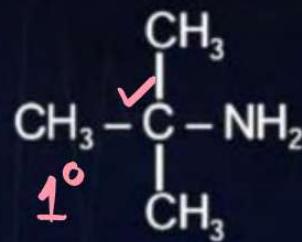


Which of the following is 1° amine?

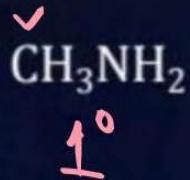
A



B



C



D

All of these

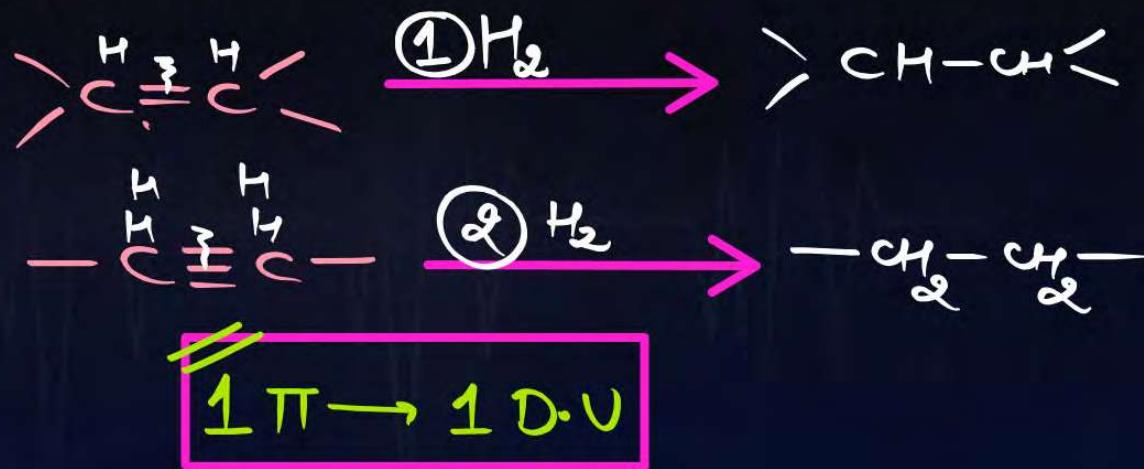


## Degree of Unsaturation

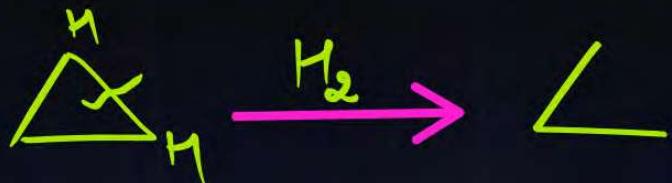


- D.U. (Degree of Unsaturation)  
OR
- I.H.D. (Index of Hydrogen deficiency)  
OR
- U.I. (Unsaturation Index)  
OR
- D.B.E. (Double bond equivalent)

**Case 01:** Number of H<sub>2</sub> molecules are required to convert a molecule (multiple bond) into open chain saturated compound.



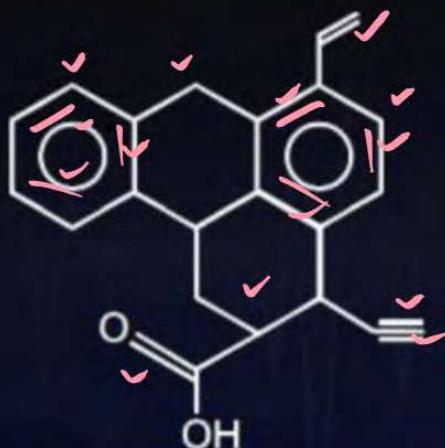
**Case 02:** How many bonds are cleaved to form an open chain saturated compounds.



1 Ring → 1 DV



C.Q. 12



10  $\pi$  + 4 Ring

D.B.E of above compound is:

A 12

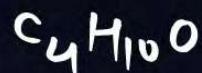
C 14

B 13

D 15

when M.F is given

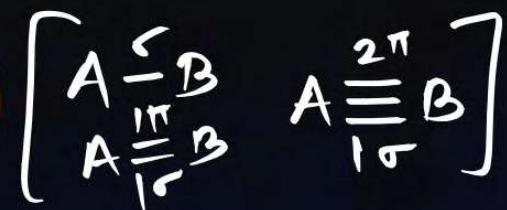
$$D.V = (C+H) - \frac{C+H+N}{2}$$



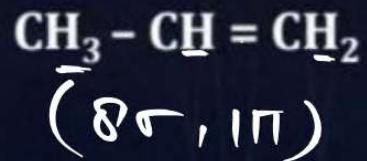
$$D.V = (4+1) - \frac{(10+0-0)}{2}$$
$$= 5-5=0$$



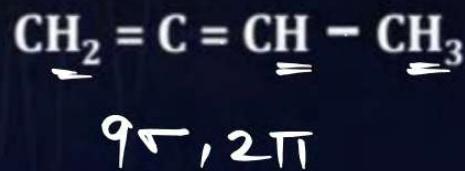
## **Calculation of $\sigma$ and $\pi$ bonds**



A

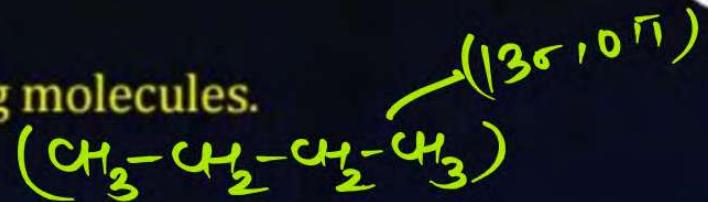
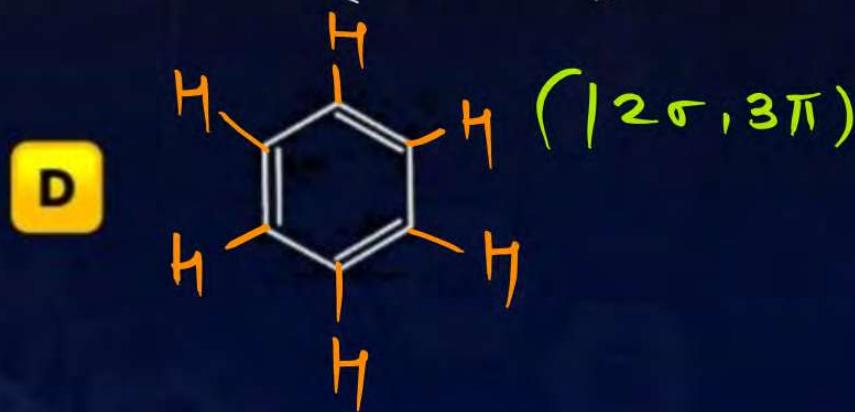
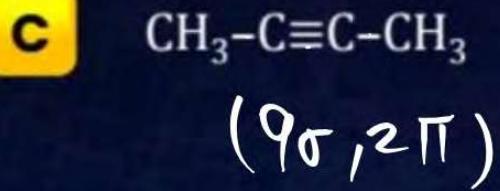
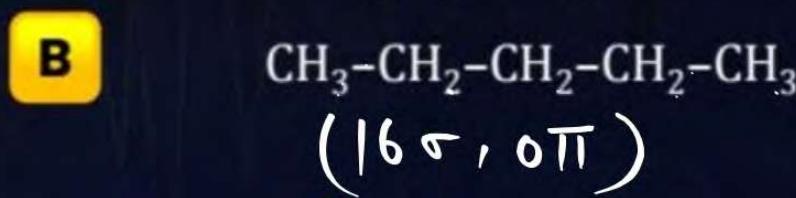
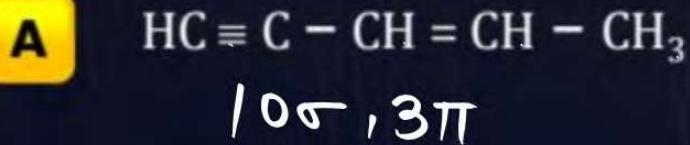


B



**QUESTION**

Indicate the number of  $\sigma$ - and  $\pi$ -bonds in the following molecules.



C. Q. 13 (NEET 2024)

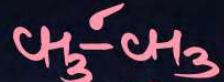


Match List I with List II.

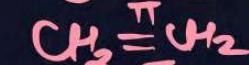
**List-I**

**(Molecule)**

A. Ethane



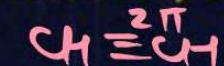
B. Ethene



C. Carbon molecule, C<sub>2</sub>



D. Ethyne



**List-II**

**(Number and type of bonds b/w two carbon atoms)**

(I) one σ-bond and two π-bonds

(II) two π-bonds

(III) one σ-bond

(IV) one σ-bond and one π-bonds

Choose the correct answer from the options given below:

