THE P-BLOCK ELEMENTS

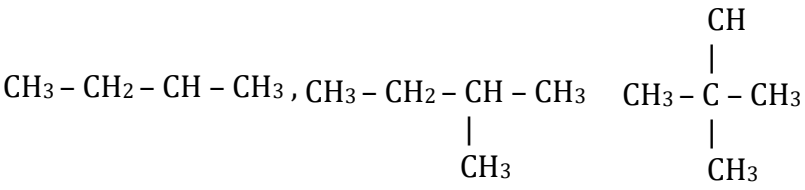
CLASSIFICATION OF ORGANIC COMPOUNDS

❖ **Classification Of Organic Compounds**

Aliphatic or Open chain compounds

Those compounds in which first & last carbon are not connected with each other. Branched or unbranched chains are possible in these compounds.

For example:



Unbranched Branched

There are two varieties in the compounds: -

Saturated Hydrocarbons

(a) In such type, adjacent carbon is attached with single bonds.

Example: $CH_3 - CH_2 - CH_3$

(b) General formula of these compounds is C_nH_{2n+2}

(c) These are also called as paraffins (Parum + Affine i.e., little reactivity) because these are less reactive due to absence of π-bonds.

Unsaturated Hydrocarbons

(a) There will be a double bond or a triple bond between any two carbon atoms,

$CH_2 = CH - CH_3$ Propene

$CH \equiv C - CH_3$ Propyne

(b) General formula is C_nH_{2n} or $C_n H_{2n-2}$

(c) These are also called as olefins because they react with halogens to form oily substances olefins (Oleum + fines i.e., Oil forming).

(d) Due to presence of πbonds these are more reactive.

Closed chain compounds

In these compounds first & last carbon are attached with each other.

Example:

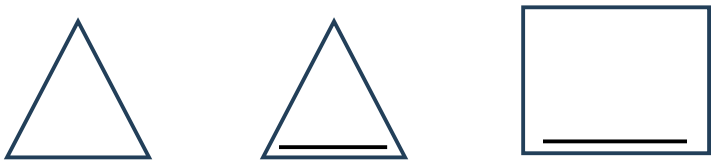
Cyclopropane.

Homocyclic compounds

These are the compounds in which the complete ring is formed by carbon atoms only. These are also of two types

(A) **Alicyclic compounds:** These are the compounds having the properties like aliphatic compounds.

These may be saturated or unsaturated like aliphatic compounds.



cyclopropane cyclopropane cyclobutene

(B) **Aromatic compounds:** Conditions for a compound to be aromatic:

(i) Compound should be cyclic.

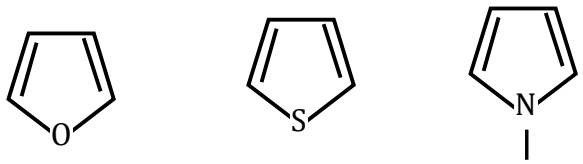
(ii) Compound should be planar. (All carbon in ring should be sp^2 hybridized)

(iii) It allows Huckers' Rule: - $(4n + 2)$ π electrons. (Odd number of π electron pairs)

n = 0	2π electrons	or 1 pair
n = 1	6 π electrons	or 3 pairs
n = 2	10 π electrons	or 5 pairs
n = 3	14 π electrons	or 7 pairs

Heterocyclic Compounds

These are cyclic compounds having ring and rings buildup of more than one kind of atoms.



Furam Thiophene Pyrrole

Normal Groups

(a) It is represented by 'n':

(b) Straight chain of carbon atoms is known as normal group.

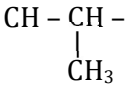
(c) Free bond will come either on I[st] carbon atom or on last carbon atom.

n- propyl $CH_3– CH_2– CH_2 –$

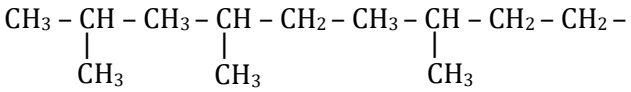
n - butyl $CH_3– CH_2– CH_2 – CH_2 –$

Iso group

(a) It is represented by following structure



(b) When methyl groups are attached to the second last carbon atom, group is named as iso.



