Polynuclear Hydrocarbons

- The aromatic hydrocarbons in which two or more than two benzene nuclei are present, called polynuclear hydrocarbons.
- They can be of two types –

A. Fused or Condensed polynuclear hydrocarbons

The polynuclear hydrocarbons in which two or more benzene rings involved in the system are fused to each other i.e. have atleast two C atoms in common, joining the two nuclei together are called fused or condensed polynuclear hydrocarbons.



B. Isolated polynuclear hydrocarbons

The polynuclear hydrocarbons in which two or more benzene rings involved in the system and separated by at least one single bond are called isolated polynuclear hydrocarbons.



Biphenyl diphenyl



Diphenyl methane



Triphenyl methane

NAPHTHALENE



• Naphthalene is the first member of condensed polynuclear hydrocarbon in which two benzene rings are fused at each other at *ortho* position.

Nomenclature



Various positions in naphthalene ring system are indicated either by numbering or by designating them with Greek letters α , β . Position 1,4,5,8 are identical. Position 2,3,6,7 are also identical. Position 9 and 10 are given for angular C without using Greek letters.

$$\alpha = 1,4,5,8$$

 $\beta = 2,3,6,7$

Eg.



Method of Preparation

1. Haworth's Reaction

It involve mainly four types of reaction-

- a) Friedel craft acylation of benzene
- b) Clemmensen's reduction
- c) Ring closure
- d) Aromatization



2. Dealkylation :



Chemical Properties

- 1. Naphthalene is cyclic, planar and aromatic compound because it follow huckels rule $(10\pi e^{-})$, n=2.
- 2. Resonating structure: There are three structure





Resonance Hybrid

3. Electrophilic Substitution reaction (due to the aromatic compound)

Attack at a position



more stable (benzene ring undamaged

Attack at β position



- The α attack by an electrophile gives intermediate carbocation, which is a resonance hybrid of 7 structures (I to VII) with favour more stable structure (I, II, VI,VII) in which one benzene ring is intact (undamaged).
- The β attack gives an intermediate carbocation with few resonance structure (I to V) with only two more stable structures (I, V), in which one benzene ring is intact (undamaged).
- Therefore α attack with more contributing and more stable structures will be favoured than β substitution with few contributing and less stable structures.

Eg.





4. Addition reaction

At the presence of different reducing agents



5. Oxidation:

At the presence of different oxidizing agent,





1) **Naphthols:** Monohydroxy naphthalene (α and β naphthol)



 α naphthol- used in molisch test for carbohydrate

- Dye intermediate
 - β naphthol- dye intermediates

* β naphthol ethers, specially methyl and ethyl ethers, k/a **Nerolines** are used in perfumes.

ii)) Naphthylamine



In manufacturing of dyes

iii) Naphthaquinones

