

# NEET | JEE

## ESSENTIALS

Class  
XI

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## Unit 7

## Organic Chemistry — Some Basic Principles and Techniques

### INTRODUCTION

Organic chemistry is the chemistry of carbon compounds as all organic compounds contain carbon as their essential constituent. Organic compounds may be regarded as hydrocarbons *i.e.*, compounds of carbon and hydrogen only. A large number of organic compounds also contain elements like N, O, S, X, etc. which are derived from hydrocarbons by replacing one or more hydrogen atoms in their molecules with these atoms. Thus, the modern definition of the organic chemistry is “the chemistry of the hydrocarbons and their derivatives.”

### ORGANIC COMPOUNDS

#### Tetravalency of Carbon

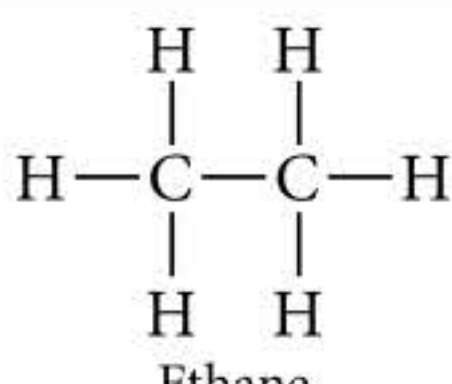


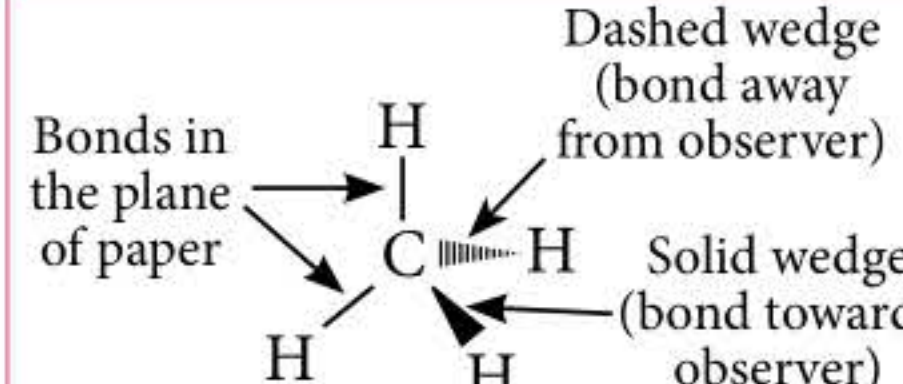
Carbon can complete its octet by sharing its valence electrons with the electrons of other atoms, by virtue of

which it forms four covalent bonds, is generally referred to as tetravalency of carbon. The unique capacity of carbon atom to form bonds with other carbon atoms, is called catenation.