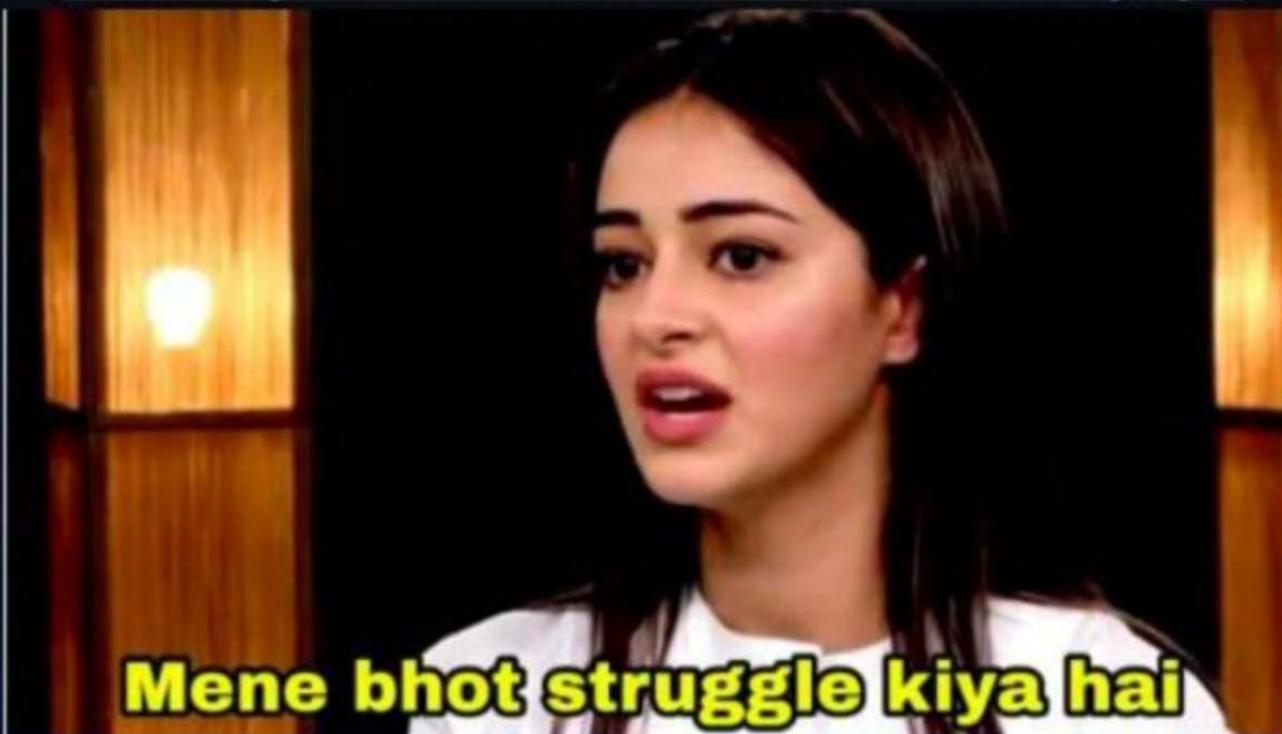
**A** A-III, B-IV, C-II, D-I

**B** A-III, B-IV, C-I, D-II

**C** A-I, B-IV, C-II, D-III

**D** A-IV, B-III, C-II, D-I

Jab aapse  $\sigma$  &  $\pi$  ka sawal shi ho jaye

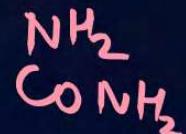


**Mene bhot struggle kiya hai**



## Identification of Functional Groups

1. The functional group may be defined as an atom or group of atoms joined in a specific manner which is responsible for the characteristic chemical properties of the organic compounds.
2. The examples are hydroxyl group (Alkene, Alkyne, -OH, -CHO, -COOH etc.)



## International Example of Functional Groups: Different Functional Groups, different Characters



As a Businessman

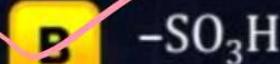
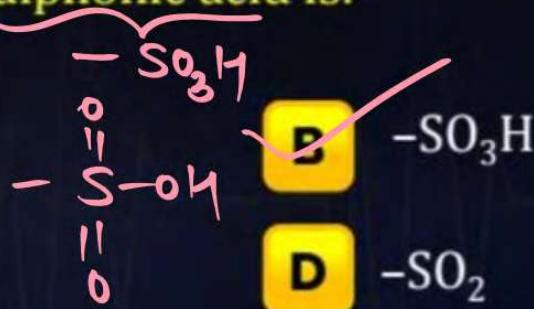


As a Politician

C. Q. 14 (JEE Mains 6th April 2024, Morning Shift)



Functional group present in Sulphonic acid is:



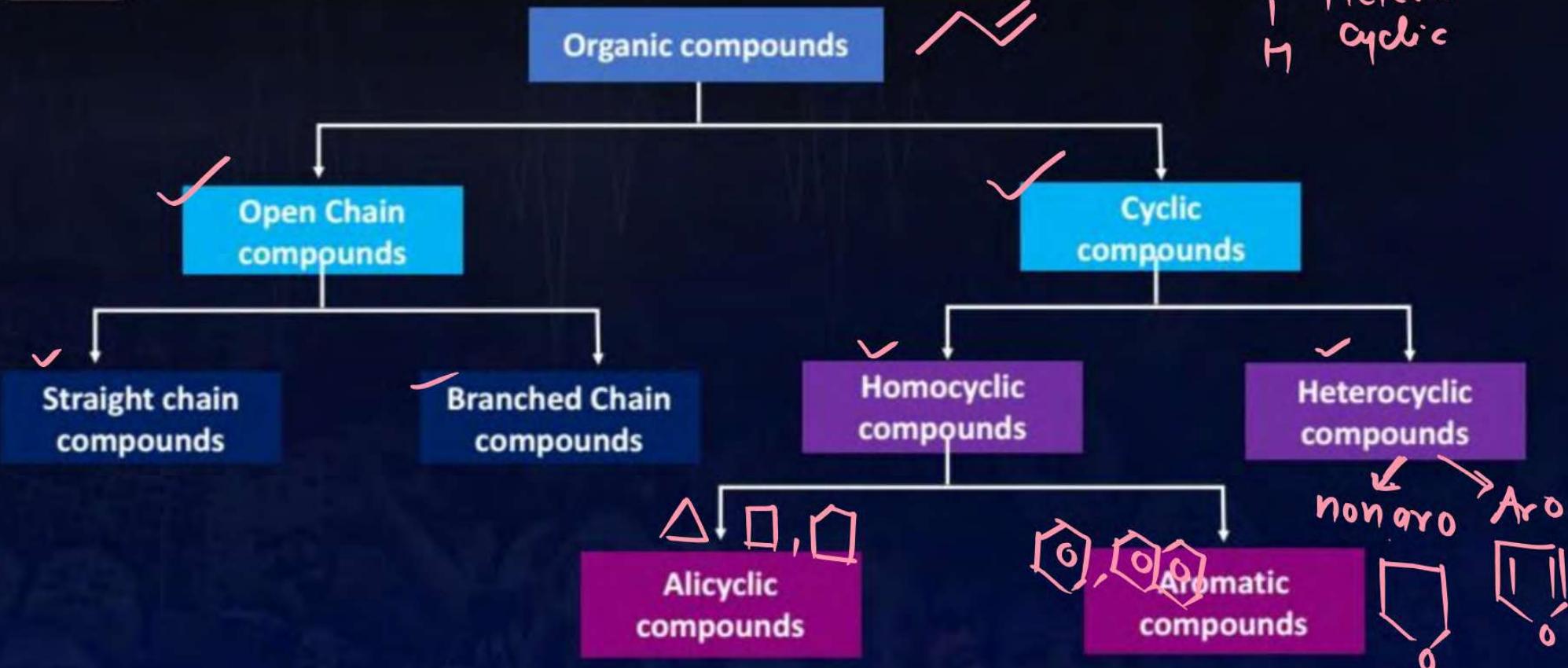
When students ask you for the IUPAC name  
of the compound after a lots of practice

