



**SSC GK**

**SSC GK BATCH 2.0**

**Chemistry**

**Carbon & It's Compounds**

**Lecture :- 6**

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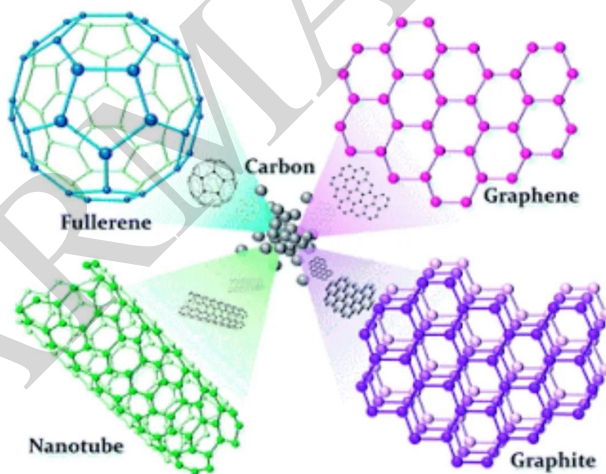


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## CARBON AND IT'S COMPOUND



## Carbon

- Atmosphere: 0.036%
- Earth crust: 0.02%
- Atomic no: 6 → 2, 4

$C^{4+}$

$C^{4-}$

- Alkali metals: Li, Na, K

- Halogen: 7

-1

$e^-$  sharing

↓  
Covalent Bond

## Bonding in Carbon: The Covalent Bond



- Strength: weak      Nitrogen:  $:N:::N:$
- Low Melting Point/Boiling Point

## Allotropes of Carbon

Graphite: 1C → 3C → Slippery

↳ Good conductor of electricity

- Diamond: 1C → 4C → Hardest substance known

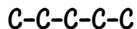
- Buckminster Fullerene: C<sub>60</sub>

↳ Arranged in football shape

## Versatile Nature of Carbon

- Catenation: unique ability to form bonds with other carbon atom → Large molecule

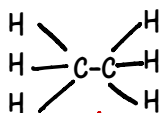
↓  
Due to small size of C atom



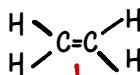
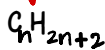
- ane: C-C single bond      Saturated compounds
  - ene: C=C
  - yne: C≡C
- } Unsaturated compounds

- Alkane:  $C_nH_{2n+2}$
- Alkene:  $C_nH_{2n}$
- Alkyne:  $C_nH_{2n-2}$
- Hydrocarbon → C-H

### Saturated and Unsaturated Carbon Compounds



ane



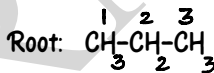
ene



yne

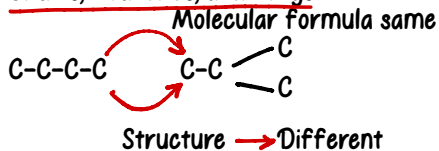
### Nomenclature

- 1C: Meth
- 2C: Eth
- 3C: Prop
- 4C: But
- 5C: Pent
- 6C: Hexa
- 7C: Hepta
- 8C: Octa

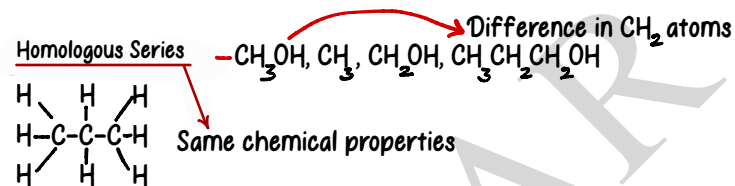


continuation of Parent chain

## Chains, Branches, and Rings



Isomers: compounds with identical molecular formula but different structural formula

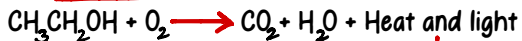


Hetero atom	Class of compounds	Formula of functional group
Cl/Br	Halo- (Chloro/bromo) alkane	-Cl, -Br (substitutes for hydrogen atom)
Oxygen	1. Alcohol	-OH
	2. Aldehyde	$\begin{array}{c} H \\   \\ -C \\    \\ O \end{array}$
	3. Ketone	$\begin{array}{c} -C- \\    \\ O \end{array}$
	4. Carboxylic acid	$\begin{array}{c} O \\    \\ -C-OH \end{array}$