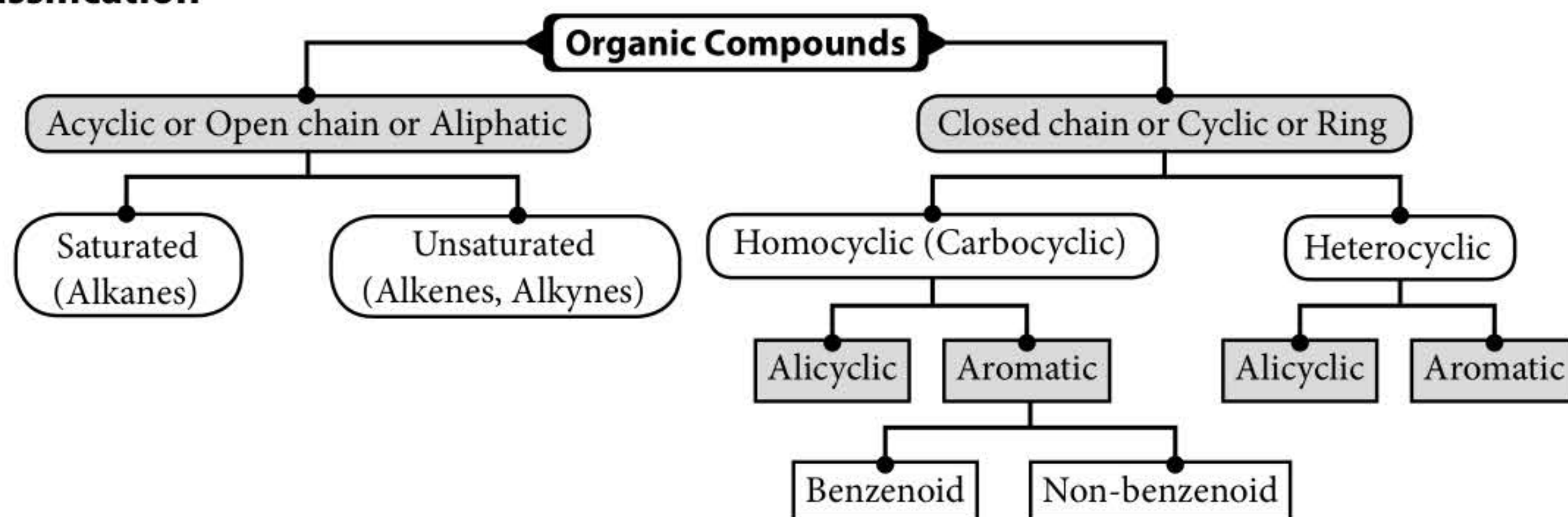
#### Shapes

Type of hybridisation	Orbitals used	Geometry of the hybrid orbitals formed	Bond angle	Percentage of <i>s</i> - and <i>p</i> -characters
$sp^3$	one <i>s</i> + three <i>p</i>	Tetrahedral	109.5°	25% <i>s</i> + 75% <i>p</i>
$sp^2$	one <i>s</i> + two <i>p</i>	Trigonal planar	120°	33.3% <i>s</i> + 66.7% <i>p</i>
$sp$	one <i>s</i> + one <i>p</i>	Linear	180°	50% <i>s</i> + 50% <i>p</i>

#### Structural Representation

Complete formula	Condensed formula	Bond-line formula	Polygon formula	3D Representation
 <p>Ethane</p>	$\text{CH}_3\text{—CH}_3$ Ethane	 <p><i>n</i>-Pentane</p>	 <p>Cyclopropane</p>	 <p>Bonds in the plane of paper</p> <p>Dashed wedge (bond away from observer)</p> <p>Solid wedge (bond towards observer)</p>

## Classification



## Homologous Series

A series of organic compounds, each containing a characteristic functional group, forms a homologous series in which each successive member differs by a  $-\text{CH}_2$  unit or by  $12 + 2 \times 1 = 14$  mass units.

## Functional Groups

An atom or a group of atoms joined in a specific manner which is responsible for the characteristic chemical properties of the organic compounds *e.g.*, hydroxyl group ( $-\text{OH}$ ), aldehyde group ( $-\text{CHO}$ ), carboxylic acid group ( $-\text{COOH}$ ), etc.

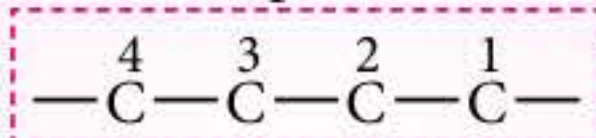
## IUPAC Nomenclature

**IUPAC name** = **2° prefix** + **1° prefix** + **word root** + **1° suffix** + **2° suffix**

Some functional groups are always treated as substituents whether organic compound is monofunctional or polyfunctional *e.g.*, Fluoro ( $-\text{F}$ ), Chloro ( $-\text{Cl}$ ), Bromo ( $-\text{Br}$ ), Iodo ( $-\text{I}$ ), Nitro ( $-\text{NO}_2$ ), Nitroso ( $-\text{NO}$ ), Diazo ( $-\text{N}^+\equiv\text{N}$ ), Alkoxy ( $-\text{OR}$ ), Alkyl ( $-\text{R}$ ), Phenyl ( $-\text{C}_6\text{H}_5$ ), etc.

Cyclo is used for carbocyclic compounds. If cyclo is not used, it indicates acyclic or open chain compound.

Principal chain



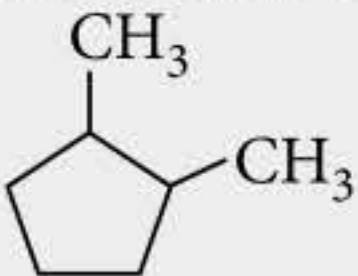

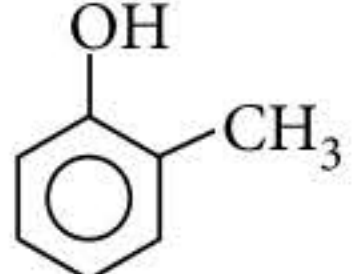
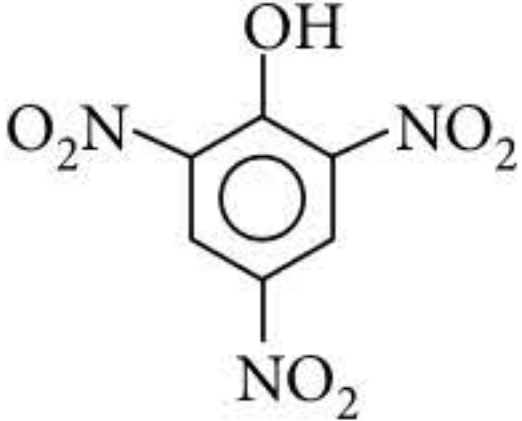
If no. of C atoms is 1-meth, 2-eth, 3-prop(*a*), 4-but(*a*), 5-pent(*a*), 6-hex(*a*), 7-hept(*a*), 8-oct(*a*), 9-non(*a*), 10-dec(*a*), 11-undec(*a*), 12-dodec(*a*). Extra 'a' is added to word root if 1° suffix begins with a consonant.