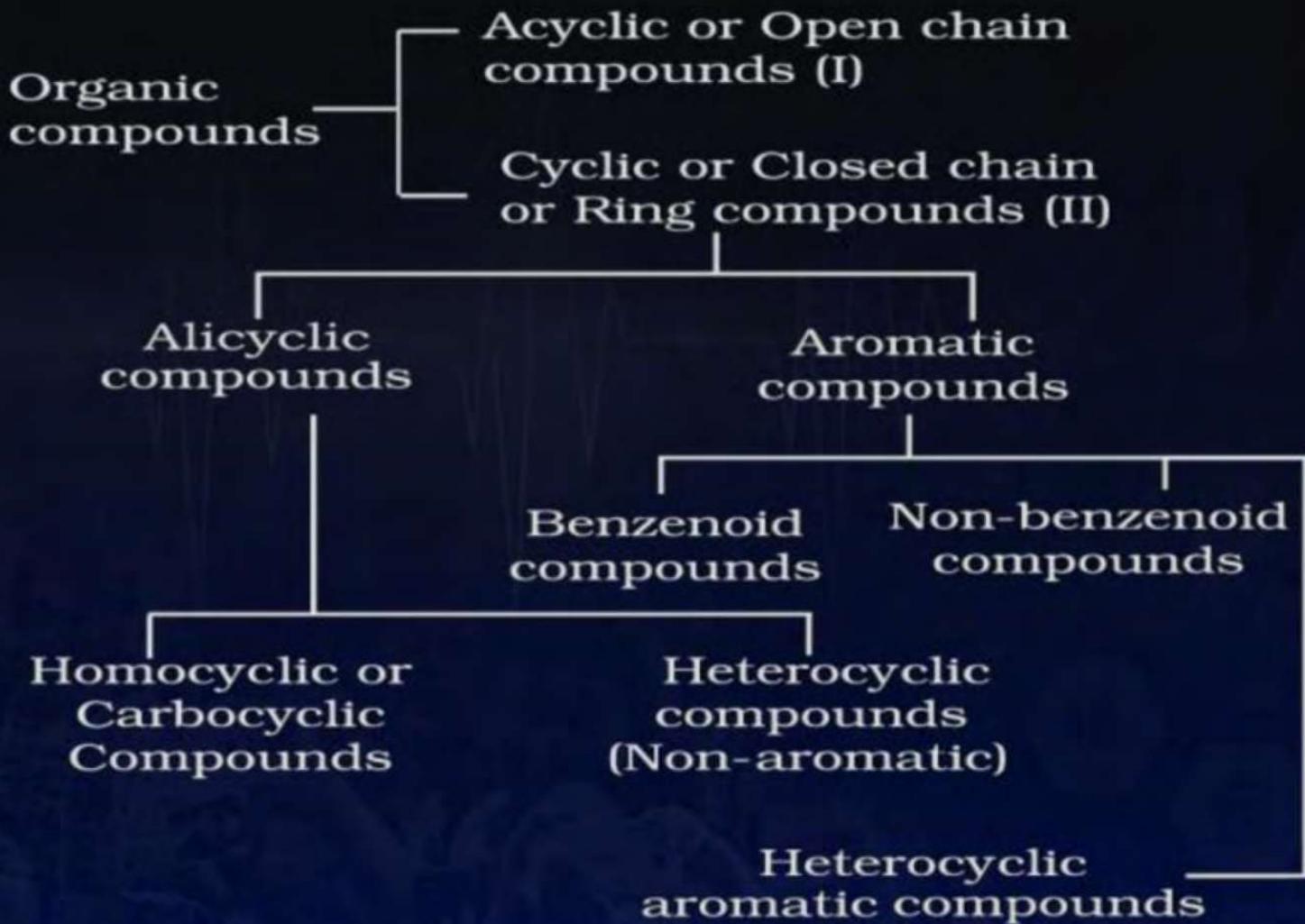


Pankaj sir be like: You know the Rules so do it



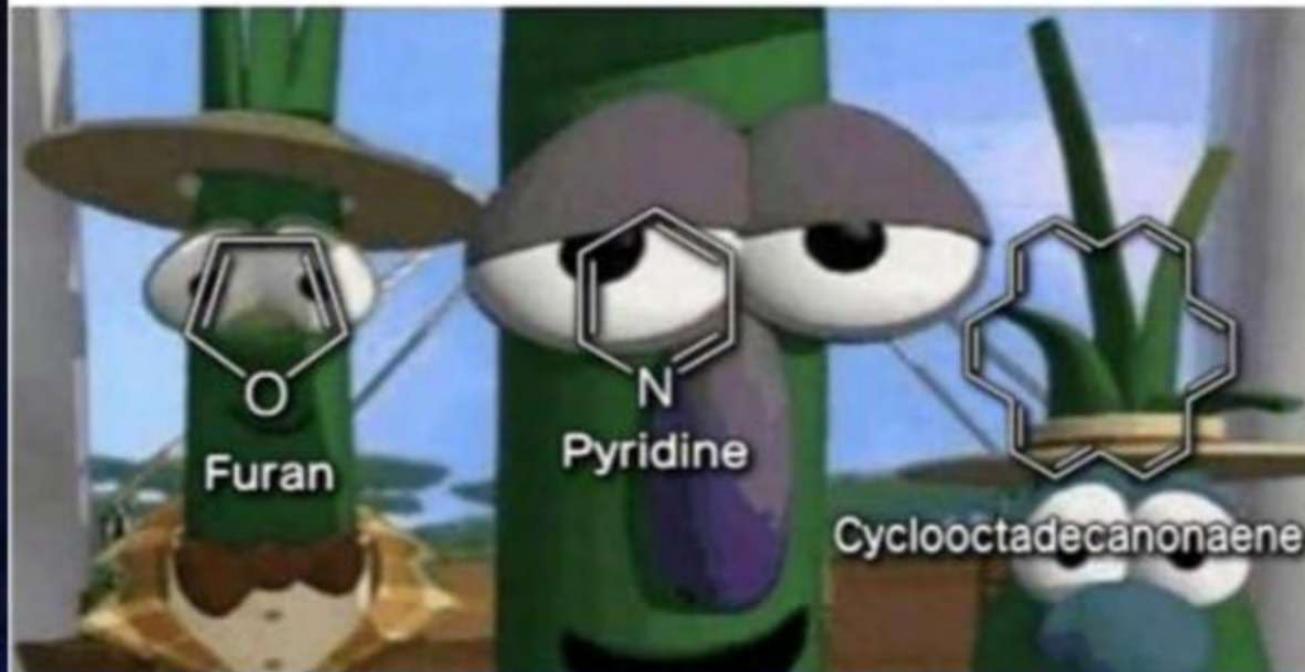
# Classification of Organic Compounds





Me: "All aromatic compounds have a benzene ring!"

Organic Chemistry:



C. Q. 15



Which of the following statements is TRUE about saturated hydrocarbons?

- A They contain at least one double or triple bond. X
- B They follow the general formula  $C_nH_{2n+2}$ . ✓
- C They are always aromatic. X
- D They include alkynes. X

When students ask you for the IUPAC name  
of the compound after a lots of practice



Pankaj sir be like: You know the Rules so do it

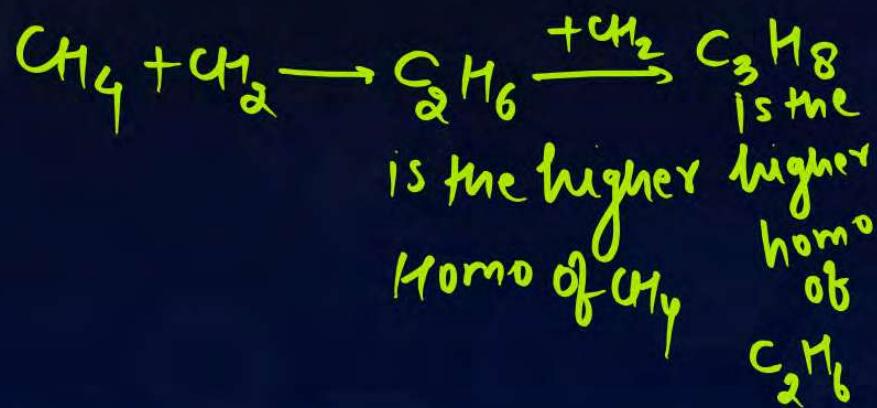


## Homologous Series



**Definition:** A group or a series of organic compounds each containing a characteristics functional group forms a homologous series and the members of the series are called homologues.

- Same Functional group.
- Different Molecular formula.
- Different Molecular mass.
- Different in  $\text{CH}_2$  group.  
 $(1, 2, 3, 4, \dots)$



**Political Example of Homologous Series:**  
**Homologous Series**

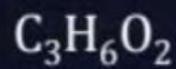


C. Q. 16 (JEE Mains 27th January 2024, Evening Shift)



The molecular formula of second homologue in the homologous series of mono carboxylic acids is \_\_\_\_\_. (P.W.)

A



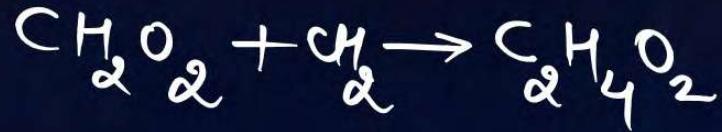
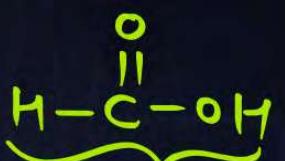
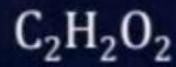
B



C



D



When students ask you for the IUPAC name  
of the compound after a lots of practice



Pankaj sir be like: You know the Rules so do it



## IUPAC Nomenclature



cycle

### IUPAC Naming

**Rule:** Prefix-2 + Prefix-1 + Word Root + Suffix-1 + Suffix-2

↓  
Branch  
or  
Substituent

-R alkyl (-ph phenyl)

-OR alkoxy

-X halo

-NO<sub>2</sub> nitro

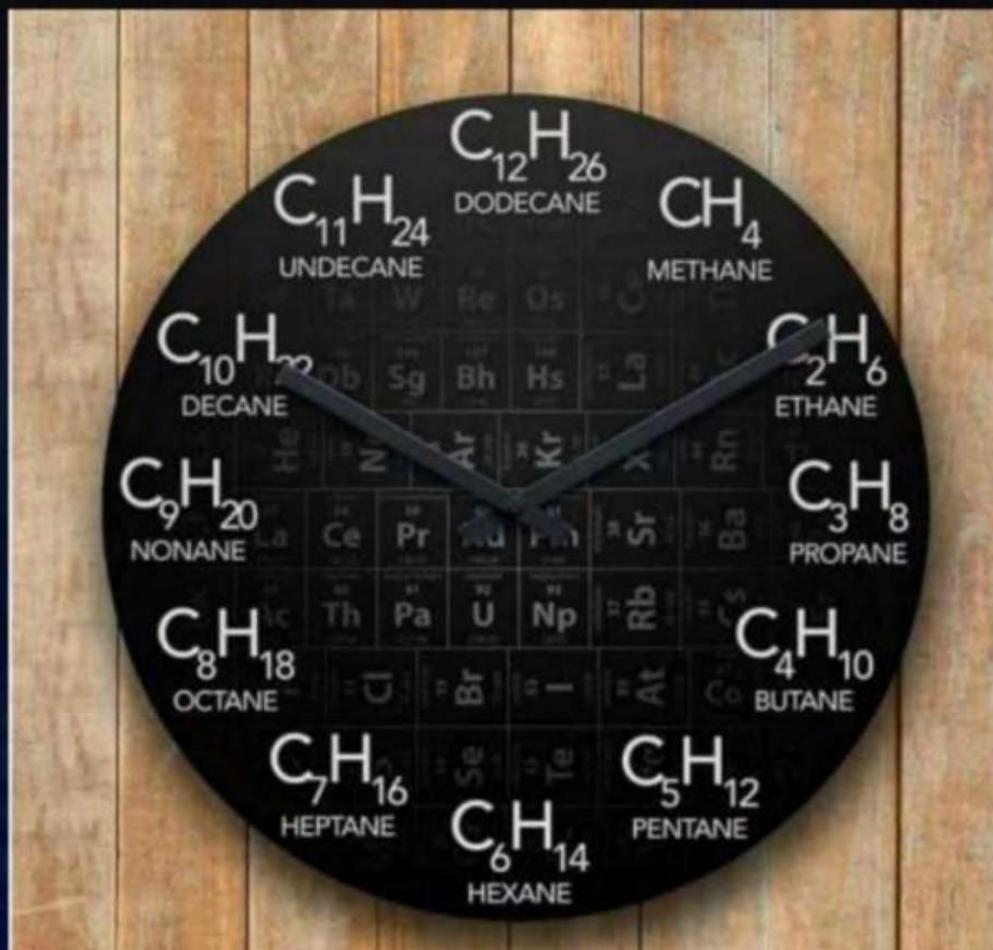
-NO nitroso

No. of C	W.R
1	meth
2	eth
3	prop
:	:
:	:

→ Princi func<sup>n</sup> groups  
(P.F.G)

C-Cane  
C=Cene  
C≡Cyne

# Wall Clock for Organic Chemistry Students



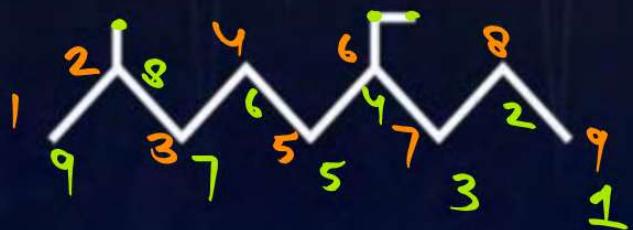


## Rules of IUPAC Nomenclature



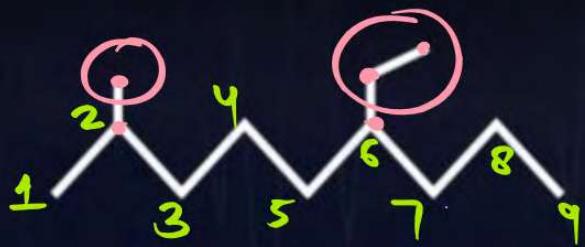
### Rule 1:

The longest carbon chain in the molecule is identified.



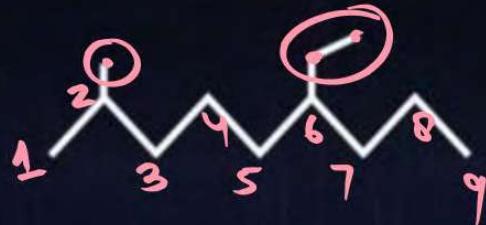
**Rule 2:**

The numbering is done in such a way that the branched carbon atoms get the lowest possible numbers.



**Rule 3:**

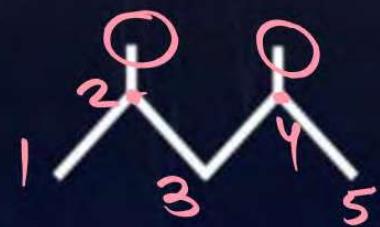
If different alkyl groups are present, they are listed in alphabetical order.



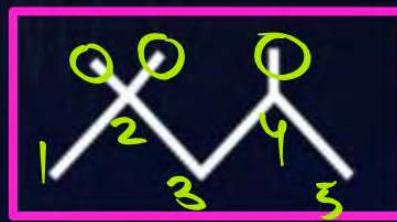
6-Ethyl- $\alpha$ -methyl Nonane

**Rule 4:**

If two or more identical substituent group are present then the numbers are separated by commas. The names of identical substituents are not repeated, instead prefixes such as di (for 2), tri (for 3), tetra (for 4), penta (for 5), hexa (for 6) etc are used.



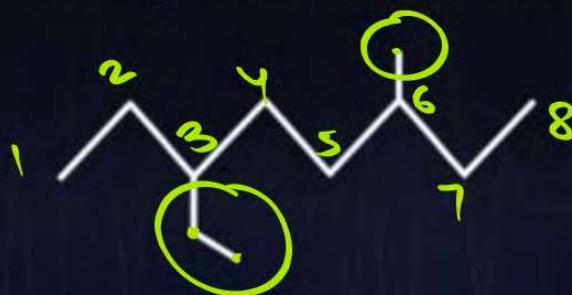
(2,4-Dimethylpentane)



2,2,4-Trimethylpentane

**Rule 5:**

The lower number is given to the one coming first in the alphabetical listing.



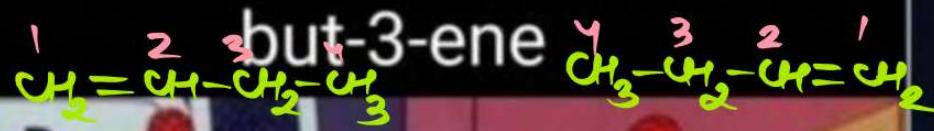
3-Ethyl-6-methyl octane

When students ask you for the IUPAC name  
of the compound after a lots of practice



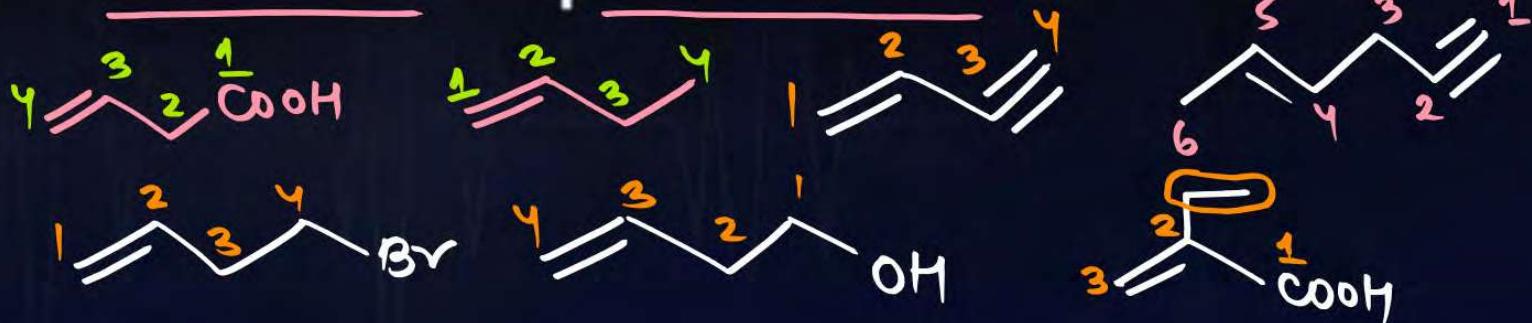
Pankaj sir be like: You know the Rules so do it

When but-1-ene meets



Priority: (Maha imp)

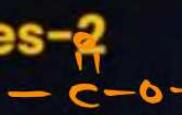
PFG > Multiple bonds > Number of C atoms > Maximum number of Substituents > Lowest locant > alphabetical order



## IUPAC Naming of Principal Functional groups



Suffixes-2



Carboxylic acid > Sulphonic acid > anhydride > Ester > acid chloride

> acid amide > cyanide > isocyanide > aldehyde > ketone > alcohol

> thiol > amine



## Filmy Example: Priority order of Functional Groups:

Other F.G be like:  
Kaun ho tum

-COOH be like: Hum  
bhi vo h jo kabhi kisi  
ke pichhe khade nhi  
hote



Jha khade ho jaate h, numbering vhi se shuru ho jati h

## P.F.G

Carboxylic acid  
Sulphonic acid  
anhydride  
Ester  
acid chloride  
acid amide  
cyanide  
isocyanide  
aldehyde  
ketone  
alcohol  
thiol  
amine

## Suffix-2

oic acid ✓  
Sulphonic acid ✓  
oic anhydride ✓  
oate ✓  
oyl chloride ✓  
amide ✓  
nitrile ✓  
isonitrile ✓  
al ✓  
one ✓  
ol ✓  
thiol ✓  
amine ✓

**P.F.G**

Carboxylic acid  
Sulphonic acid  
anhydride  
Ester  
acid chloride  
acid amide  
cyanide  
isocyanide  
aldehyde  
ketone  
alcohol  
thiol  
amine

**Prefix - 2**

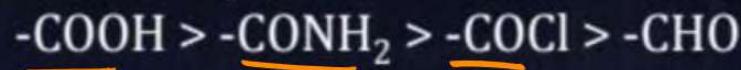
carboxy ✓  
Sulpho ✓  
- ✗  
Alkoxycarbonyl ✓  
chlorocarbonyl ✓  
carbamoyl ✓  
cyano ✓  
isocyano ✓  
**aldo** and **formyl**  
keto or oxo  
hydroxy ✓  
mercapto ✓  
amino ✓

C. Q. 17 (JEE Mains 26 July 2022, Evening Shift)

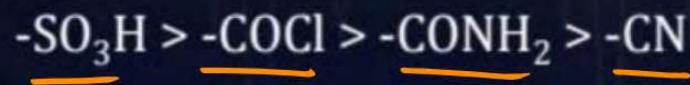


The correct decreasing order of priority of functional groups in naming an organic compound as per IUPAC system of nomenclature is:

A



B



C



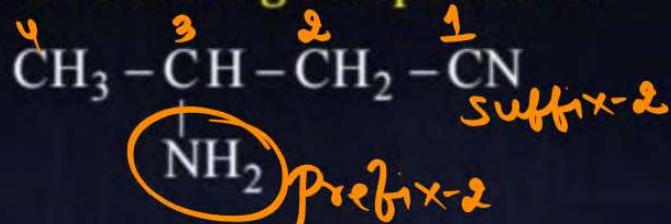
D



C. Q. 18 (JEE Mains 30 January 2024, Evening Shift)



IUPAC name of following compound is:



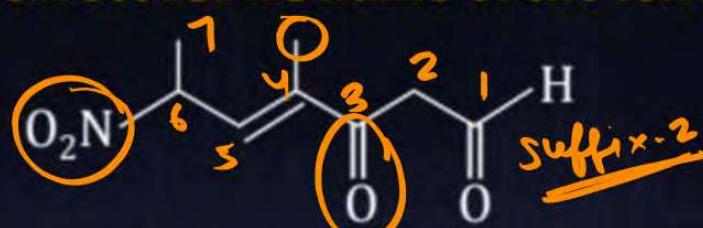
- A ~~2-Aminopentanenitrile~~
- B ~~2-Aminobutanenitrile~~
- C 3-Aminobutanenitrile
- D 3-Aminopropanenitrile

C. Q. 19 (28th June 2nd Shift JEE Mains 2022)

(a,e,i,o,u,y)



**The correct IUPAC name of the following compound is:**



do consecutive  
alpha repeat nali  
honge

- A 4-methyl-2-nitro-5-oxohept-3-enal

B 4-methyl-5-oxo-2-nitrohept-3-enal

C 4-methyl-6-nitro-3-oxohept-4-enal ~~4-enal~~

D 6-formyl-4-methyl-2-nitrohex-3-enal

Given below are two statements:

**Statement I:** IUPAC name of  $\text{HO}-\overset{1}{\text{CH}_2}-\underset{\substack{6,5,4 \\ |}}{(\text{CH}_2)_3}-\underset{\substack{3 \\ |}}{\text{CH}_2}-\underset{\substack{2 \\ |}}{\text{COCH}_3}$  is 7-hydroxyheptan-2-one.

