Electrophilic Aromatic Substitution and the Effect of Substituents

Chapter 16 Overview:

A) Electrophilic Aromatic Substitution
- *I) Typical Reactions*
- *II) General Mechanism*

B) Electrophilic Aromatic Substitution Reactions
- *I) Halogenation*
  - a) Reaction
  - b) Mechanism
- *II) Nitration*
  - a) Reaction
  - b) Mechanism
- *III) Sulfonation*
  - a) Reaction
  - b) Mechanism

C) Friedel-Crafts Reactions
- I) *Friedel-Crafts Alkylation*
  - a) Reaction
  - b) Alkyl Halide Reactivity
  - c) Typical Lewis Acids
  - d) Mechanism
  - e) Intramolecular Reaction
  - f) Other Sources of Electrophiles
  - g) Potential Problems
- II) *Friedel-Crafts Acylation*
  - a) Reaction
  - b) Mechanism
- III) *Limitations of Friedel-Crafts Reactions*

D) Clemmensen Reduction

E) Substituent Effects on Electrophilic Substitution
- *I) Activating Groups*
- *II) Deactivating Groups*
- *III) Theory of Substituent Effects*
  - a) Electron Donating Groups
    - i) ortho, para directors
  - b) Electron Withdrawing Groups
    - i) meta directors
  - c) Classification of Substituents

F) Substitution on Multiply Substituted Aromatic Rings
- *I) Most Powerful Activating Group Controls Position of Substitution*

G) Substituent Modification to Modify Reactivity
- *I) Acyl ↔ Alkyl Transformation*
- *II) Addition of Acyl Groups to Amines and Alcohols*
- *III) Nitro ↔ Amine Transformation*
- *IV) Reversible Sulfonation*