Single bond only - ane

1 (= $\equiv$ )bond -ene	1 (= $\equiv$ )bond -yne
2 (= $\equiv$ )bonds -diene	2 (= $\equiv$ )bonds -diyne
3 (= $\equiv$ )bonds -triene	3 (= $\equiv$ )bonds -triyne

Indicates functional group,  
 $-\text{OH}$ (-ol),  $-\text{CHO}$ (-al)  
 $>\text{C}=\text{O}$ (-one),  
 $-\text{COOH}$  (-oic acid),  
 $-\text{CONH}_2$  (-amide),  
 $-\text{COCl}$  (-oyl chloride),  
 $-\text{COOR}$  (alkyl .....oate),  
 $-\text{CN}$  (nitrile),  $-\text{SH}$  (thiol),  
 $-\text{NH}_2$  (-amine).  
 If 2° suffix begins with a vowel, the terminal 'e' is dropped.

Compound	IUPAC name	Compound	IUPAC name
$\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$	Butane	$\text{CH}_3\text{CH}_2\text{OH}$	Ethanol
$\text{CH}\equiv\text{CH}$	Ethyne	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$	Propanamine
$\text{CH}_3\text{COOH}$	Ethanoic acid	$\text{HC}\equiv\text{CCOOH}$	Prop-2-yn-1-oic acid
$\text{CH}_3\text{CH}_2\text{Br}$	Bromoethane	$\text{CH}_3\text{CH}_2\text{COCH}_3$	Butan-2-one
$\text{C}_2\text{H}_5\text{OC}_2\text{H}_5$	Ethoxyethane	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3-\text{CH}-\text{CH}_3 \end{array}$	2-Methylpropane

	1, 2-Dimethylcyclopentane		Cyclohexene
	2-Methylphenol		2, 4, 6-Trinitrophenol

## Isomerism

The phenomenon of existence of two or more compounds possessing the same molecular formula but different properties is known as isomerism. It is classified broadly into structural isomerism and stereoisomerism.

### Types of structural isomerism :

Isomerism	Description	Example
<b>Chain isomerism</b>	Arises due to different arrangements of C-atoms. The chain isomers have almost similar chemical properties but different physical properties.	$\text{H}_3\text{C}-\text{CH}_2-\text{CH}_2-\text{CH}_3, \text{H}_3\text{C}-\overset{\text{CH}_3}{\underset{ }{\text{C}}}-\text{CH}_3$ <p style="text-align: center;">Butane <span style="margin-left: 100px;">Isobutane</span></p>
<b>Position isomerism</b>	Arises due to different positions of side chains, substituents, functional groups, double bonds, triple bonds, etc. on the parent chain.	$\text{H}_2\text{C}=\text{CH}-\text{CH}_2-\text{CH}_3, \text{H}_3\text{C}-\text{CH}=\text{CH}-\text{CH}_3$ <p style="text-align: center;">But-1-ene <span style="margin-left: 100px;">But-2-ene</span></p>
<b>Functional isomerism</b>	Arises due to presence of different functional groups. These isomers differ in both physical and chemical properties.	$\text{H}_3\text{C}-\text{CH}_2-\text{OH}, \text{H}_3\text{C}-\text{O}-\text{CH}_3$ <p style="text-align: center;">Ethyl alcohol <span style="margin-left: 100px;">Dimethyl ether</span></p>
<b>Metamerism</b>	Arises due to different alkyl groups on either side of the functional group.	$\text{H}_3\text{C}-\text{CH}_2-\text{O}-\text{CH}_2-\text{CH}_3, \text{H}_3\text{C}-\text{O}-\text{CH}_2-\text{CH}_2-\text{CH}_3$ <p style="text-align: center;">Diethyl ether or Ethoxyethane <span style="margin-left: 100px;">Methyl propyl ether or Methoxypropane</span></p>
<b>Tautomerism</b>	Tautomers have different functional groups and exist in dynamic equilibrium with each other due to rapid interconversion from one form to another.	$\text{H}_3\text{C}-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3 \rightleftharpoons \text{H}_3\text{C}-\overset{\text{OH}}{\underset{ }{\text{C}}}-\text{CH}_2$ <p style="text-align: center;">Acetone (keto form) <span style="margin-left: 100px;">Prop-1-en-2-ol (enol form)</span> Keto-enol tautomerism</p>

## iNFOSHOTS

### Antiaromatic molecules display record electrical conductance !

Antiaromatic compounds featuring planar rings of carbon atoms sharing a number of electrons that is a multiple of four, have been predicted to be excellent conductors. Researchers demonstrate high electrical conductance for an antiaromatic nickel complex-an order of magnitude higher than for a similar aromatic complex. Since, the conductance is also tunable by electrochemical gating, antiaromatic complexes are promising materials for future electronic devices.

