

CARBON AND ITS COMPOUNDS





(चतुः भंगोजी =) Covalant Band. (Pair)

<u>CARBON</u>

- Carbon belongs to the group IV of the periodic table.
- It has four electrons in its outermost orbit, so its valancy is four.
- Carbon is a non-metal.





IVA

Si

32

Why so many Carbon Compounds in V nature?

- Because carbon is chemically unique.
- Only carbon atoms have the ability to combine with themselves to form long chains





8. Carbon Family: Group 14 (4a)

- Metals, nonmetals, and metalloids
- Bond with many elements by sharing electrons
- Silicon is a semiconductor:
 - 1. Extremely abundant metalloid
 - 2. Used in computer chip manufacturing "Silicon Valley"
- D. 4 valence electrons



Long Chain Creation



What are Allotropes ?

 $(3\sqrt{4224})$

- Allotropes are elements which are chemically identical, but they differ markedly in their physical properties.
- Diamond and Graphite two allotropes of carbon differ in their physical properties.

Carbon

, Grophite , C

, Diamond > C

C - C - C - C



* Graphile'-Sheets like Structure (Hexagon) = look like = chicken wire. => Single Bond. > Vonder Walls forcer Weak ~

Graphene:-→Graphite Single layer of graphite is called Graphene. > 5 Graphene > Pure Carbon Single Sheet. Z)



· BUCK minster Fullerent [C60]:-Shape (31012)=> Football like

Earbon atom =) Corner (Anti Tr)
= 20 hexagons.





Physical Properties of Diamond and Graphite

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	Property	Diamond	Graphite
12 2 d al	Appearance	Transparent	Black, Shiny
कंगरता	Hardness	Very Hard	Soft, slippery to touch
मित्रा ने रात्मता निरंपुत को	Thermal Conductivity	Very poor	moderate
	Electrical Conductivity	Poor	Good conductor
	Density(kg/m3)	3510	2250
	Uses	Jewellery, drilling	Dry cell, electric arc, lubricant, pencil lead

Why the physical properties of diamond and graphite are so different?

• Due to the difference in the arrangement of carbon atoms in diamond and graphite



Hydrocarbons



• Hydrocarbons are compounds of carbon and hydrogen.







Hydrocarbon Type	Characteristic Group	Example	
Saturated Hydrocarbon: Alkanes	No double or Triple Bond Single Bond Only	CH ₃ CH ₂ CH ₃ Propane	- С- С - И И И
Unsaturated Hydrocarbon: 1. Alkenes 2. Alkynes	ЗЦНД Л Double Bond Triple Bond	CH ₃ –CH=CH₂ <i>Propene</i> CH ₃ –C≡CH <i>Propyne</i>	$\begin{array}{c} H \\ C = C \\ H \\ H \end{array}$
Aromatic Hydrocarbons:	Benzene ring	Methyl Benzene	







-Single - Alkane (V)	No. of C atoms	Name	Formula	Structure
->Dobble > Alkene ST		methin	Icarbon	H
Triple - Alkyne Hisa	1	Methane	CH4	H H
	2	e 拘 で到 Ethane	C_2H_6	$\begin{array}{ccc} H & H \\ H - C & -C - H \\ H & H \end{array}$
h=c=H hethane	3	y T 4 Propane	$\underline{C_3}H_8$	H H H H H H H H - C - C - C - H H H H H
	4	र यूटे Butane	C_4H_{10}	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
	5	ेर ट् ट Pentane √	C ₅ H ₁₂	$\begin{array}{cccccccc} H & H & H & H & H \\ H & - & - & - & - & - & - \\ H - & - & - & - & - & - & - & - \\ H & - & - & - & - & - & - & - & - \\ H & H & H & H & H & H \end{array}$
	6	ेट्ट ∓स / Hexane	C ₆ H ₁₄	Н Н Н Н Н Н Н-С-С-С-С-С-С-Н Н Н Н Н Н Н









 Unsaturated hydrocarbon burns in air with yellow sooty flame because percentage of carbon is higher than saturated hydrocarbon which does not get completely oxidized in air.



Unsaturated hydrocarbon and hydrogen in the presence of crystals palladium or nickel.

· HYDROGENATION. EISSTUATION M/ M Double Bond Single Bond



OXIDATION REACTION



I) PHYSICAL PROPERTIES DIFFERENCES :

• <u>Ethanol</u> : └∕

It has specific smell.

It has burning taste.

It does not freeze in winters.

• <u>Ethanoic Acid</u> : It has Vinegar like smell.

It is sour in taste.

It freezes in winters. \sim

II) CHEMICAL PROPERTIES DIFFERENCES :

• <u>Ethanol</u> : ►

It does not react with NaHCO₃.

It burns with blue flame. \checkmark

It does not affect blue litmus. γ

Ethanoic Acid : It gives CO₂ with NaHCO₃

It does not burn with blue flame.

It turns blue litmus red.

(ii) Reaction with base

Base Acid Salt water NaOH + CH3COOH → CH3COONa + H2O

(iii) Reaction with carbonates and hydrogen carbonates : $2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2$ CHH₂COOH + NaHCO₃ \rightarrow CH₃COONa + H₂O + CO₂

Saponification -> Jug Anol

 Saponification is a process by which triglycerides are reacted with sodium or potassium hydroxide (lye) to produce glycerol and a fatty acid salt called "soap." The triglycerides are most often animal fats or vegetable oils. When sodium hydroxide is used, a hard soap is produced.

GIY. Fatty Acid Salt. Nach II Koh Soap (Hig

Soaps and Detergents :





DETERGENTS

- Detergents are a class of surfactants with cleaning properties when diluted in water.
- Most detergents are akylbenzenesulfonates.
- Detergents are classified according to the electrical charge they carry as anionic, cationic, or non-ionic.
- While detergents are used for cleaning, they also find use as fuel additives and biological reagents.



Hydrophobic Region

Hydrophilic Region



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