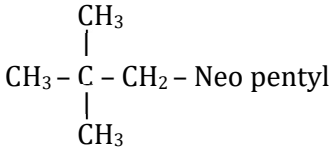
Iso Propyl Iso butyl Isopentyl

Neo group

(a) When two methyl group are attached to second last carbon atom group is named neo group.

(b) It is represented by following structure:

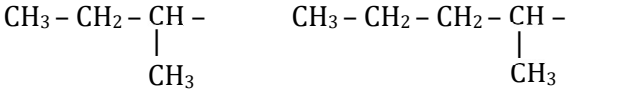
for example



Secondary group

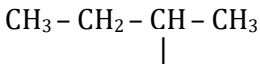
(a) When two alkyl groups attached to the same carbon atom, group is named as secondary.

Ex.



Secondary butyl Active Secondary pentyl

(b) It is represented by following structure.

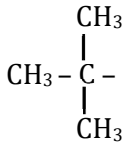


Tertiary group

(a) When three alkyl groups (similar or dissimilar) are attached to the same carbon atom, group is name as tertiary.

Tertiary butyl Tertiary pentyl

(b) It is represented by following structure:



Groups

When a hydrogen is removed from saturated hydrocarbon then alkyl group is formed. It is represented by R & its general formula is C_nH_{2n+1}. A bond is vacant on alkyl group, on which any functional group may come.

Alkyl groups

Alkane $\xrightarrow{-H}$ **Alkyl (monovalent radical)** $\xrightarrow{-H}$ **Bivalent radical** $\xrightarrow{-H}$ **Trivalent radical**

$CH_4 \rightarrow -CH_3$ Methyl $\quad C_2H_6 \rightarrow -C_2H_5$ Ethyl

$CH_3–CH_2–CH_3$
Propane

(i) $CH_3–CH_2–CH_2–$ n-Propyl

(ii) $CH_3–\underset{|}{CH}–CH_3$ Iso-Propyl

$CH_3–CH_2–CH_2–CH_3$
Butane

(i) $CH_3–CH_2–CH_2–CH_2–$ n-butyl

(ii) $CH_3–CH_2–\underset{|}{CH}–CH_3$ Sec-butyl

$CH_3–\underset{\underset{CH_3}{|}}{CH}–CH_3$
Isobutane

(i) $CH_3–\underset{\underset{CH_3}{|}}{CH}–CH_2–$ Isobutyl

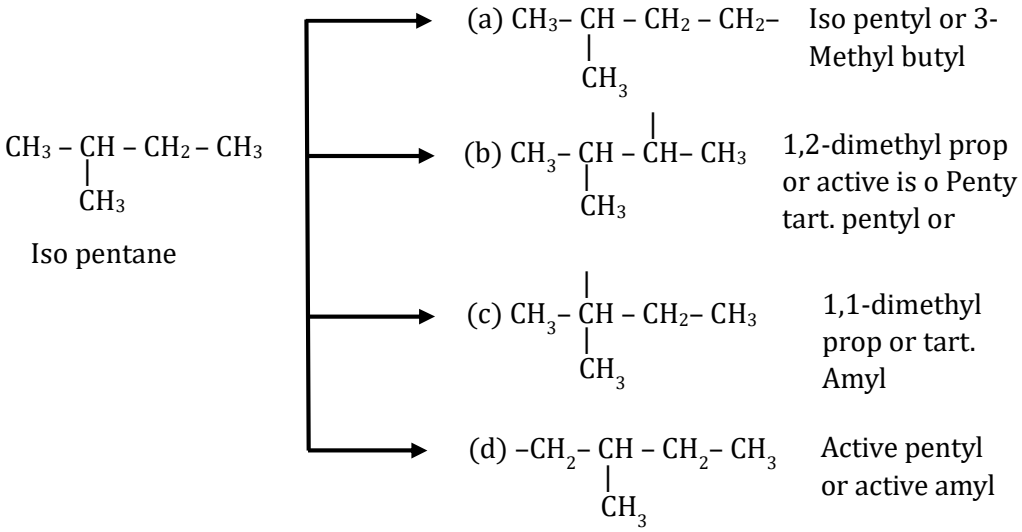
(ii) $CH_3–\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}–CH_3$ Tart. -butyl