## Types of stereoisomerism :

<b>Geometrical isomerism</b>	<ul style="list-style-type: none"> <li>Isomers have the same structural formula but differ in the spatial arrangement of atoms or groups of atoms about double bond.</li> <li>Compounds containing C=N and N=N bonds also show geometrical isomerism. In these cases, 'syn' (for <i>cis</i>) and 'anti' (for <i>trans</i>) are more commonly used.</li> <li><i>E</i> and <i>Z</i> system of nomenclature is used for highly substituted alkenes, having four different atoms or groups, attached to C=C bond.           <ul style="list-style-type: none"> <li><i>E</i> is assigned to an isomer in which high priority atoms or groups are on the opposite sides.</li> <li><i>Z</i> is assigned to an isomer in which high priority atoms or groups are on the same side.</li> </ul> </li> </ul>	
<b>Optical isomerism</b>	<ul style="list-style-type: none"> <li>Compounds having similar physical and chemical properties but differing only in the behaviour towards polarised light are called optical isomers and the phenomenon is called optical isomerism.</li> <li>Some substances have the ability to rotate the plane polarised light either to the right (clockwise) <i>i.e.</i>, dextrorotatory or to the left (anticlockwise) <i>i.e.</i>, laevorotatory are optically active substances and the property is called optical activity.</li> <li>In order to exhibit optical activity, an object must be chiral.</li> <li>The compound is said to have chirality if the central carbon atom is attached to four different groups and this centre is called chiral (asymmetric) centre or stereogenic centre or stereocentre.</li> <li>If the central carbon atom has at least two identical groups then this centre is called achiral (symmetric) centre.</li> <li>If molecule has a plane of symmetry, it is achiral and if molecule has no plane of symmetry, it is chiral.</li> <li>Enantiomers or <i>d</i>- and <i>l</i>-isomers are the optical isomers which are non-superimposable mirror images (or dissymmetric). Equimolecular mixture of <i>d</i>- and <i>l</i>-forms is known as racemic mixture (<i>dl</i>-form). This is optically inactive due to external compensation.</li> <li>Diastereomers are the optical isomers which are not mirror images of each other. They have different physical properties and magnitude of specific rotation.</li> <li>Meso compounds are those compounds which have two or more even number of chiral carbon atoms and have an internal plane of symmetry. They are optically inactive due to internal compensation.</li> </ul>	

