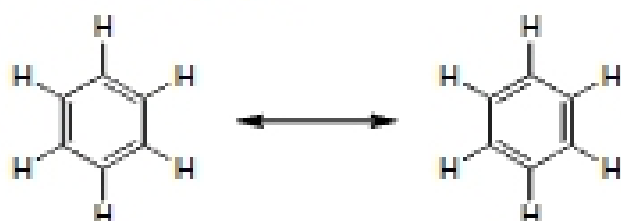


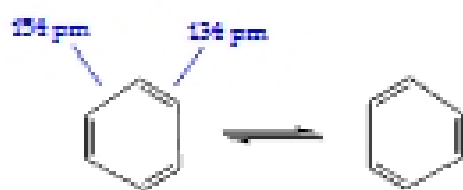
Chapter 11: Arenes and Aromaticity

11.1: Benzene - C_6H_6



11.2: Kekulé and the Structure of Benzene

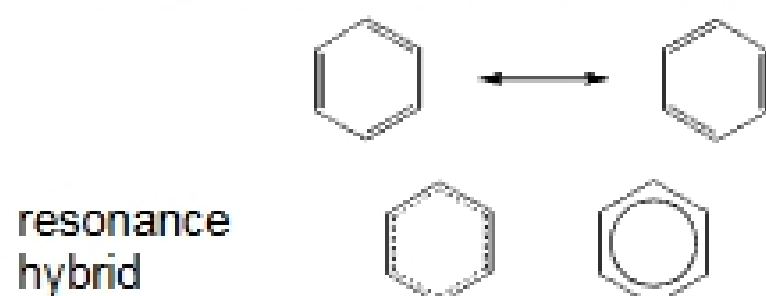
Kekulé benzene: two forms are in rapid equilibrium



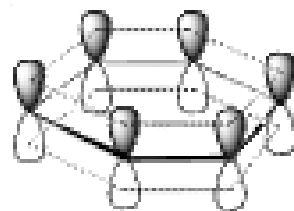
- All bonds are 140 pm (intermediate between C-C and C=C)
- C-C-C bond angles are 120°
- Structure is planar, hexagonal

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11.3: A Resonance Picture of Bonding in Benzene



6 π -electron delocalized over 6 carbon atoms



11.4: The Stability of Benzene

Aromaticity: cyclic conjugated organic compounds such as benzene, exhibit special stability due to resonance delocalization of π -electrons.

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Heats of hydrogenation (Fig. 11.2, p. 425)



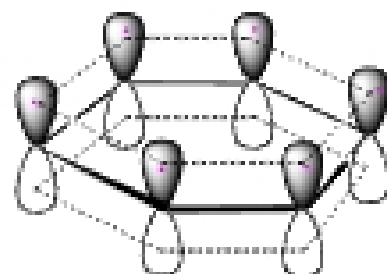
1,3,5-Hexatriene - conjugated but not cyclic