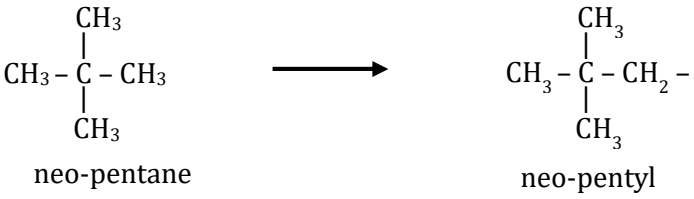
$CH_3CH_2CH_2CH_3$
n – Pentane

(a) $CH_3–CH_2–CH_2–CH_2–CH_2–$ n-pentyl

(b) $CH_3–CH_2–CH_2–\underset{|}{CH}–CH_3$ Active sec. pentyl

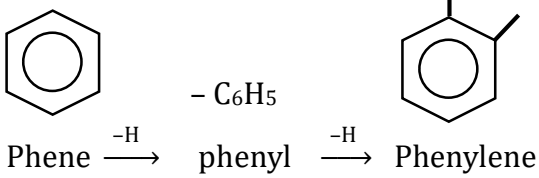
(c) $CH_3–CH_2–\underset{|}{CH}–CH_2–CH_3$ 1-Ethyl propyl or sec. pentyl



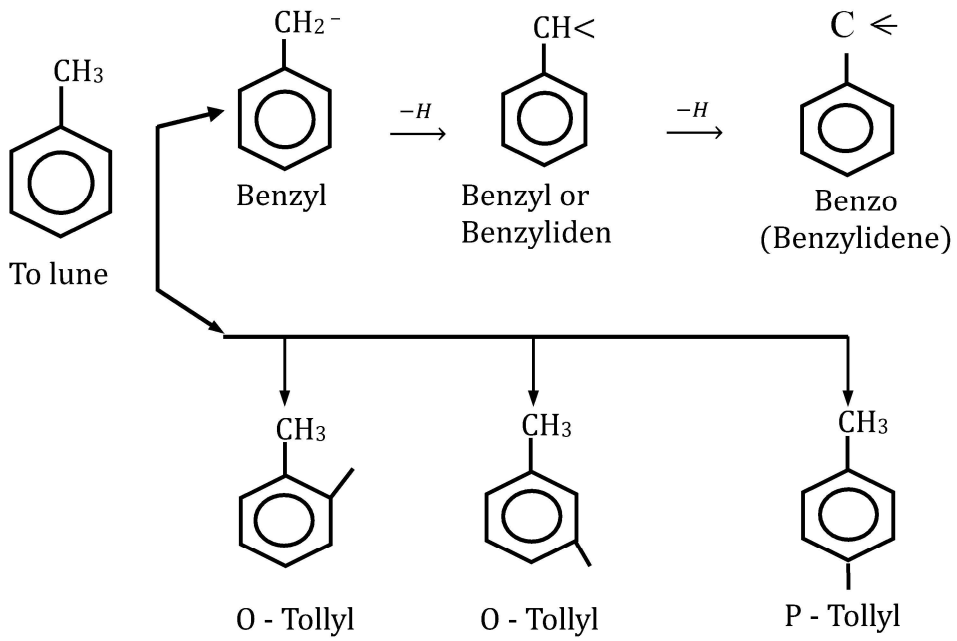


Aryl Radical

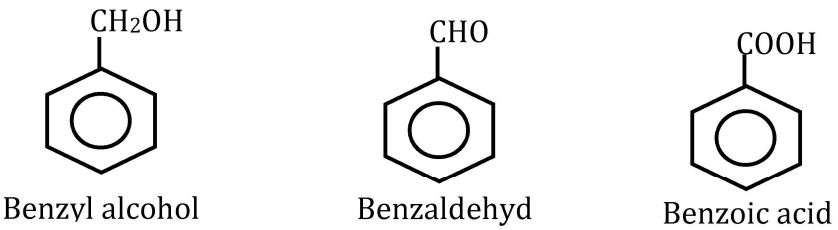
(i)



(ii)


CH3
To lune
CH2 –
Benzyl
–H
CH<
Benzyl or
Benzyliden
–H
C <
Benzo
(Benzylidene)
CH3
O - Tollyl
CH3
O - Tollyl
CH3
P - Tollyl

Ex.


CH2OH
Benzyl alcohol
CHO
Benzaldehyd
COOH
Benzoic acid