**Statement II:** 2-oxoheptan-7-ol is the correct IUPAC name for above compound.

In the light of the above statements, choose the most appropriate answer from the options given below:

- A Statement I is correct but Statement II is incorrect.
- B Both Statement I and Statement II are incorrect.
- C Both Statement I and Statement II are correct.
- D Statement I is incorrect but Statement II is correct.

When students ask you for the IUPAC name  
of the compound after a lots of practice



Pankaj sir be like: You know the Rules so do it



## IUPAC Nomenclature of Cyclo Compounds

Prefix + Word Root + Suffix-1 + Suffix-2

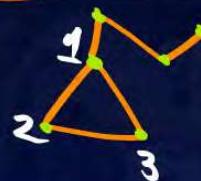
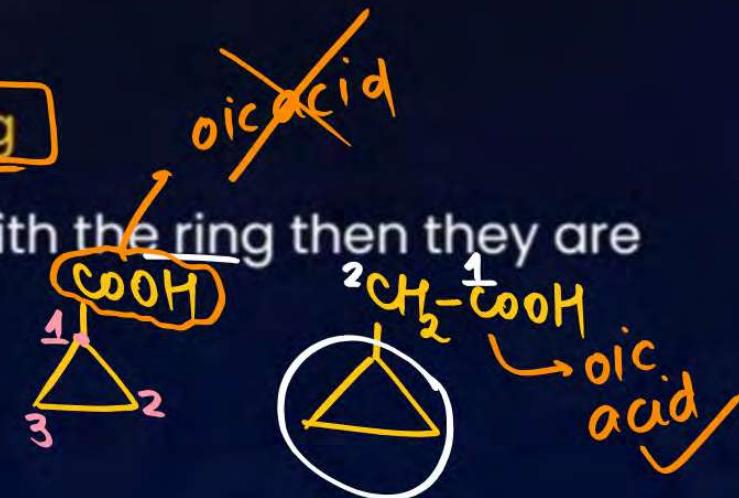
Priority:

PFG > Multiple bonds > Number of C atoms > Ring

# If carbon containing F.G is directly attached with the ring then they are taken as part of the ring. (Ring ki numbering hogi)

# If no. of carbon atoms are same then

priority Ring > Chain



**P.F.G**

Carboxylic acid	$\text{—COOH}$
Sulphonic acid	$\text{—SO}_3\text{H}$
Ester	$\text{—COR}$
acid chloride	$\text{—COCl}$
acid amide	$\text{—CONH}_2$
cyanide	$\text{—CN}$
aldehyde	$\text{—CHO}$
ketone	$\text{—C=O}$
alcohol	$\text{—OH}$
thiol	$\text{—SH}$
amine	$\text{—NH}_2$

**Special Suffix-2**

carboxylic acid  
sulphonic acid  
carboxylate  
carbonyl chloride  
carboxamide  
carbonitrile  
carbaldehyde  
one  
ol  
thiol  
amine

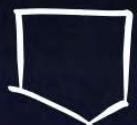
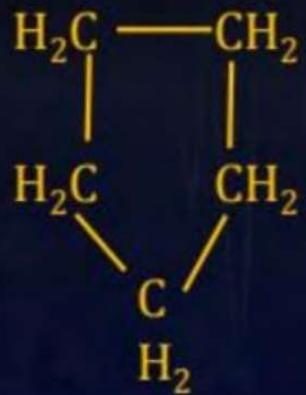
**QUESTION**

**Write IUPAC Name of the following Compounds.**

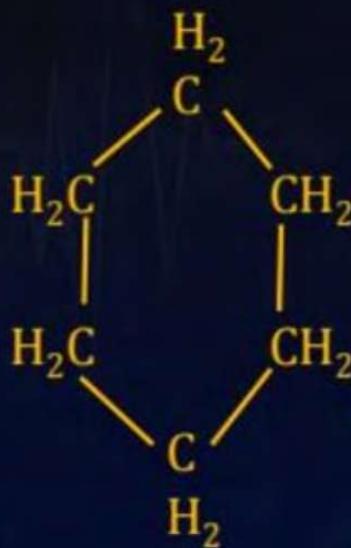
**A****B**

**QUESTION**

**Write IUPAC Name of the following Compounds.**

**A**

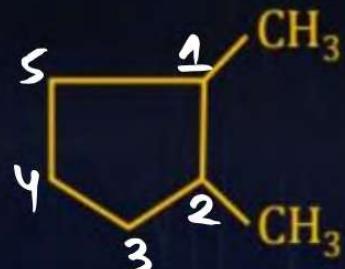
cyclopentane

**B**

cyclohexane

**QUESTION**

**Write IUPAC Name of the following Compounds.**

**A**

1,2-Dimethyl cyclopentane

**B**

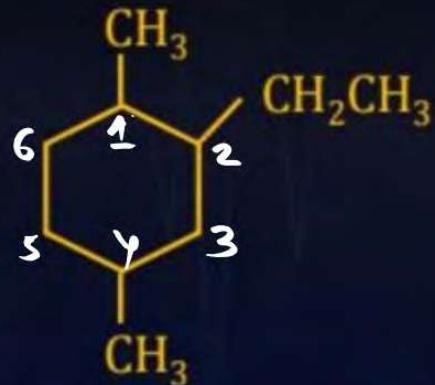
1-Ethyl-3-methyl cyclohexane

**QUESTION**



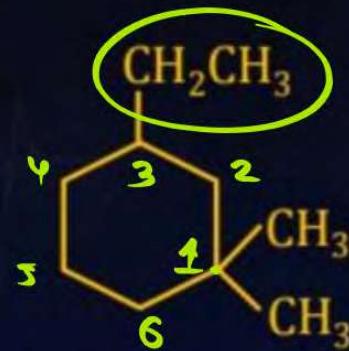
**Write IUPAC Name of the following Compounds.**

**A**



2-Ethyl-1,4-dimethylcyclohexane

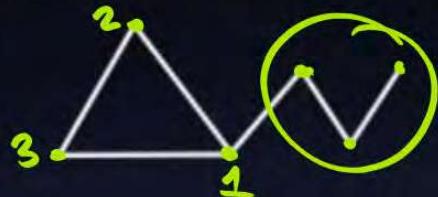
**B**



3-Ethyl-1,1-dimethylcyclohexane

**QUESTION**

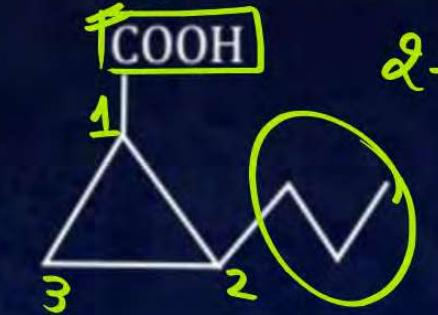
Write IUPAC Name of the following Compounds.

**A**

1-Propylcyclopropane

**B**

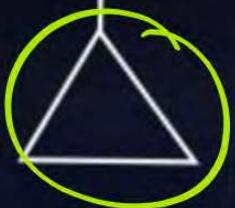
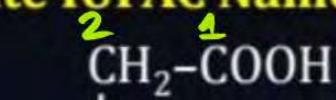
1-cyclopropylpropane

**C**

2-propylcyclopropane-1-carboxylic acid

**QUESTION**

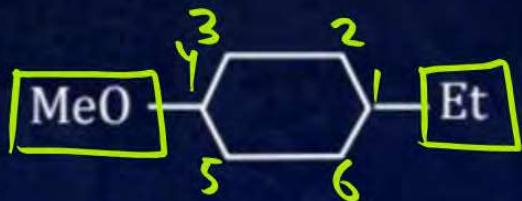
Write IUPAC Name of the following Compounds.