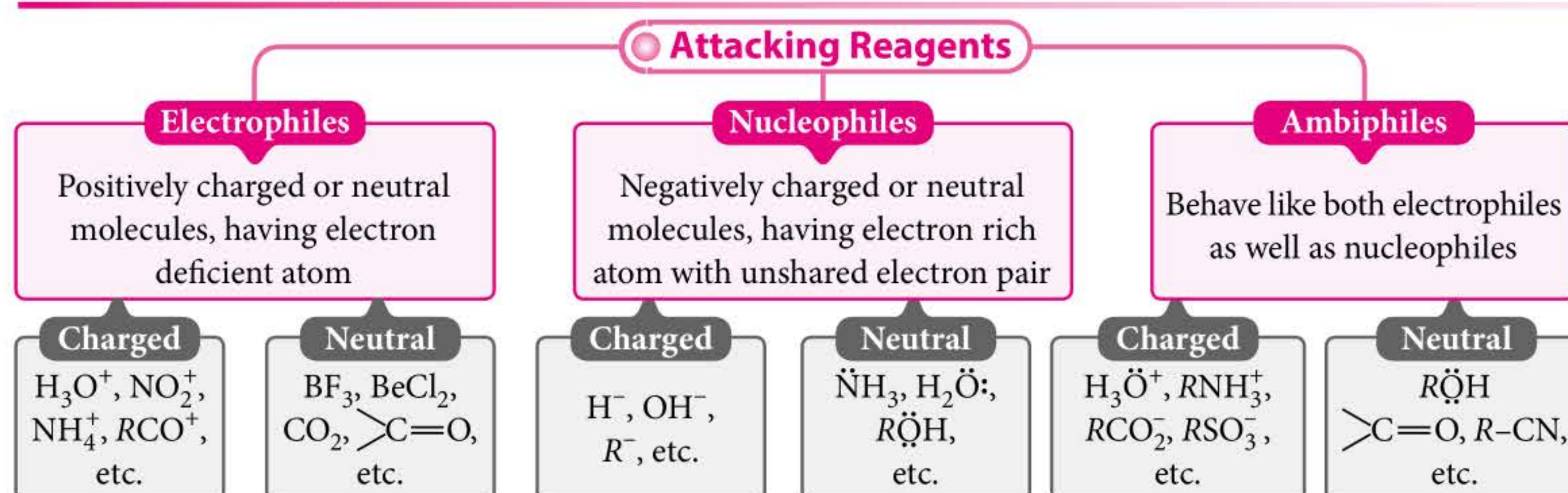
## FUNDAMENTAL CONCEPTS IN REACTION MECHANISM

### Reaction Intermediates

Intermediates	Definition	Hybridisation of carbon and shape	Stability order
<b>Carbocation</b> : Formed by heterolytic cleavage of the covalent bond in which the leaving group takes away the shared pair of electrons.	Carbon species carrying positive charge on carbon.	$sp^2$ -Hybridised carbon and trigonal planar shape.	$3^\circ > 2^\circ > 1^\circ$
<b>Carbanion</b> : Formed by heterolytic cleavage of the covalent bond in which the shared pair of electrons remains with the carbon atom.	Carbon species carrying negative charge on carbon.	$sp^3$ -Hybridised carbon and pyramidal shape.	$1^\circ > 2^\circ > 3^\circ$

<b>Free radical</b> : Formed by homolytic cleavage of a covalent bond.	Atom or group of atoms having odd or unpaired electrons.	$sp^2$ -Hybridised carbon and trigonal planar shape.	$3^\circ > 2^\circ > 1^\circ$
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## ATTACKING REAGENTS



## ELECTRON DISPLACEMENT EFFECTS IN COVALENT BOND

<p><b>Inductive effect</b> : Displacement of <math>\sigma</math>-electrons along a saturated carbon chain when an electron donating (+I effect) or electron withdrawing (-I effect) group is attached at the end of the carbon chain.</p>	<ul style="list-style-type: none"> <li>• <b>-I effect</b> : <math>R_3\overset{+}{N}-</math>, <math>-NO_2</math>, <math>-SO_2R</math>, <math>-CN</math>, <math>-COOH</math>, <math>-F</math>, <math>-Cl</math>, <math>-Br</math>, <math>-I</math>, <math>-OR</math>, <math>-COR</math>, <math>-OH</math>, <math>-C_6H_5</math>, <math>-CH=CH</math>, etc.</li> <li>• <b>+I effect</b> : <math>(CH_3)_3C-</math>, <math>(CH_3)_2CH-</math>, <math>CH_3CH_2-</math>, <math>CH_3-</math>, <math>-COO^-</math>, etc.</li> </ul>
<p><b>Electromeric effect</b> : It involves complete transfer of <math>\pi</math>-electrons of a multiple bond towards one of the bonded atoms in the presence of an attacking reagent.</p>	<ul style="list-style-type: none"> <li>• <b>+E effect</b> : When electron transfer takes place towards the atom to which the attacking reagent gets attached.</li> <li>• <b>-E effect</b> : When electron transfer takes place away from the atom to which the attacking reagent gets attached.</li> </ul>
<p><b>Resonance or mesomeric effect</b> : It is defined as the polarity produced in the molecule by the interaction of two <math>\pi</math>-bonds or between a <math>\pi</math>-bond and a lone pair of electrons present on adjacent atom.</p>	<ul style="list-style-type: none"> <li>• <b>+R effect</b> : <math>-Cl</math>, <math>-Br</math>, <math>-I</math>, <math>-NH_2</math>, <math>-NHR</math>, <math>-NR_2</math>, <math>-NHCOR</math>, <math>-OH</math>, <math>-OR</math>, <math>-SR</math>, <math>-SH</math>, <math>-OCH_3</math>, <math>-OCOR</math>, etc.</li> <li>• <b>-R effect</b> : <math>-NO_2</math>, <math>-CN</math>, <math>-CHO</math>, <math>-COOH</math>, <math>-COR</math>, etc.</li> </ul>
<p><b>Hyperconjugation</b> : It involves delocalisation of <math>\sigma</math>-electrons of C—H bond of an alkyl group directly attached to an atom of unsaturated system or to an atom having vacant <math>p</math>-orbital.</p>	<ul style="list-style-type: none"> <li>• For an alkyl group attached to unsaturated system, it decreases with decrease in number of <math>\alpha</math>-hydrogens : <math>CH_3- &gt; CH_3CH_2- &gt; (CH_3)_2CH- &gt; (CH_3)_3C-</math></li> </ul>

