

## Chapter 9. Benzene and Derivatives

### Learning objectives:

1. Name benzene derivatives.
2. Recognize aromatic compounds using Huckel's criteria.
3. Explain the trend for the acidity of substituted phenol using the concept of electron-donating and electron-withdrawing groups, and inductive and resonance effects..
4. Write the oxidation of the benzylic groups with C-H bond(s) to benzoic acid.
5. Write the electron-pushing (arrow-pushing) mechanisms for the electrophilic aromatic substitution of benzene including halogenation, nitration, sulfonation, Friedel-Crafts alkylation, and Friedel-Crafts acylation.
6. Explain the trend for the reactivity of benzene toward electrophilic aromatic substitution using the concept of electron-donating and electron-withdrawing groups.
7. Recognize the reagents for reduction of nitro group to amino group.
8. Using the concept of electron-donating and electron-withdrawing groups, explain the regioselectivity (ortho/para versus meta) for the formation of di-substituted benzene derivatives.

### Sections to be covered (in the order of delivery):

- 9.1 The Structure of Benzene
- 9.2 The Concept of Aromaticity
- 9.4 Phenols
- 9.5 Oxidation at Benzylic Position
- 9.6 Electrophilic Aromatic Substitution
- 9.7 Mechanism of Electrophilic Aromatic Substitution
- 9.8 Disubstitution

### Recommended additional problems

9.9 – 9.39