

Chapter #03

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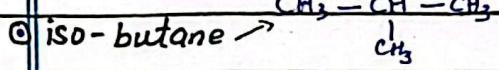
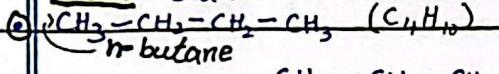
Organic Chemistry

Isomerism

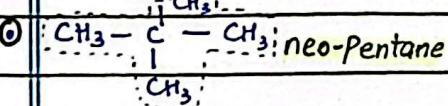
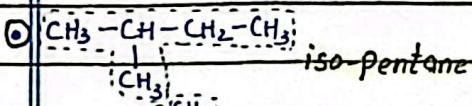
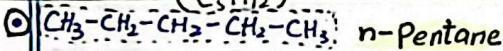
The Compounds that have same molecular formula but different arrangement of atoms in their molecules are called isomers. This phenomenon is called isomerism.

Example:

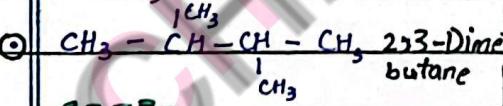
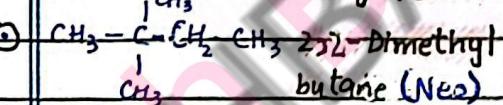
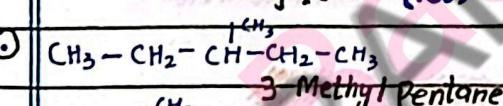
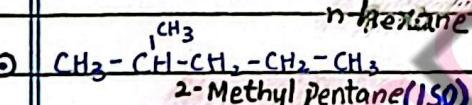
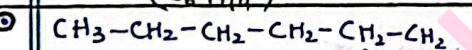
Butane: Butane has two isomers.



Pentane: Pentane has three isomers.



Hexane: Hexane has 5 isomers.



Catenation: The self-linking ability of carbon is called catenation.



n-pentane Q: Difference b/w saturated



& unsaturated hydrocarbon

Naming Alkanes

An international body, the international union of pure and applied chemistry (IUPAC)

We can easily recognize organic compound by its IUPAC name. Such names are called Systematic names.

Points →

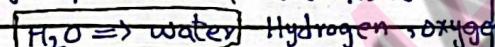
Organic Chemistry

The study of carbon containing compounds and their properties is called organic chemistry.

Organic compound: organic compounds are defined as the hydrocarbons and its derivatives.

Formula and its type:

Formula: symbolic representation of a compound that give idea about type of element & ratio b/w it.



Hydrogen, oxygen

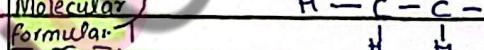
2 : 1 ratio

Types

Molecular formula, structural formula, condensed formula, dot & cross formula

Actual no. of atom in a compound

Structural formula: Shows arrangement of diff. atoms around the carbon atom present in a compound.



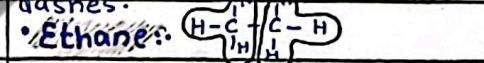
Molecular formula: C₂H₆

C_nH_{2n+2}

alkene

Condensed formula:

Formula where groups of atom are shown in order as they appear in structural formula with no bond or dashes.

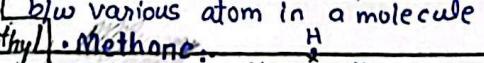


Condensed formula: CH_3CH_3

C_nH_{2n-2}

alkyne

Dot & Cross formula: formula in which electrons are shown as dot & cross b/w various atom in a molecule.



key = C.

Alkyl radical: $\text{H} \cdot \times \text{C} \times \text{H}$

Saturated: Hydrocarbons whose C-C atom have all single bond is called Saturated hydrocarbon.

Unsaturated: Hydrocarbons whose C-C atom have multiple bonds are called unsaturated i.e.

C=C, C≡C

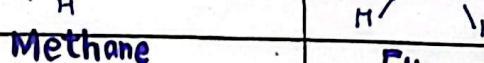
They are called alkenes & alkynes.

They are called alkenes & alkynes.

General formula: C_nH_{2n+2}

C_nH_{2n-2}

Example



Methane



Ethene



Ethyne

by Soch Boddo

MAK

Soch Boddo

Common name of carboxylic acid & Aldehyde

DATE _____ / _____ / _____

1	carboxylic acid formic acid \rightarrow ant	aldehyde formaldehyde
2	Acetic acid \rightarrow vinegar	Acetaldehyde
3	Propionic acid \rightarrow fat	Propionaldehyde
4	Butyric acid \rightarrow butter	Butyraldehyde
5	Valeric acid \rightarrow plant	Valeraldehyde

Parts

- ↓
- Stem suffix
- Stem: The stem tells the no of carbon atom in the chain.