## METHODS OF PURIFICATION OF ORGANIC COMPOUNDS

Method	Used for separating	Examples
Crystallisation	Mixtures with difference in the solubility of the organic compound and its impurities in a solvent.	<ul style="list-style-type: none"> <li>• Sugar with impurity of common salt can be crystallised from hot ethanol at 348 K (sugar dissolves but salt does not).</li> <li>• Benzoic acid and naphthalene from hot water (benzoic acid dissolves but naphthalene does not).</li> </ul>

Sublimation	Mixtures of sublimable volatile compounds and non-sublimable impurities.	<ul style="list-style-type: none"> <li>Purification of camphor, anthracene, naphthalene, benzoic acid, etc.</li> </ul>
Simple distillation	Mixtures of liquids having sufficient difference in their boiling points and contain non-volatile impurities.	<ul style="list-style-type: none"> <li>Chloroform (b.pt. 334 K) and aniline (b.pt. 457 K).</li> <li>Ether (b.pt. 308 K) and toluene (b.pt. 384 K).</li> </ul>
Fractional distillation	Mixtures of two or more miscible liquids which have b.pt. close to each other.	<ul style="list-style-type: none"> <li>Acetone (b.pt. 329 K) and methyl alcohol (b.pt. 338 K).</li> <li>Benzene (b.pt. 353 K) and toluene (b.pt. 383 K).</li> </ul>
Steam distillation	Mixtures of substances which are (i) volatile in steam, (ii) not miscible with water, (iii) possess a vapour pressure of about 10-15 mm of Hg, and (iv) contain non-volatile impurities.	<ul style="list-style-type: none"> <li>Aniline and water.</li> <li>Purification of nitrobenzene, <i>o</i>-nitrophenol, bromobenzene, etc.</li> </ul>
Azeotropic distillation	Mixtures with constant boiling points <i>i.e.</i> , azeotropic mixtures.	<ul style="list-style-type: none"> <li>Ethanol and water in ratio 95.87 : 4.13.</li> </ul>
Vacuum distillation	Mixtures of high boiling liquids which decompose at or below their boiling points.	<ul style="list-style-type: none"> <li>Glycerol from spent-lye in soap industry (at 453 K under 12 mm Hg).</li> <li>Concentration of sugarcane juice.</li> </ul>
Chromatography	Mixtures with difference in the rates at which the components of the mixture move through a porous medium.	<ul style="list-style-type: none"> <li><i>ortho</i> and <i>para</i> nitroaniline.</li> <li>Blue and red dyes.</li> <li>Plant pigments and other natural products.</li> </ul>
Differential extraction	Mixtures of organic compounds from their aqueous solutions using a solvent that should (i) be immiscible with water, (ii) dissolve the organic compound.	<ul style="list-style-type: none"> <li>Benzoic acid from its aqueous solution using benzene.</li> </ul>

## QUALITATIVE ANALYSIS OF ORGANIC COMPOUNDS

Element	Detection	Confirmatory test	Reaction
Carbon	Copper(II) oxide test $2\text{CuO} + \text{C} \xrightarrow{\Delta} 2\text{Cu} + \text{CO}_2\uparrow$	$\text{CO}_2$ gas turns lime water milky.	$\text{CO}_2 + \text{Ca(OH)}_2 \rightarrow \text{CaCO}_3\downarrow + \text{H}_2\text{O}$ Lime water      Milkiness
Hydrogen	$\text{CuO} + 2\text{H} \xrightarrow{\Delta} \text{Cu} + \text{H}_2\text{O}$	Water droplets appear on the cooler part of the ignition tube and also turns anhydrous $\text{CuSO}_4$ blue.	$\text{CuSO}_4 + 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ White                                      Blue
Nitrogen	Lassaigne's extract (L.E.) $\text{Na} + \text{C} + \text{N} \xrightarrow{\Delta} \text{NaCN}$ (L.E.)	L.E. + $\text{FeSO}_4$ + $\text{NaOH}$ , boil and cool + $\text{FeCl}_3$ + conc. $\text{HCl}$ → blue or green colour.	$\text{FeSO}_4 + 2\text{NaOH} \rightarrow \text{Fe(OH)}_2 + \text{Na}_2\text{SO}_4$ $\text{Fe(OH)}_2 + 6\text{NaCN} \rightarrow \text{Na}_4[\text{Fe(CN)}_6] + 2\text{NaOH}$ $3\text{Na}_4[\text{Fe(CN)}_6] + 4\text{FeCl}_3 \rightarrow \text{Fe}_4[\text{Fe(CN)}_6]_3 + 12\text{NaCl}$ Prussian blue


