

**I. Amines**

- A. Introduction
- B. Chirality
- C. Bronsted Basicity
- D. Synthesis and Reactions
  - 1. Alkylation of Amines
  - 2. Reductive Amination
  - 3. Mono-Alkylation by Acylation/Reduction
  - 4. Reduction of Nitriles
  - 5. Hofmann Rearrangement
  - 6. Eliminations to Form Olefins: Hofmann, Cope
  - 7. Formation of Diazonium Salts

**II. Carboxylic Acids and Derivatives**

- A. Introduction
- B. Acyl Transfer Reactions
  - 1. Background
  - 2. Acid Chlorides and Anhydrides
  - 3. Esters
  - 4. Carboxylic Acids
  - 5. Amides
  - 6. Evidence for a Tetrahedral Intermediate
  - 7. Reactions with  $\text{LiAlH}_4$ ,  $\text{NaBH}_4$ ,  $\text{RLi}$ ,  $\text{RMgBr}$
  - 8. Chemistry of Nitriles

**III. Enols and Enolates**

- A. Background
- B.  $\alpha$ -Halogenation of Ketones
- C.  $\alpha$ -Alkylation
- D. Aldol Reaction
- E. Claisen Condensation
- F. Michael Reaction
- G. Robinson Annulation
- H. Biosynthesis

**IV. Carbocations**

- A. Introduction
- B. Generation
- C. Reactions of Carbocations
  - 1. Elimination
  - 2. Combination with Nucleophiles
  - 3. Rearrangements and Fragmentations
  - 4. Neighboring Group Participation

## V. Radicals

- A. Introduction
  - 1. Stability
  - 2. Structure
  - 3. Generation/Initiation
  - 4. Termination
  - 5. Propagation
  - 6. Chain Reactions
  - 7. Solvent Effects
- B. Abstraction
- C. Addition
- D. Fragmentation
- E. Rearrangement
- F. Other Topics
  - 1. Air Oxidation
  - 2. Inhibitors/Scavengers
  - 3. Practical Applications

## VI. Photochemistry of the Carbonyl Group