**Reactions of Organic Compounds**
**(Outlines)**

## *I. Reactions of Hydrocarbons*

A. Substitution Reactions of alkanes to give alkyl halides.
B. Combustion Reactions
C. Addition Reactions on alkenes and alkynes.
  i) Hydrogenation to form alkanes.
  ii) Halogenation to form alkyl halide.
  iii) Addition of a halogen acid (HF, HCl, HBr, HI) to produce alkyl halide.
  iv) Addition of water (Hydration) to produce alcohol.
D. Aromatic substitution reaction.

## *II. Reactions of organic compounds that contain other functional groups:*

1. *Reactions of Alcohols*:
   A. Oxidation to give aldehydes and ketones.
   B. Dehydration to give alkenes.
   C. Substitution Reactions to give alkyl halides.
   D. Esterification to give esters.

2. *Reactions of Ethers:*
   Cleavage reaction to give alkyl halide and/or alcohol.

3. Reactions of Aldehydes and Ketones:
   A. Reduction of aldehydes to give primary alcohol s.
      Reduction of ketone to give secondary alcohols.
   B. Oxidation of aldehydes to give carboxylic acids.
   C. Hydration (addition of Water) to give two hydroxyl groups on the same carbon.
   D. Addition of Alcohol to produce Acetals and hemiacetals.
   E. Addition of Hydrogen Cyanide to produce cyanohydrin.
   F. Addition of ammonia and ammonia derivatives to give imines.

4. Reactions of Carboxylic acids:
   A. Reaction with thionyl chloride to give acid chloride.
   B. Reaction with acid chloride to produce acid anhydride.
   C. Reaction with alcohols to give ester.
   D. Reaction with amine to produce an amide:

5. Reactions of Esters:
   Cleaved reaction to give carboxylic acid and alcohol.

**Introduction to Organic Chemistry**
**Part Three: Preparation of Organic Compounds**

*Important remarks on the preparation of different organic compounds as inferred from the reactions mentioned in part II*

*Preparation of alkyl halides:*
Alkyl halides are prepared by:
1. Substitution reaction of halogens on saturated hydrocarbons.
2. Substitution reaction of HX on primary alcohols.
3. Addition reaction of hydrogen halides or halogens on unsaturated hydrocarbons.
4. Cleavage reaction of ethers in presence of HX.

*Preparation of saturated hydrocarbons:*
By addition reaction of hydrogen (hydrogenation) on unsaturated hydrocarbons.

*Preparation of alcohols:*
Alcohols are prepared by:
1. Addition reaction of water on unsaturated hydrocarbons.
2. Cleavage reaction of ethers in presence of HX, gives primary alcohols.
3. Reduction of aldehydes gives primary alcohols.
4. Reduction of ketones secondary alcohols.
5. Cleavage reactions of esters.

*Preparation of aldehydes:*
Aldehydes are prepared by oxidation of primary alcohols.

*Preparation of ketones:*
Ketones are prepared by oxidation of secondary alcohols.

*Preparation of alkenes:*
Alkenes and alkynes are prepared by dehydration of alcohols.

*Preparation of ethers:*
Ethers are prepared by dehydration of primary alcohols.

*Preparation of carboxylic acids:*
Carboxylic acids are prepared by:
1. Cleavage reactions of esters.
2. Oxidation of primary alcohols

*Preparation of esters:*
Esters are prepared by reaction of primary alcohols with carboxylic acids.

*Saturated, unsaturated hydrocarbons, alkyl halides, aldehydes, ketones, ethers, carboxylic acids and esters all can be prepared from alcohols.*

*THE END*