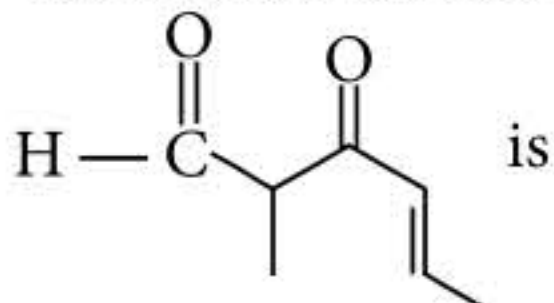
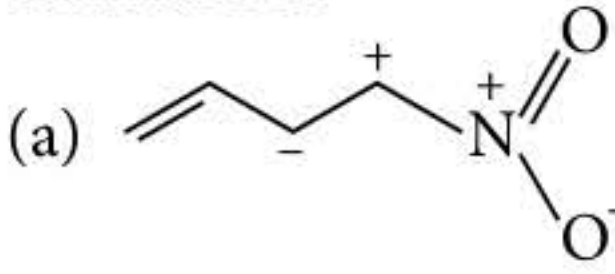
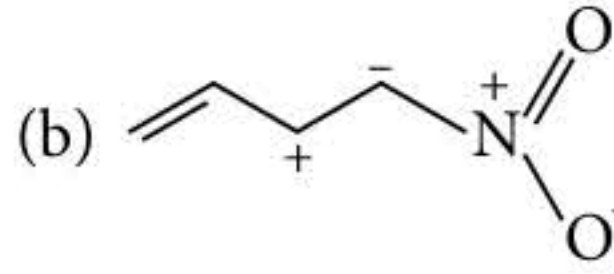
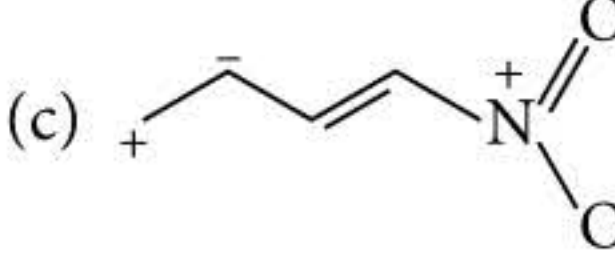
Sulphur	$2\text{Na} + \text{S} \xrightarrow{\Delta} \text{Na}_2\text{S}$ (L.E.)	<ul style="list-style-type: none"> <li>L.E. + sodium nitroprusside → deep violet colour.</li> <li>L.E. + <math>\text{CH}_3\text{COOH} + (\text{CH}_3\text{COO})_2\text{Pb}</math> → black ppt.</li> </ul>	$\text{Na}_2\text{S} + \text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}] \rightarrow$ Sodium nitroprusside $\text{Na}_4[\text{Fe}(\text{CN})_5\text{NOS}]$ Deep violet $\text{Na}_2\text{S} + (\text{CH}_3\text{COO})_2\text{Pb} \xrightarrow{\text{CH}_3\text{COOH}} \text{PbS}\downarrow + 2\text{CH}_3\text{COONa}$ Black ppt.
Halogens	$\text{Na} + \text{X} \xrightarrow{\Delta} \text{NaX}$ (L.E.)	L.E. + $\text{HNO}_3 + \text{AgNO}_3$ , if <ul style="list-style-type: none"> <li>white ppt. soluble in aq. <math>\text{NH}_3</math> (or <math>\text{NH}_4\text{OH}</math>) confirms Cl.</li> <li>dull yellow ppt. partially soluble in aq. <math>\text{NH}_3</math> (or <math>\text{NH}_4\text{OH}</math>) confirms Br.</li> <li>yellow ppt. insoluble in aq. <math>\text{NH}_3</math> (or <math>\text{NH}_4\text{OH}</math>) confirms I.</li> </ul>	$\text{NaX} + \text{AgNO}_3 \xrightarrow{\text{HNO}_3} \text{AgX}\downarrow$ ppt. $\text{AgCl} + 2\text{NH}_3(\text{aq.}) \rightarrow [\text{Ag}(\text{NH}_3)_2]\text{Cl}$ White ppt. Soluble $\text{AgBr} + 2\text{NH}_3(\text{aq.}) \rightarrow [\text{Ag}(\text{NH}_3)_2]\text{Br}$ Dull yellow ppt. Partially soluble $\text{AgI} + 2\text{NH}_3(\text{aq.}) \rightarrow [\text{Ag}(\text{NH}_3)_2]\text{I}$ Yellow ppt. Insoluble
Nitrogen and sulphur together	$\text{Na} + \text{C} + \text{N} + \text{S} \xrightarrow{\Delta} \text{NaSCN}$ Sodium thiocyanate (L.E.)	As in test for nitrogen; instead of green or blue colour, blood red colouration confirms presence of N and S both.	$\text{NaSCN} + \text{FeCl}_3 \rightarrow [\text{Fe}(\text{SCN})]\text{Cl}_2 + \text{NaCl}$ Blood red colour
Phosphorus	$\text{P} \xrightarrow[\Delta]{\text{Na}_2\text{O}_2, \text{boil}} \text{Na}_3\text{PO}_4$	Solution is boiled with nitric acid and then treated with ammonium molybdate $(\text{NH}_4)_2\text{MoO}_4$ . Formation of yellow ppt. indicates the presence of phosphorus in organic compound.	$\text{Na}_3\text{PO}_4 + 3\text{HNO}_3 \rightarrow \text{H}_3\text{PO}_4 + 3\text{NaNO}_3$ $\text{H}_3\text{PO}_4 + 12(\text{NH}_4)_2\text{MoO}_4 + 21\text{HNO}_3 \rightarrow (\text{NH}_4)_3\text{PO}_4 \cdot 12\text{MoO}_3 + 21\text{NH}_4\text{NO}_3 + 12\text{H}_2\text{O}$ Ammonium phosphomolybdate (yellow ppt.)