2-cyclopropyl ethanoic acid



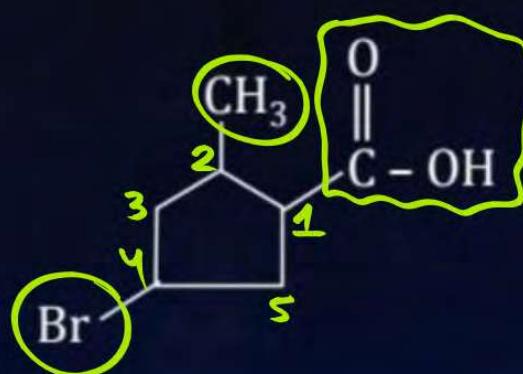
4-Ethyl-1,1-dimethyl cyclohexane



1-Ethyl-4-methoxy cyclohexane

The IUPAC name of the following compound is:

- A 3-bromo-5-methylcyclopentanoic acid
- B 4-bromo-2-methylcyclopentane carboxylic acid
- C 3-bromo-5-methylcyclopentane carboxylic acid
- D 5-bromo-3-methylcyclopentanoic acid



When students ask you for the IUPAC name  
of the compound after a lots of practice



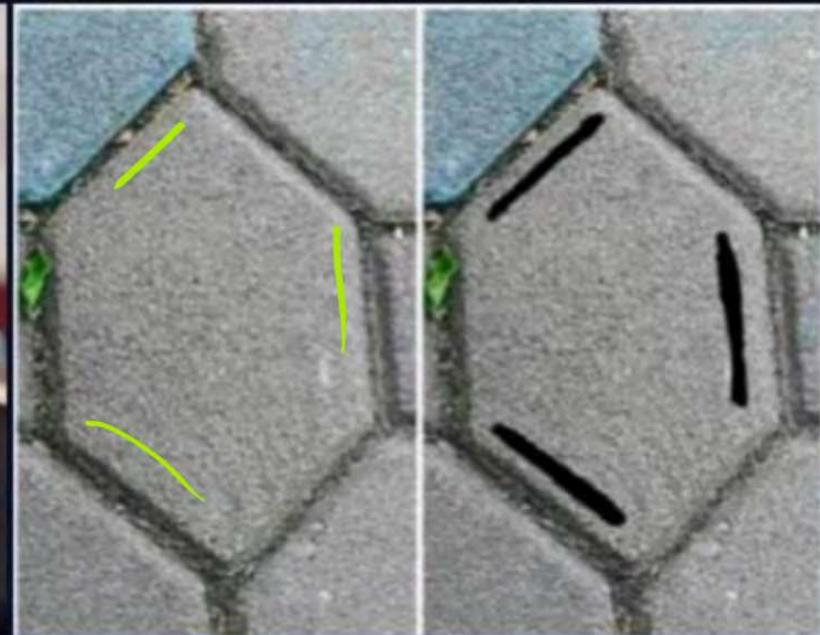
Pankaj sir be like: You know the Rules so do it



## IUPAC Nomenclature of Benzene Derivatives



Hume Benzene Ring bahut jyada he pasand h

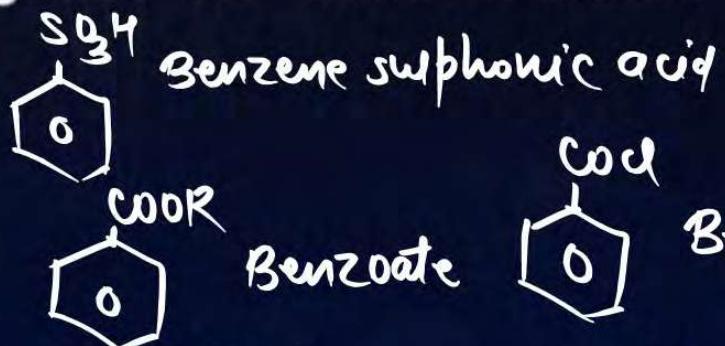
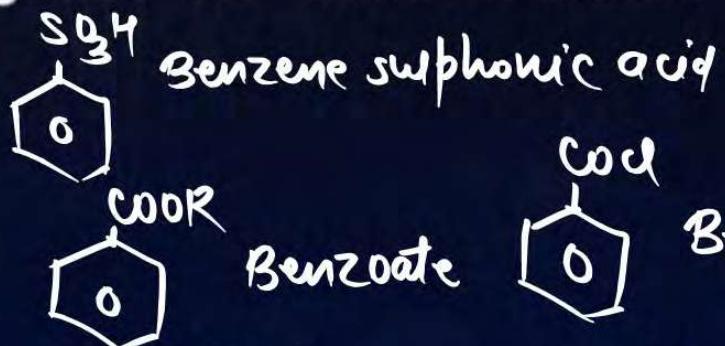
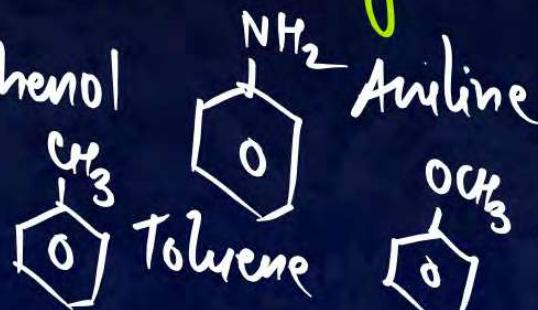
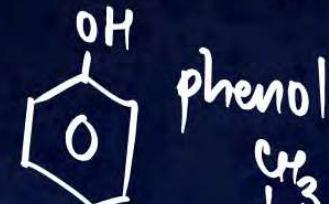
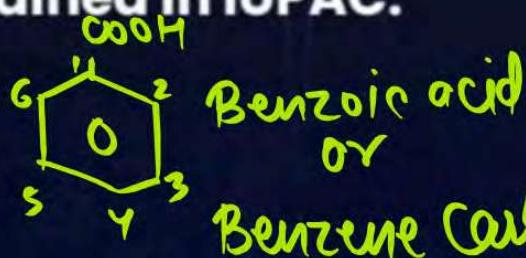




## IUPAC Nomenclature of Benzene Derivatives

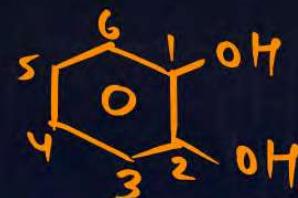
### Rules

1. If organic Compound is having one F.G then common name is retained in IUPAC.

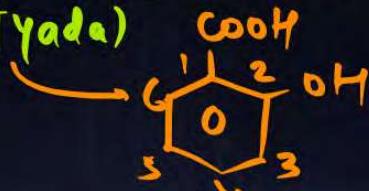


## IUPAC Naming of Benzene Derivative

2. If more than one F.G are present then numbering is done according to IUPAC. (Jiski priority Jyada)



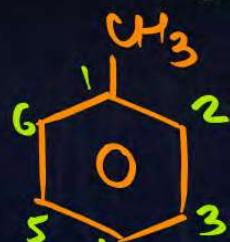
Benzene-1,2-diol



2-Hydroxybenzoic acid

### IUPAC Naming of Benzene Derivative

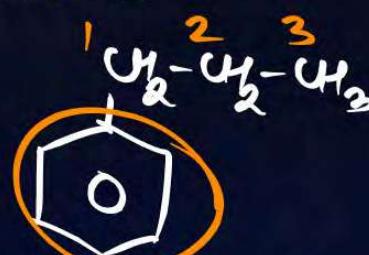
3. If Hydrocarbon is combination of both open and ring part then except Me and Et open part is taken as main part.



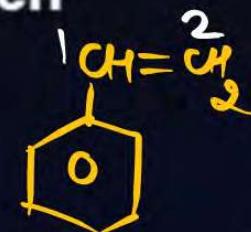
1-methyl benzene or Toluene



1-Ethyl benzene



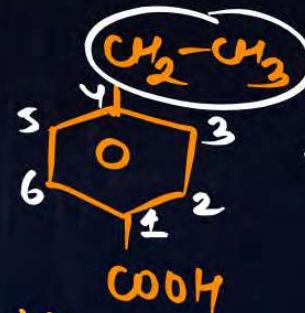
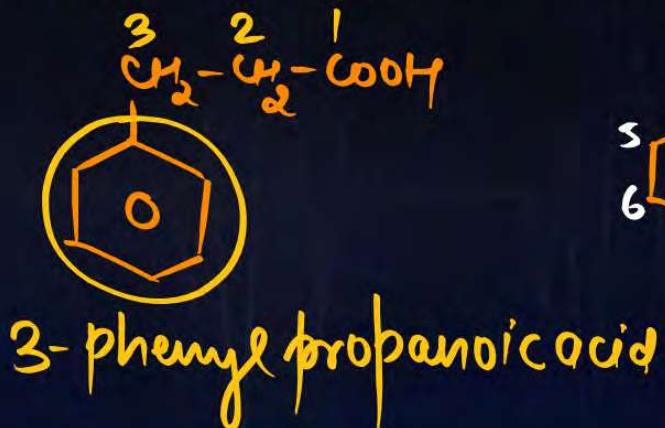
1-phenyl propane



1-phenyl ethene

### IUPAC Naming of Benzene Derivative

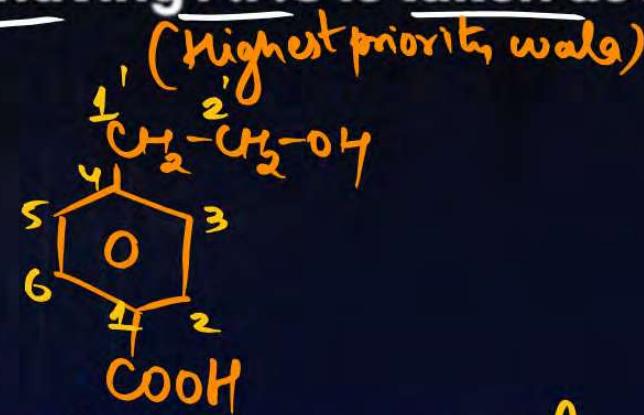
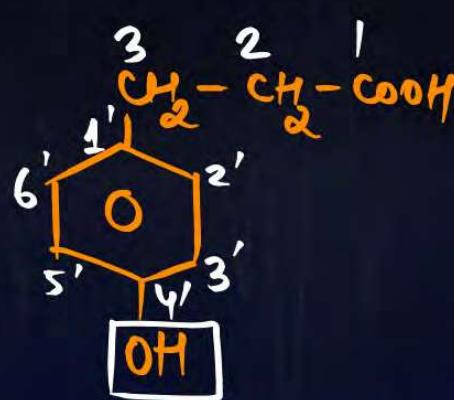
4. If organic compound is having F.G then part having F.G is taken as main part.



