

### Aldehydes and Ketones

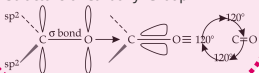
Common names :

- Replace corresponding carboxylic acids with aldehyde
- Alkyl phenyl ketones by adding acyl group as prefix to phenone.

IUPAC names :

- Replacing -e with -al and -one as required.

• Structure of Carbonyl Group



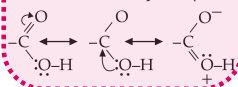
Nomenclature

Preparation

### Aldehydes, Ketones And Carboxylic Acids

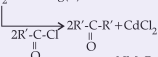
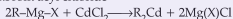
### Carboxylic Acids

- Common names : end with -ic
- IUPAC names : replace -e in the corresponding alkane with -oic acid.
- Structure of Carboxyl Group

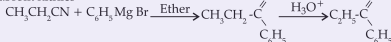


### KETONES

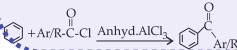
1. From acyl chloride



2. From nitriles

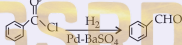


3. From benzene or substituted benzenes



### ALDEHYDES

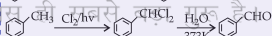
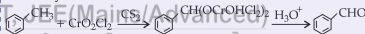
1. From acyl chloride



2. From nitriles and esters : Stephen reaction

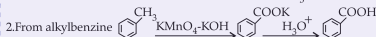


3. From hydrocarbons : Etard reaction



### Carboxylic Acids

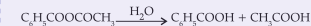
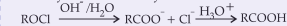
1. From primary alcohols and aldehydes  $RCH_2OH \xrightarrow{\text{alk. KMnO}_4, H_3O^+} RCOOH$



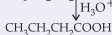
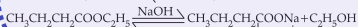
3. From nitriles and amides  $R-CN \xrightarrow{H^+ \text{ or } OH^-, H_2O} R-C(=O)-NH_2 \xrightarrow{H^+ \text{ or } OH^-, \Delta} RCOOH$

4. From Grignard reagents  $R-Mg-X + CO_2 \rightarrow R-C(=O)O^-MgX \xrightarrow{H_3O^+} RCOOH$

5. From acyl halides and anhydrides



6. From esters



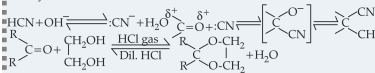
**ALDEHYDES AND KETONES:**

**(i) Physical:**

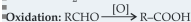
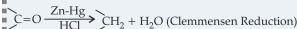
Boiling points are higher than hydrocarbons and ethers of comparable molecular masses.

**(ii) Chemical : Nucleophilic addition reactions :**

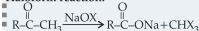
Aldehydes are more reactive than ketones due to steric and electronic reasons.



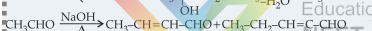
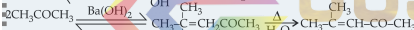
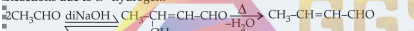
**Reduction :** (a) To alcohols – aldehydes and ketones reduce to primary and secondary alcohols respectively by  $\text{NaBH}_4$  or  $\text{LiAlH}_4$ .  
 (b) To hydrocarbons –



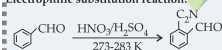
**Haloform reaction:**



**Reactions due to  $\alpha$ -hydrogen:**



**Electrophilic substitution reaction:**



**Aldehydes,  
Ketones And  
Carboxylic Acids**

**Properties**

**Carboxylic acids:**

**(i) Physical:**

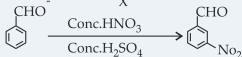
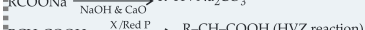
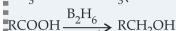
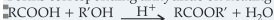
Higher boiling points than aldehydes, ketones or alcohols.

Solubility decreases with increasing number of C atoms

**(ii) Chemical :**



Forms corresponding anhydride on heating with mineral acid



**Uses**

**(a) Carboxylic acids**

- Methanoic acid in rubber, textile, dyeing, leather industries.
- Ethanoic acid as solvent
- Higher fatty acids in manufacture of soaps and detergents.

**(b) Aldehydes of ketones**

- As solvents.
- Starting materials and reagents for synthesis of products.