Resonance energy of benzene is 129 - 152 KJ/mol

247

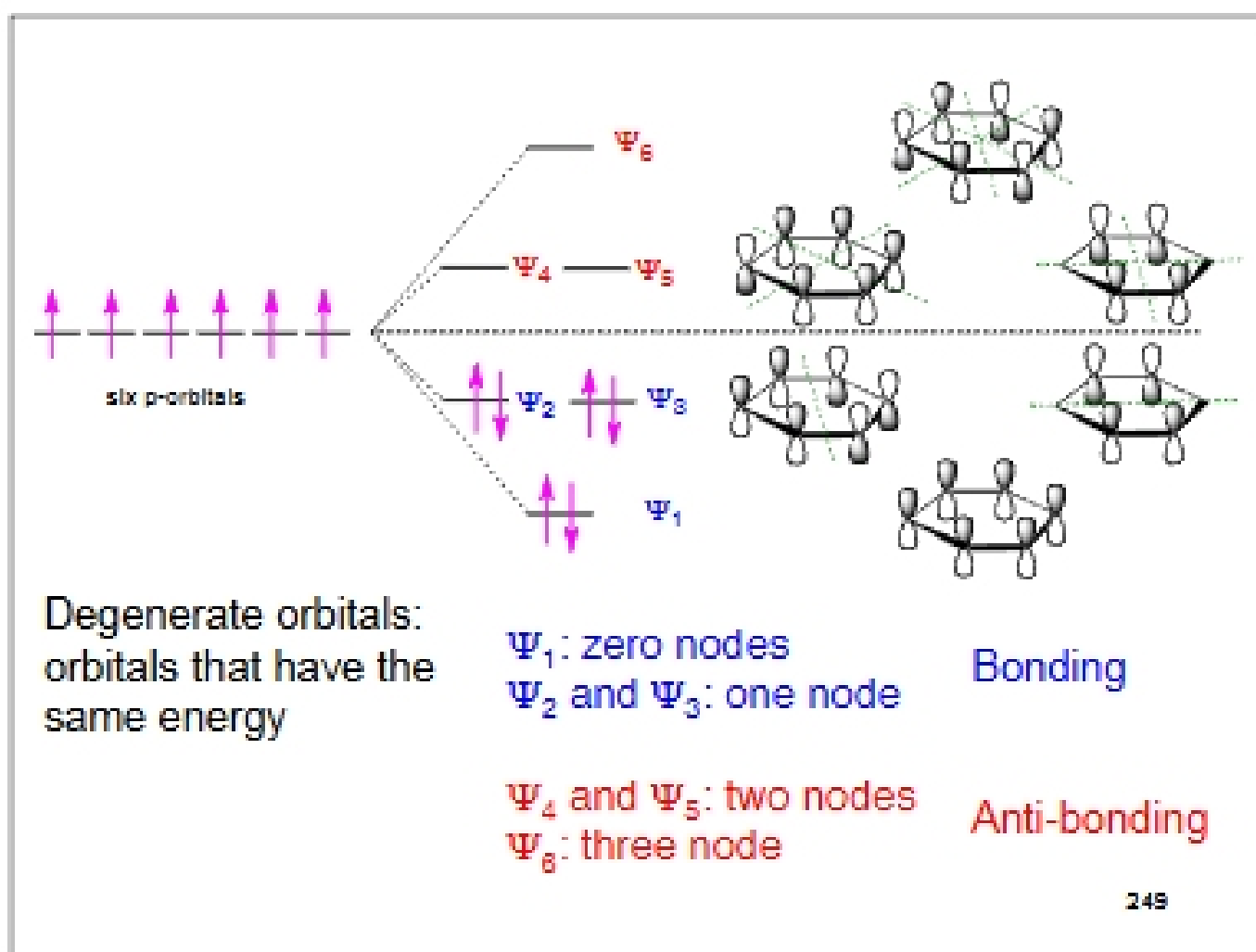
11.5: An Orbital Hybridization View of Bonding in Benzene

- Benzene is a planar, hexagonal cyclic hydrocarbon
- The C-C-C bond angles are 120° = sp^2 hybridized
- Each carbon possesses an unhybridized p-orbital, which makes up the conjugated π -system.
- The six π -electrons are delocalized through the π -system



11.6: The π Molecular Orbitals of Benzene - the aromatic system of benzene consists of six p-orbitals (atomic orbitals). Benzene must have six molecular orbitals.

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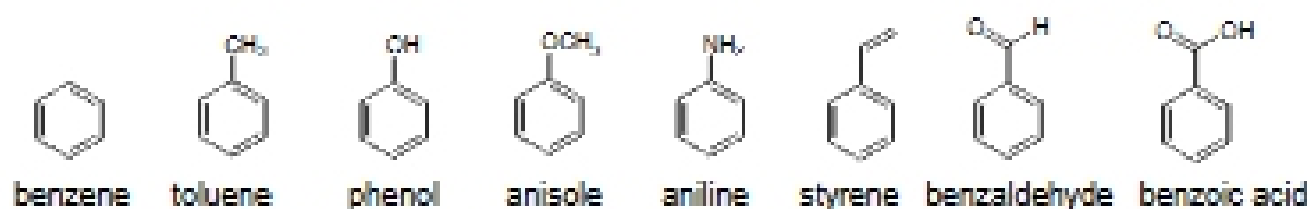


11.7: Substituted Derivatives of Benzene and Their Nomenclature

Generally, mono-substituted benzenes are named in a similar manner as hydrocarbons with -benzene as the parent name



large number of non-systematic names that can serve as the parent name (Table 11.1)



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