## QUANTITATIVE ANALYSIS OF ORGANIC COMPOUNDS

Element	Method
Carbon and Hydrogen	<b>Liebig's combustion method :</b> $\% \text{ of C} = \frac{12}{44} \times \frac{\text{mass of CO}_2 \text{ formed}}{\text{mass of compound taken}} \times 100$ $\% \text{ of H} = \frac{2}{18} \times \frac{\text{mass of H}_2\text{O formed}}{\text{mass of compound taken}} \times 100$
Nitrogen	<b>Dumas method :</b> $\% \text{ of N} = \frac{28}{22400} \times \frac{\text{vol. of N}_2 \text{ at STP}}{\text{mass of compound taken}} \times 100$ <b>Kjeldahl's method :</b> $\% \text{ of N} = \frac{1.4 \times \text{molarity of acid} \times \text{vol. of acid used} \times \text{basicity of acid}}{\text{mass of compound taken}}$

Halogens	<b>Carius method :</b> $\% \text{ of } X = \frac{\text{At. mass of } X}{108 + \text{At. mass of } X} \times \frac{\text{mass of AgX formed}}{\text{mass of compound taken}} \times 100$
Sulphur	<b>Carius method :</b> $\% \text{ of S} = \frac{32}{233} \times \frac{\text{mass of BaSO}_4 \text{ formed}}{\text{mass of compound taken}} \times 100$
Phosphorus	<b>Ignition method :</b> $\% \text{ of P} = \frac{62}{222} \times \frac{\text{mass of Mg}_2\text{P}_2\text{O}_7 \text{ formed}}{\text{mass of compound taken}} \times 100$
Oxygen	<b>Iodine method :</b> $\% \text{ of O} = \frac{16}{44} \times \frac{\text{mass of CO}_2 \text{ formed}}{\text{mass of compound taken}} \times 100 \quad \text{or} \quad \% \text{ of O} = \frac{5 \times 16}{2 \times 127} \times \frac{\text{mass of I}_2 \text{ formed}}{\text{mass of compound taken}} \times 100$

# SPEED PRACTICE

- In Lassaigne's test for nitrogen, the blue colour is due to the formation of
  - ferric ferrocyanide
  - potassium ferrocyanide
  - sodium ferrocyanide
  - sodium cyanide.
- The IUPAC name of the compound  is
  - 3,4-dimethyl-1-penten-3-ol
  - isopropyl-3-methylvinylcarbinol
  - 2,3-dimethyl-4-penten-3-ol
  - none of the above.
- The number of structural isomers for  $C_6H_{14}$  is
  - 3
  - 4
  - 5
  - 6
- The IUPAC name of the compound  is
  - 5-formylhex-2-en-3-one
  - 5-methyl-4-oxohex-2-en-5-al
  - 3-keto-2-methylhex-5-enal
  - 3-keto-2-methylhex-4-enal. (NEET 2017)
- The Lassaigne's extract is boiled with conc.  $HNO_3$  while testing for halogens. Because it
  - decomposes  $Na_2S$  and  $NaCN$ , if formed
  - helps in the precipitation of  $AgCl$
  - increases the solubility product of  $AgCl$
  - increases the concentration of  $NO_3^-$  ions.
- Hyperconjugation is most useful for stabilising which of the following carbocations?
  - Neopentyl
  - tert*-Butyl
  - Isopropyl
  - Ethyl
- Which of the following statements is not true about partition chromatography?
  - Mobile phase can be a gas or liquid.
  - Separation depends upon equilibration of solute between a mobile and a stationary phase.
  - Stationary phase is a finely divided solid adsorbent.
  - None of the above.
- The less reactivity of chlorine atom in,  $CH_2=CH-Cl$  is due to
  - inductive effect
  - resonance stabilisation
  - electromeric effect
  - electronegativity.
- Among the following, the least stable resonance structure is
  - 
  - 
  - 
  - 