

Chapter #03

Organic Chemistry

DATE: ___/___/___

Soch Badlo by MAK	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 has two isomers. ① $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_3$ (C_4H_{10}) n-butane ② iso-butane $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	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. $\text{H}_2\text{O} \Rightarrow$ water Hydrogen oxygen 2 1 ratio
Name:- Neha Jyotima	Pentane: Pentane has three isomers. (C_5H_{12}) ① $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ n-Pentane ② $\begin{array}{c} \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$ iso-pentane ③ $\begin{array}{c} \text{CH}_3-\text{C}-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$ neo-pentane	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. C_2H_6 Molecular formula $\text{H}-\text{C}-\text{C}-\text{H}$ Structural formula $\text{H} \quad \text{H}$ Ethane: C_2H_6 alkane
Name:- Mam Ayesha	Hexane: Hexane has 5 isomers. (C_6H_{14}) ① $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ n-hexane ② $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}-\text{CH}_2-\text{CH}_2-\text{CH}_3 \end{array}$ 2-Methyl pentane (ISO) ③ $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}_2-\text{CH}-\text{CH}_2-\text{CH}_3 \end{array}$ 3-Methyl pentane ④ $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{C}-\text{CH}_2-\text{CH}_3 \\ \\ \text{CH}_3 \end{array}$ 2,2-Dimethyl butane (Neo) ⑤ $\begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3-\text{CH}-\text{CH}-\text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$ 2,3-Dimethyl butane	Condensed formula: Formula where groups of atom are shown in order as they appear in structural formula with no bond or dashes. $\text{H}-\text{C}-\text{C}-\text{H}$ $\text{H} \quad \text{H}$ Ethane: Condensed formula $\rightarrow \text{CH}_3\text{CH}_3$ Dot & Cross formula: formula in which electrons are shown as dot & cross b/w various atom in a molecule. Key = C • H x $\text{H} \cdot \times \text{C} \cdot \times \text{H}$ $\text{H} \quad \text{H}$
Teacher:- Mam Ayesha	Catination: The self-linking ability of carbon is called catination. $\text{CH}_3-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{CH}_3$ n-pentane Benzene  Q: Difference b/w saturated & unsaturated hydrocarbon.	Saturated: Hydrocarbons whose C-C atom have all single bond is called Saturated hydrocarbon. They are called alkane. Unsaturated: Hydrocarbons whose containing carbon carbon multiple bonds are called unsaturated i.e. $\text{C}=\text{C}$, $\text{C}\equiv\text{C}$. They are called alkenes & alkynes. General formula Alkane: $\text{C}_n\text{H}_{2n+2}$ Alkene: C_nH_{2n} Alkyne: $\text{C}_n\text{H}_{2n-2}$
	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. Parts $\rightarrow$	Example $\text{H}-\text{C}-\text{H}$ $$ H Methane $\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}=\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ Ethene $\text{H}-\text{C}\equiv\text{C}-\text{H}$ Ethyne

1	Formic acid ^{Carboxylic acid} → Ant	Formaldehyde ^{aldehyde}
2	Acetic acid ^{Acid} → ^{vinegar} Ac	Acetaldehyde
3	Propionic acid → fat	Propionaldehyde
4	Butyric acid ^{Butter}	Butyraldehyde
5	Valeric acid → Plant	Valeraldehyde

