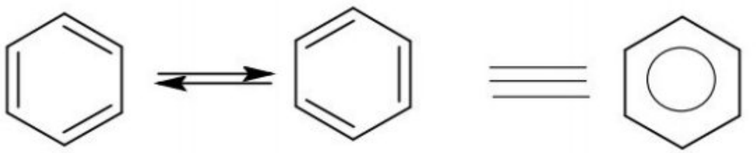
Aromatic Hydrocarbons

- Originally called **aromatic** due to fragrant odors, although this definition seems inaccurate as many products posses distinctly non-fragrant smells!
- Currently a compound is said to be aromatic if it has ***benzene-like in its properties***.



- Their properties differ markedly from those of aliphatic hydrocarbons.

Aromatic hydrocarbons undergo electrophilic substitution whereas **aliphatic hydrocarbons** undergo electrophilic addition to double and triple bonds and free radical substitution.

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The Structure of Benzene Ring

- **Benzene** is the ***parent hydrocarbon of aromatic compounds***, because of their special chemical properties.
- Today a compound is said to be **aromatic** if it is ***benzene-like in its properties***.

Structure of Benzene

- Molecular formula = C_6H_6

  The carbon-to-hydrogen ratio in benzene, suggests a ***highly unsaturated structure.***

- *Benzene reacts mainly by* ***substitution***.

  It does not undergo the typical addition reactions of alkenes or alkynes.

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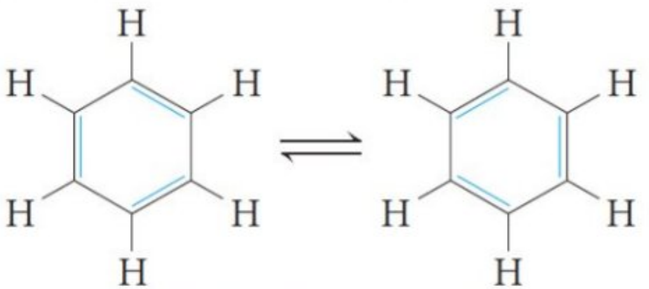
The Structure of Benzene Ring

- **Kekulé structure for benzene.**
  - *He suggested that six carbon atoms are located at the corners of* ***a regular hexagon****, with one hydrogen atom attached to each carbon atom.*
  - *He suggested that* ***single and double bonds alternate*** *around the ring (conjugated system of double bonds).*
  - *Kekulé suggested that the single and double bonds exchange positions around the ring so rapidly that the typical reactions of alkenes cannot take place.*



the Kekulé structures for benzene

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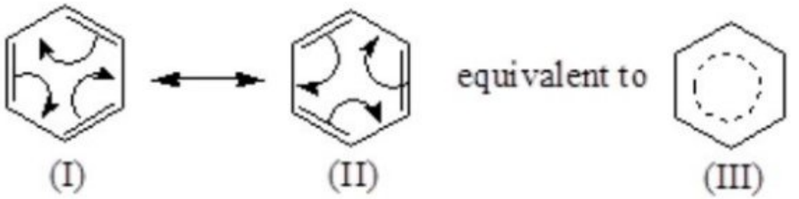
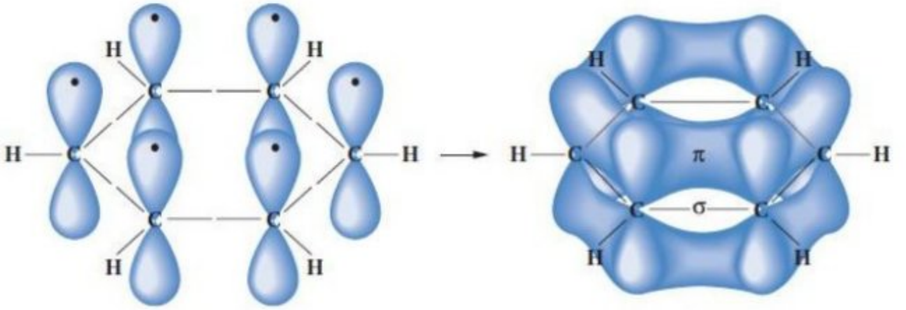
The Structure of Benzene Ring

- ***Resonance Model for Benzene.***



- *Benzene is planar.*
- *All of the carbon–carbon bond lengths are identical*: 1.39 A°, intermediate between typical *single (1.54A°)* and *double (1.34 A°)* carbon–carbon bond lengths.
- Each carbon is therefore *sp2-hybridized*.
- Bond angles of 120°.



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