4-Ethylbenzene  
-1-Carboxylic acid  
or  
4-Ethyl benzoic acid

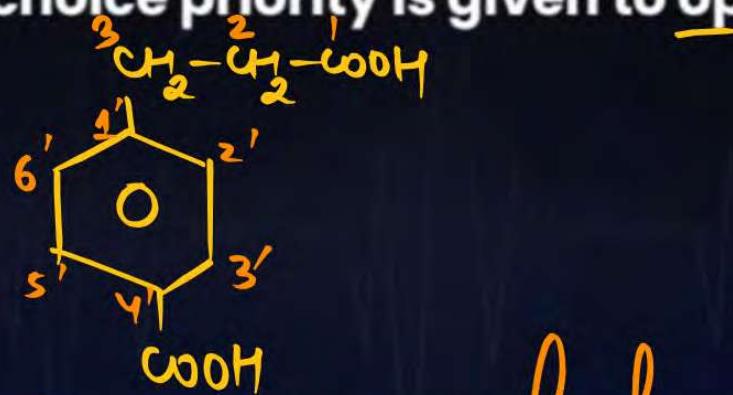
## IUPAC Naming of Benzene Derivative

5. If both parts are having F.G then part having P.F.G is taken as main part.



## IUPAC Naming of Benzene Derivative

6. If there is choice priority is given to open part.



3-  
(4'-Carboxyphenyl)  
propanoic acid

**QUESTION**

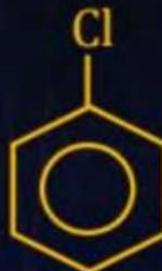
Write IUPAC Name of the following Compounds.



Toluene  
or  
1-methylbenzene



1-Ethylbenzene



1-chlorobenzene



1-nitrobenzene

**QUESTION**



Write IUPAC Name of the following Compounds.



Anilino  
Aniline



Phenol



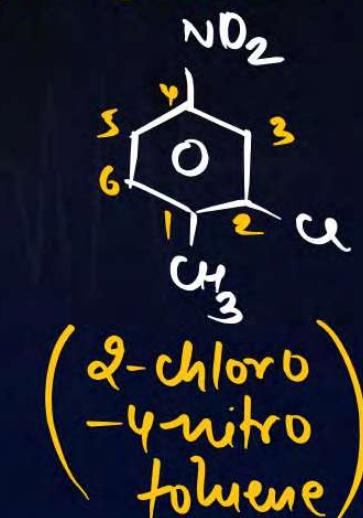
Benzaldehyde



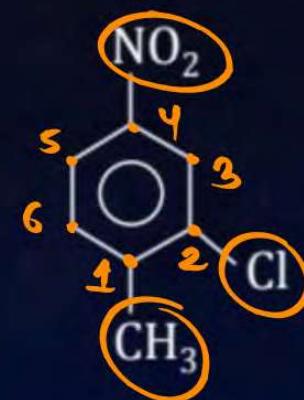
Benzoic acid

The correct IUPAC name of the following compound is:

- A 5-chloro-4-methyl-1-nitrobenzene
- B 2-methyl-5-nitro-1-chlorobenzene
- C 3-chloro-4-methyl-1-nitrobenzene
- D 2-chloro-1-methyl-4-nitrobenzene



(2-chloro-4-nitro toluene)



When students ask you for the IUPAC name  
of the compound after a lots of practice



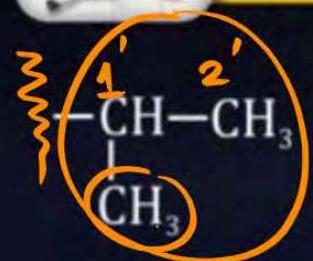
Pankaj sir be like: You know the Rules so do it



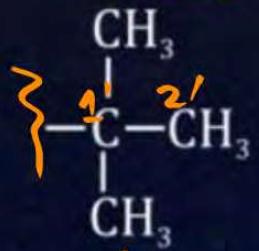
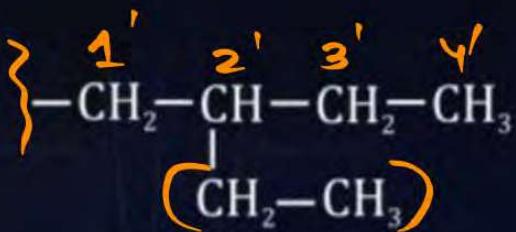
## Complex Substituents



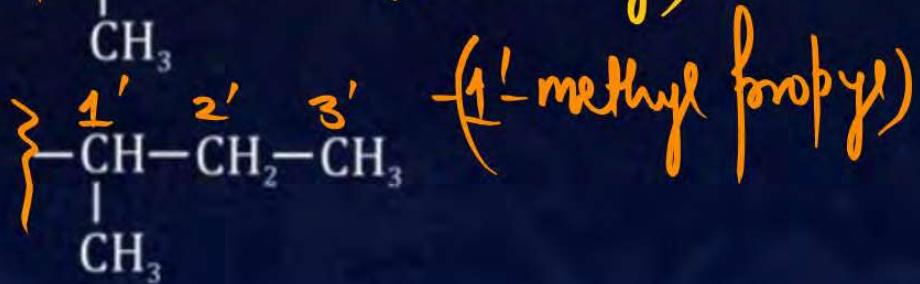
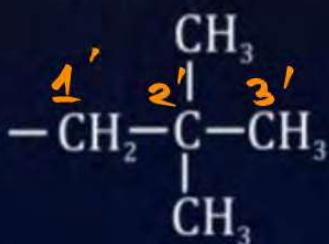
-(2'-ethylbutyl)



- (1'-methyl ethyl)  
or  
(isopropyl)



- (1',1'-dimethyl ethyl)  
(tert-butyl)



- (1'-methyl propyl)

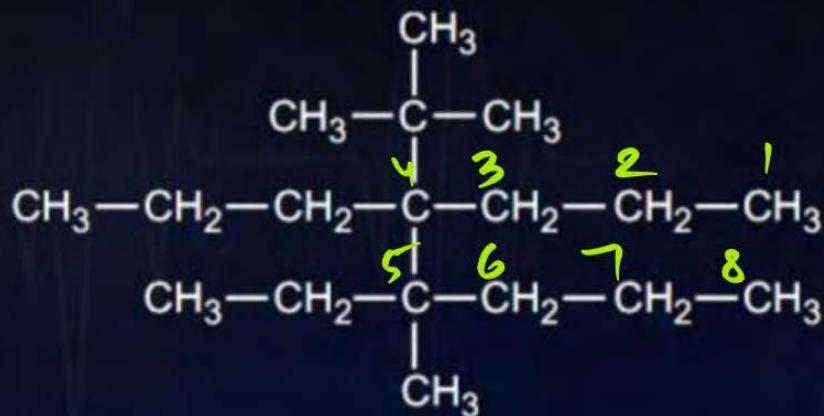


C. Q. 23



**Total number of carbon atoms present in parent chain is:**

- A 5  
B 6  
C 7  
D N



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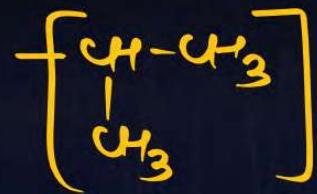
## Common Names



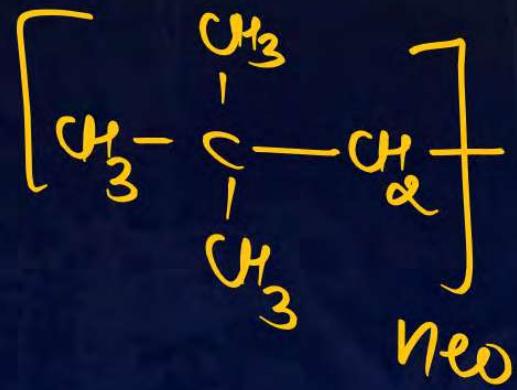


## Common Names

Iso



Neo



Vinyl



Allyl



Propargyl



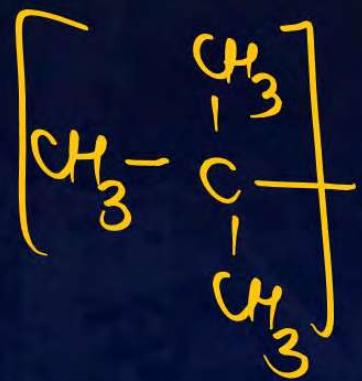
n



sec



tert



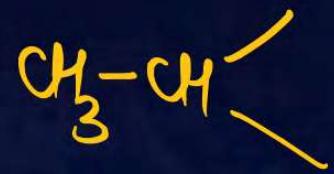
gem



vic



Alkylidene



Alkylene



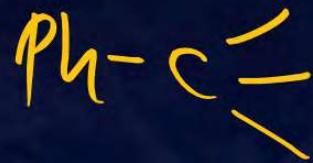
Benzyl



Benzal



Benzo



Common name of Benzene-1, 2-diol is:

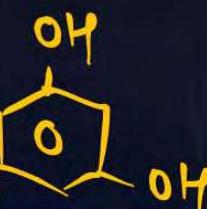
A

quinol



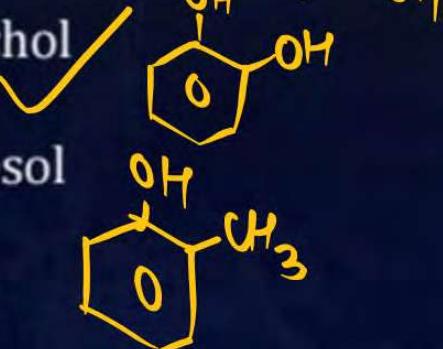
B

resorcinol



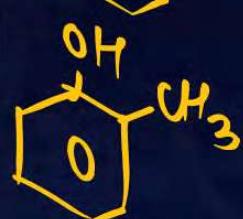
C

catechol



D

o-cresol

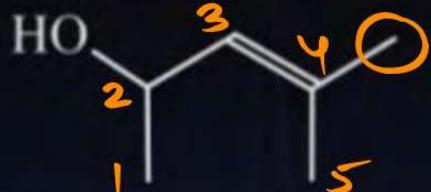


[Common name sheet]