## Chemical Properties of Carbon Compounds

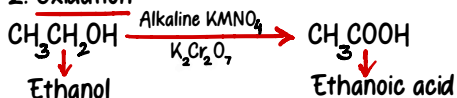
### 1. Combustion:



↓  
Exothermic

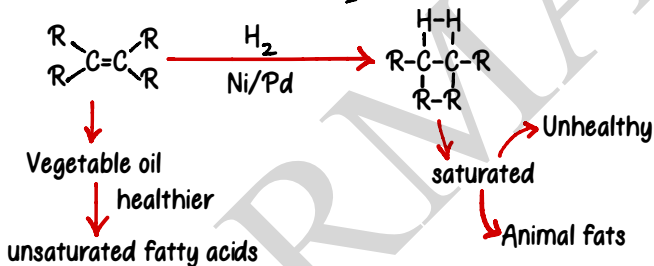
- **Saturated:** burns with clear blue flame
- **Unsaturated:** burns with yellow sooty flame
- **LPG:** Propane + Butane
- **CNG:** Methane

### 2. Oxidation



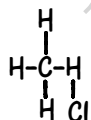
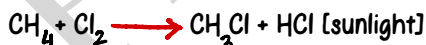
### 3. Addition Reaction

- **Unsaturated Hydrocarbon:**  $\text{H}_2$



### 4. Substitution Reaction

- **Saturated Hydrocarbons** → are unreactive and inert

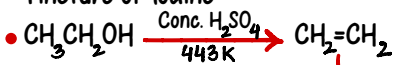


further continued, then forms  $\text{CHCl}_3$  → Chloroform

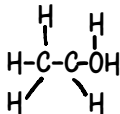
## Some important Carbon Compounds- Ethanol and Ethanoic Acid

- Ethanol → Good solvent, used in Cough syrup

Tincture of Iodine → Can be made from Sugarcane juice → Molasses → Fermentation → Ethanol



Ethene



### Properties of Ethanol

#### Reactions of Sodium



### Properties of Ethanoic Acid

Commonly known as Acetic acid  
 Also known as Glacial Acetic Acid as Melting Point is 290 K  
 Freezes during winters  
 in Vinegar: 5-8%

### Reactions of Ethanoic Acid

#### 1. Esterification Reaction

Acid + Alcohol reaction

COOR group → Ester





## 2. Reaction with a base



Saponification rkn

For making soaps

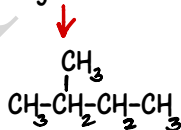
Sodium salts of long  
chain of carboxylic acids

- Detergent: Sodium salt of long chain Sulphonic acid

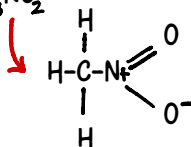
## 3. Reaction with Carbonates and Hydrocarbonates



- Alkylbenzene widely used in production of phenol: Cumene
- Strong reducing agent used to reduce aldehydes, ketones, esters, carboxylic acid chlorides, carboxylic acids and even carboxylate salts to alcohols: Lithium aluminium hydride ( $\text{LiAlH}_4$ )
- Two double carbon-carbon bonds are known as dienes
- Isopentane also called 2-methylbutane and is branched structure with formula  $\text{C}_5\text{H}_{12}$



- Nitromethane formula:  $\text{CH}_3\text{NO}_2$



- Sedimentation not used to purify organic compounds



- Alkanes were earlier known as Paraffin
- Paradichlorobenzene is used as fumigant insecticide to contra cloth moths and chemical formula is:  $C_6H_4Cl_2$
- Root is used to represent the no. of carbon atoms in the parent chain
- Examples of monosaccharides: Fructose (fruit sugar) and Glucose  
Simplest form of Sugar
- Cereals: Maltose
- Largest compound of natural gas: Methane (seen in Paddy field, they are Marsh gas)  
Also seen in where there are Termite
- Butane gas:  $C_4H_{10}$   
Alkane:  $C_nH_{2n+2}$   
 $= 2 \times 4 + 2$
- Three carbon molecules broken down from six-carbon molecules of glucose during the first step in the process of nutrition in all organisms is called: Pyruvate  
Glucose  $\xrightarrow{\text{Cytoplasm}}$  Pyruvate
- Dichlorodifluoromethane:  $CCl_2F_2$