Parts				Name	Formula	alkyl name	formula of Alkyl																																																																																				
Stem Suffin				Metane	CH_4	Methyl	$-CH_3$																																																																																				
Stem: The stem tells the no of carbon atom in the chain.				Ethane	C_2H_6	Ethyl	$CH_3-CH_2-CH_3$ ($-C_2H_5$)																																																																																				
				Propane	C_3H_8	Propyl	C_3H_7-																																																																																				
				Butane	C_4H_{10}	Butyl	C_4H_9-																																																																																				
				Pentane	C_5H_{12}	Pentyl	$C_5H_{11}-$																																																																																				
				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	$C_{10}H_{22}$	Decyl	$C_{10}H_{21}-$																																																																																				
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Suffin: Suffin is placed after, it tells the class of compound. Example: The suffix "ane" is used.				Butane → suffix it indicates alkene																																																																																							
Stem: it indicates no. of carbon atoms				Classification of organic compound:																																																																																							
Rules:				open chain close chain																																																																																							
Find the longest chain of carbon atoms.				straight chain branch chain																																																																																							
Number the chain from the nearest substituent.				Homocyclic/Carbocyclic Heterocyclic																																																																																							
Name and number substituents				Alicyclic Aromatic																																																																																							
Combine names list substituents with their positions, followed by the parent chain.				Functional group: An atom or group of atom that gives a family of organic compounds characteristic chemical and Physical Properties is called functional group.																																																																																							
Use prefix (di, tri, etc) for multiple identical substituents.				<table border="1"> <thead> <tr> <th>Name</th><th>Definition</th><th>functional group</th><th>General formula</th><th>IUPAC (Suffin)</th><th>Example</th></tr> </thead> <tbody> <tr> <td>Alkane</td><td>H with C-C</td><td>-X</td><td>$R-H$</td><td>-ane</td><td>$CH_4 \Rightarrow$ Methane</td></tr> <tr> <td>Alkene</td><td>H with C=C</td><td>$-C=C-$</td><td>$R-C=C-R$</td><td>-ene</td><td>$C_2H_4 \Rightarrow$ Ethene</td></tr> <tr> <td>Alkyne</td><td>H with C≡C</td><td>$-C \equiv C-$</td><td>$R-C \equiv C-R$</td><td>-yne</td><td>$C_2H_2 \Rightarrow$ Ethyne</td></tr> <tr> <td>Haloalkane</td><td>Alkane with a halogen (Cl, Br, I)</td><td>$R-X$</td><td>$R-X$</td><td>-yl</td><td>$CH_3Br \Rightarrow$ Methyl Bromide</td></tr> <tr> <td>Alcohol</td><td>Compound with a hydroxyl group</td><td>$-C-OH$</td><td>$R-OH$</td><td>-ol</td><td>CH_3OH methyl alcohol</td></tr> <tr> <td>Phenol</td><td>Compound with a -OH attached to a benzene ring</td><td>$-OH$</td><td></td><td></td><td>C_6H_5OH Phenol</td></tr> <tr> <td>Ethers</td><td>Compound with two C groups</td><td>$-C-O-C-$</td><td>$R-O-R'$</td><td>-ether</td><td>CH_3-O-CH_3 Dimethyl ether</td></tr> <tr> <td>Aldehyde</td><td>Compound with a -CHO at end</td><td>$-C-H$</td><td>$R-C(=O)-H$</td><td>-al</td><td>CH_2O Formaldehyde</td></tr> <tr> <td>Ketones</td><td>Compound with carbonyl group C=O</td><td>$-C-$</td><td>$R-C(=O)-R'$</td><td>-one</td><td>CH_3COCH_3 Acetone</td></tr> <tr> <td>Carboxylic acid</td><td>$COOH$ group</td><td>$-C-OH$</td><td>$R-C(=O)-OH$ or $COOH$</td><td>-oic acid</td><td>CH_3COOH Acetic Acid</td></tr> <tr> <td>Ester</td><td>Compound with O b/w two C groups</td><td>$-C-O-C-$</td><td>$R-C(=O)-OR'$</td><td>-ethanoate</td><td>$CH_3-C(=O)-OCH_3$</td></tr> <tr> <td>Amine</td><td>Compound with N atom bond of C</td><td>$-NH_2$</td><td>$R-NH_2$</td><td>-amine</td><td>CH_3NH_2 Methyl amine</td></tr> <tr> <td>Amide</td><td>Compound with carbonyl group bond of N</td><td>$-C-N$</td><td>$R-C(=O)-NH_2$</td><td>-amide</td><td>$CH_3-C(=O)-NH_2$ Ethanamide</td></tr> </tbody> </table>				Name	Definition	functional group	General formula	IUPAC (Suffin)	Example	Alkane	H with C-C	-X	$R-H$	-ane	$CH_4 \Rightarrow$ Methane	Alkene	H with C=C	$-C=C-$	$R-C=C-R$	-ene	$C_2H_4 \Rightarrow$ Ethene	Alkyne	H with C≡C	$-C \equiv C-$	$R-C \equiv C-R$	-yne	$C_2H_2 \Rightarrow$ Ethyne	Haloalkane	Alkane with a halogen (Cl, Br, I)	$R-X$	$R-X$	-yl	$CH_3Br \Rightarrow$ Methyl Bromide	Alcohol	Compound with a hydroxyl group	$-C-OH$	$R-OH$	-ol	CH_3OH methyl alcohol	Phenol	Compound with a -OH attached to a benzene ring	$-OH$			C_6H_5OH Phenol	Ethers	Compound with two C groups	$-C-O-C-$	$R-O-R'$	-ether	CH_3-O-CH_3 Dimethyl ether	Aldehyde	Compound with a -CHO at end	$-C-H$	$R-C(=O)-H$	-al	CH_2O Formaldehyde	Ketones	Compound with carbonyl group C=O	$-C-$	$R-C(=O)-R'$	-one	CH_3COCH_3 Acetone	Carboxylic acid	$COOH$ group	$-C-OH$	$R-C(=O)-OH$ or $COOH$	-oic acid	CH_3COOH Acetic Acid	Ester	Compound with O b/w two C groups	$-C-O-C-$	$R-C(=O)-OR'$	-ethanoate	$CH_3-C(=O)-OCH_3$	Amine	Compound with N atom bond of C	$-NH_2$	$R-NH_2$	-amine	CH_3NH_2 Methyl amine	Amide	Compound with carbonyl group bond of N	$-C-N$	$R-C(=O)-NH_2$	-amide	$CH_3-C(=O)-NH_2$ Ethanamide
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Example: 2-Methyl propane.																																																																																											
Add comma b/w number 2,2																																																																																											
Add (-) hyphen b/w (letter & no) (2-Methyl)																																																																																											
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