16. Aromatic Compounds

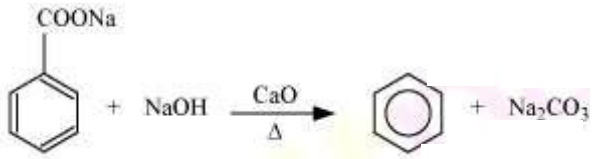
Aromatic hydrocarbon:

Aromaticity

1. Planarity
2. Complete delocalization of the electrons in the ring
3. Huckel rule → Presence of $(4n + 2)\pi$ electrons in the ring (n = 0, 1, 2…)

- **Preparation of benzene**

1. Cyclic polymerization of ethyne
2. Decarboxylation of aromatic acids

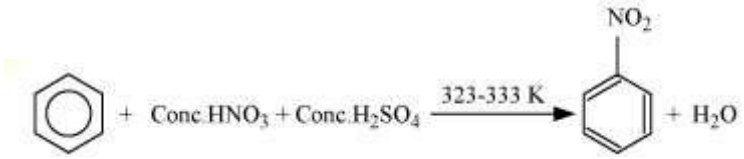


- **Physical properties**

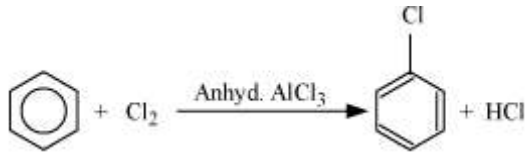
  Immiscible with water but readily miscible with organic solvents

- **Chemical properties**

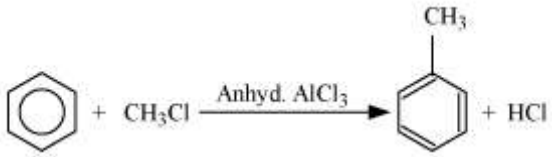
1. Electrophilic substitution
2. Nitration



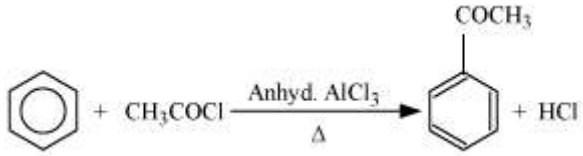
3. Halogenation



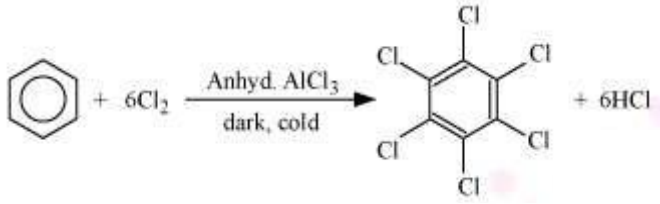
4. Friedel-Crafts alkylation



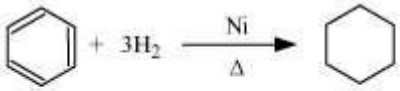
5. Friedel-Crafts acylation

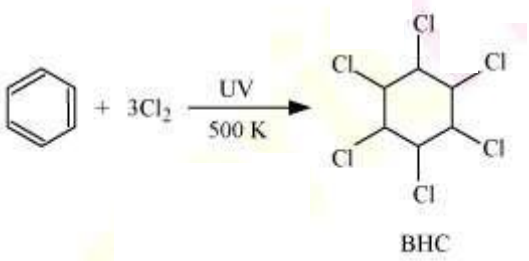


6. On treatment with excess of chlorine



7. Addition reaction





BHC

- **Directive influence of functional group in benzene ring**

1. Ortho and para directing groups:

$$–OH, –NH_2, –NHR, –NHCOCH_3, –OCH_3, –CH_3, –C_2H_5$$

2. Meta directing groups:

$$–NO_2, –CN, –CHO, –COR, –COOH, –COOR, –SO_3H$$

- **Carcinogenicity and toxicity**

Benzene and polynuclear hydrocarbons containing more than two benzene rings are toxic and can cause cancer