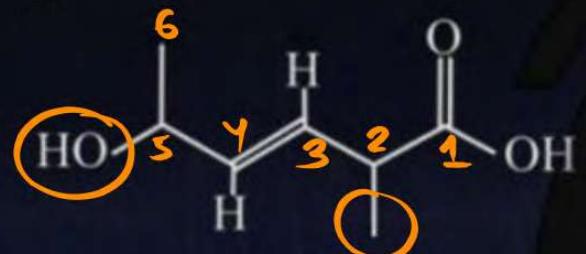
# Practice Questions

Q1 The IUPAC name of the given compound is:



- (1) 4-Methylpent-3-en-2-ol
- (2) ~~3Methylpent-3-en-2-ol~~
- (3) ~~4-Methylpent-2-en-2-ol~~
- (4) ~~4-Methylpent-3-en-1-ol~~

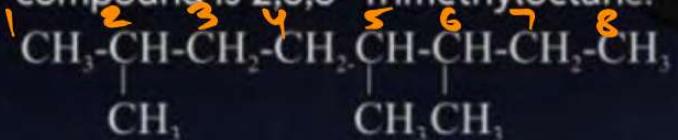
Q2 The **correct** IUPAC name of the given compound is:



- (1) ~~2-methyl-5-hydroxy-hex-3-enoic acid~~
- (2) ~~5-Hydroxy-2-methylpent-3-enoic acid~~
- (3) ~~5-Hydroxy-2-methylhex-2-enoic acid~~
- (4) 5-Hydroxy-2-methylhex-3-enoic acid

**Q3** Given below are two statements:

**Statement I:** The IUPAC name of the given compound is 2,5,6- Trimethyloctane.



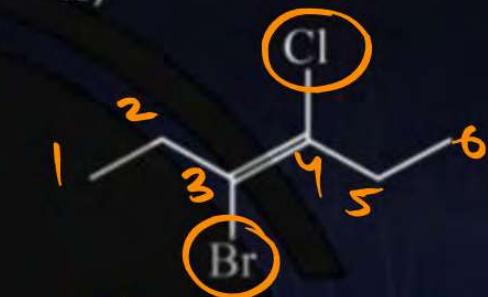
**Statement II:** During IUPAC naming, the numbering is done in such a way that the branched carbon atoms get the lowest possible numbers.

In the light of the above statements, choose the *most appropriate* answer from the options given below:

- (1) Statement I is incorrect, but Statement II is correct.

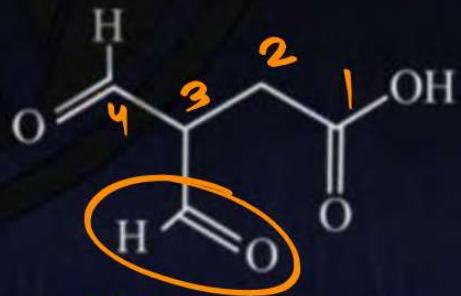
- (2) Statement I is correct, but Statement II is incorrect.  
 (3) Both Statement I and Statement II are correct.  
 (4) Both Statement I and Statement II are incorrect.

Q4 The **correct** IUPAC name of the given compound is;



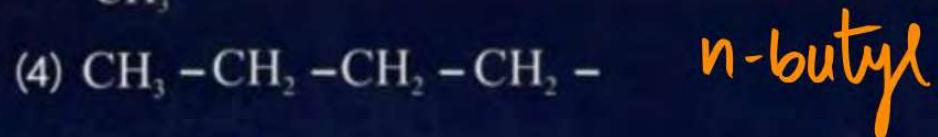
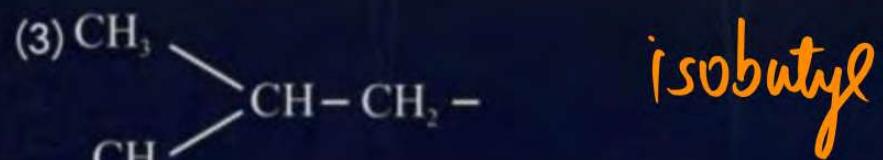
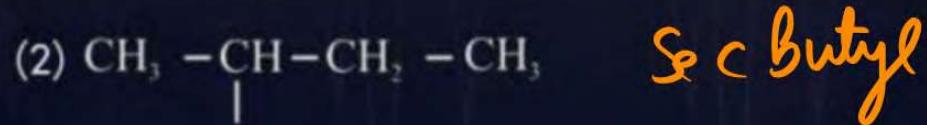
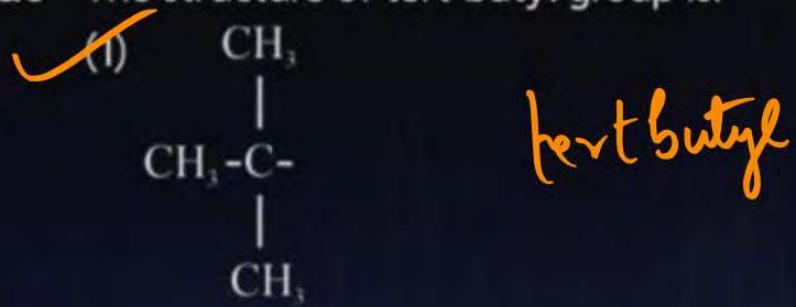
- (1) 3-bromo-4-chlorohex-3-ene
- (2) 4-bromo-3-chlorohex-3-ene
- (3) 3-bromo-4-chlorohex-2-ene
- (4) 3-chloro-4-bromohex-3-ene

Q5 The correct IUPAC name of the given compound is;

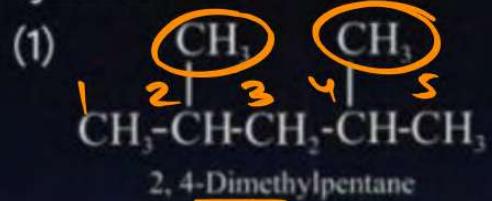


- (1) ~~4-Formyl-3-oxobutanoic acid~~
- (2) 3-Formyl-4-oxobutanoic acid
- (3) ~~3-Oxo-4-formylbutanoic acid~~
- (4) 3-Formyl-4-oxopentanoic acid

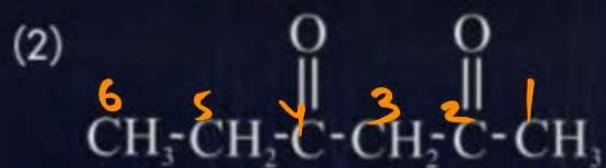
Q6 The structure of tert-butyl group is:



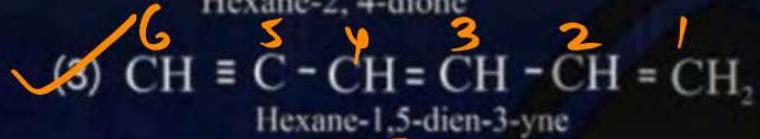
**Q7** Which nomenclature is **not** according to IUPAC system?



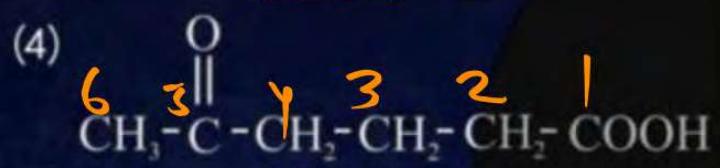
## 2, 4-Dimethylpentane



### Hexane-2, 4-dione

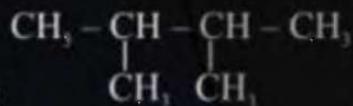


### Hexane-1,5-dien-3-yne



### 5-Oxohexanoic acid

Q8



The compound

contains;

$$\begin{array}{l} 1^\circ \text{H} = 12 \\ 3^\circ \text{H} = 2 \end{array}$$

- (1) Twelve 1° 'H' atoms only
- (2) Two 2° and twelve 1° 'H' atoms
- (3) Two 3° 'H' atoms only
- (4) Twelve 1° and two 3° 'H' atoms

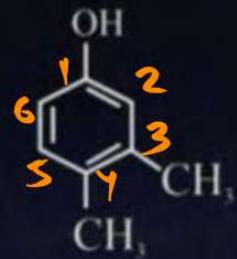
Q9 The correct IUPAC name of the given compound

is;



- (1) 2,3 - Dibromo -1 – phenylpentane
- (2) 2,4 - Dibromo -1 - phenylpentane
- (3) 2,3 - Dibromo -1 - pentylbenzene
- (4) 1,3 - Dibromo -2 – phenylpentane

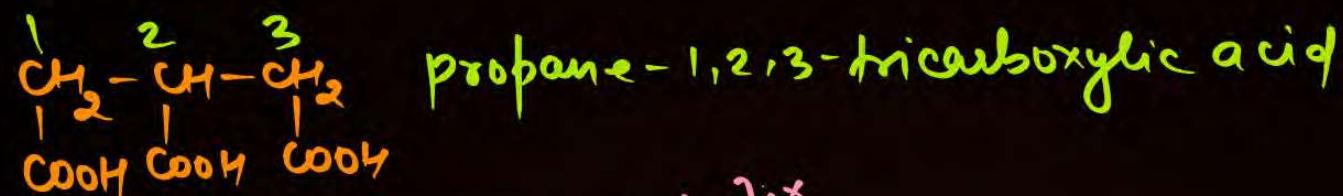
Q10 The **correct** IUPAC name of the given compound is;



- (1) 1-Hydroxy-3,4-dimethylbenzene X
- (2) 3,4-Dimethyl-1-hydroxybenzene
- (3) 3,4-methylphenol
- (4) 3,4-Dimethylphenol



①



②



③