Stem	No of carbon	Stem	No of carbon	Name	formula	alkyl name	formula of Alkyl
Meth-	1	Hep-	7	Metane	CH_4	Methyl	$-\text{CH}_3$
Eth-	2	Oct-	8	Ethane	C_2H_6	Ethyl	CH_3CH_3 ($-\text{C}_2\text{H}_5$)
Prop-	3	Non-	9	Propane	C_3H_8	Propyl	C_3H_7 -
But-	4	Dec-	10	Butane	C_4H_{10}	Butyl	C_4H_9 -
Pent-	5			Pentane	C_5H_{12}	Pentyl	C_5H_{11} -
Hex-	6			Hexane	C_6H_{14}	Hexyl	C_6H_{13} -
				heptane	C_7H_{16}	heptyl	C_7H_{15} -
				Octane	C_8H_{18}	Octyl	C_8H_{17} -
				Nonane	C_9H_{20}	Nonyl	C_9H_{19} -
				Decane	$\text{C}_{10}\text{H}_{22}$	Decyl	$\text{C}_{10}\text{H}_{21}$ -

Butane

- **Suffix:** Suffix is placed after it tells the class of compound.
- Example: The suffix "ane" is used.

Butane \rightarrow suffix it indicates alkene
Stem, it indicates no. of carbon atoms

- **Rules:**
- Find the longest chain of carbon atoms.
- Number the chain from the nearest substituent.
- Name and number substituents.
- Combine names list substituents with their positions, followed by the parent chain.
- Use prefixes (di, tri, etc) for multiple identical substituents.
- Alphabetize substituents in the final name.

Example:- 2 - Methyl propane.

- Add comma b/w number 2,2
- Add (-) hyphen b/w (letter & no)
- Add (2-Methyl)
- Alkane and Alkyl radical.

Q:- Difference

Alkane: Alkane are saturated hydrocarbon containing only single bond.

alkene &

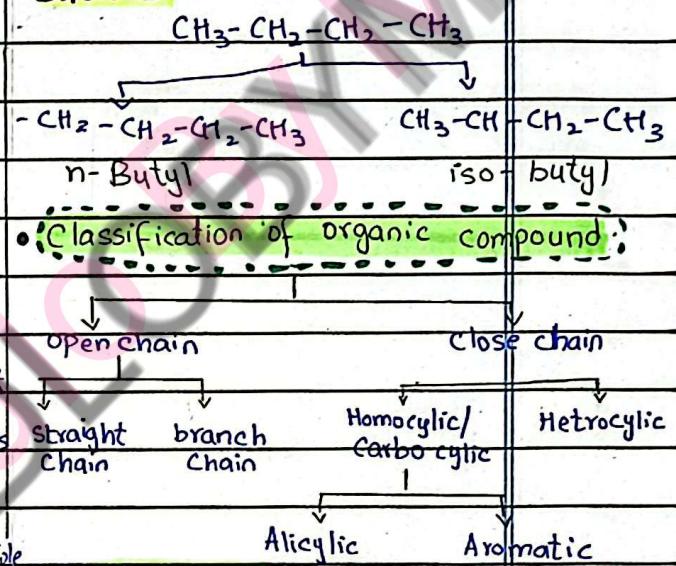
General formula:- $\text{C}_n\text{H}_{2n+2}$

Alkyl radical: Group of atoms obtained by removing one hydrogen atom from an alkane

General formula:- $\text{C}_n\text{H}_{2n+1}$.

Represented by:- R

ane \rightarrow yl



• **Functional group**: An atom or group of atom that gives a family of organic compounds characteristic chemical and physical properties is called functional group.

Name	Definition	functional group	General formula (suffix)	IUPAC	Example
Alkane	H with c-c	$\cdot \text{X}$	-H	-ane	$\text{CH}_4 \Rightarrow$ Methane
Alkene	H with c=c	$\text{-C}=\text{C}-$	-ene	$\text{C}_2\text{H}_4 \Rightarrow$ Ethene	
Alkyne	H with c≡c	$\text{-C}\equiv\text{C-}$	-yne	$\text{C}_2\text{H}_2 \Rightarrow$ Ethyne	
Halogenoalkane	H with c-X	-R-X	-X		$\text{CH}_3\text{Br} \Rightarrow$ Methyl bromide
Alcohol	Compound with a hydroxyl grp.	-C-OH	R-OH	-ol	$\text{C}_2\text{H}_5\text{OH}$ methyl alcohol
Phenol	Compound with a -OH attached to a benzene ring.	-OH			$\text{C}_6\text{H}_5\text{OH}$ Phenol
Ethers	Compound with two c grp.	-C-O-C-	R-O-R'	-ether	$\text{CH}_3\text{-O-CH}_3$ Dimethyl ether
Aldehydes	Compound with a -CHO group.	-C-H	-C=H	-al	CH_2O Formaldehyde
Ketones	Compound with carbonyl group.	-C=O	R'-C-R'	-one	CH_3COCH_3 Acetone
Carboxylic acid	Compound with COOH group.	-C(=O)OH	R-C(=O)OH or R-COOH	-oic acid	CH_3COOH Acetic Acid
Ester	Compound with two c grp.	-C-O-C-	R'-C(=O)-OR'	-ethanoate	$\text{CH}_3\text{-C(=O)-OCH}_3$
Amine	Compound with N atom and a c grp.	-NH_2	R-NH_2	-amino	CH_3NH_2 Methyl amine
Amide	Compound with carbonyl group and an N atom.	-C-N	R-C(=O)NH_2	-amide	$\text{CH}_3\text{-C(=O)-NH}_2$ Ethanimide