



आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

**IFTM University, Moradabad, Uttar Pradesh**

**NAAC ACCREDITED**

# E-Content

## IFTM University, Moradabad

# UNIT 2

## AROMATIC CARBOXYLIC ACIDS

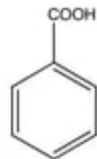


# AROMATIC CARBOXYLIC ACIDS

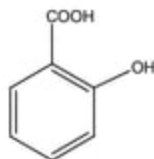
- ▶ Aromatic acids are compounds in which one or more carboxyl groups ( $-\text{COOH}$ ) are attached directly to the aromatic ring.



# SELECTED EXAMPLES OF THE FAMILY ARE AS FOLLOWS



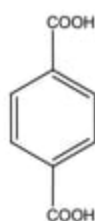
Benzoic acid



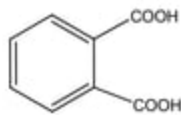
Salicylic acid



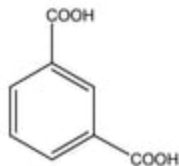
4-chlorobenzoic acid



terephthalic acid



phthalic acid



isophthalic acid

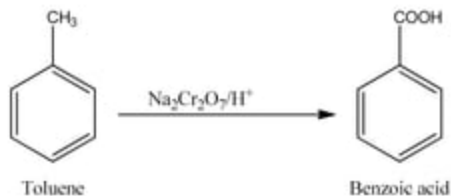
# PHYSICAL PROPERTIES

- ▶ The aromatic carboxylic acids are generally crystalline solids with high melting point.
- ▶ They are soluble in hot water and organic solvents.
- ▶ Benzoic acid is a colourless solid; m.p.  $122^{\circ}\text{C}$ . It is soluble in hot water, diethyl ether, ethanol and benzene.

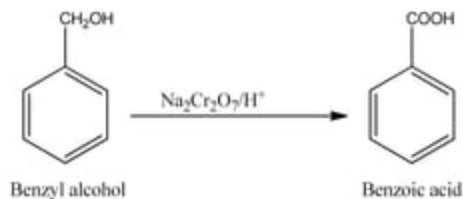


# PREPARATION OF AROMATIC CARBOXYLIC ACIDS

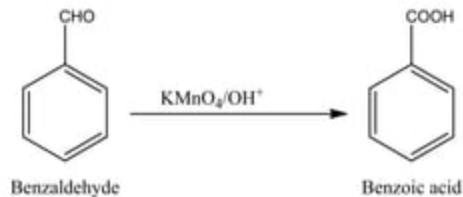
- ▶ Oxidation Reactions
  - Oxidation of Alkyl benzene
  - Example

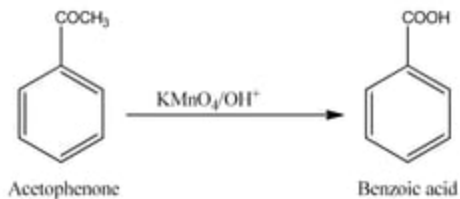


- Oxidation of Primary aromatic alcohols

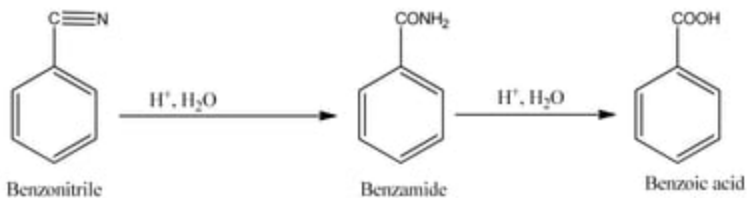


- Oxidation of Aromatic carbonyl compounds

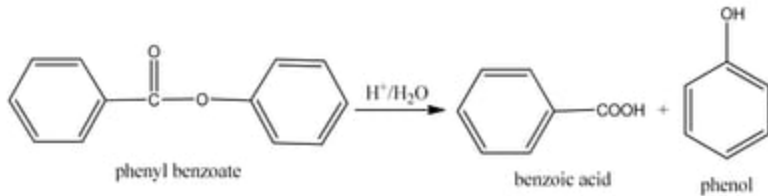
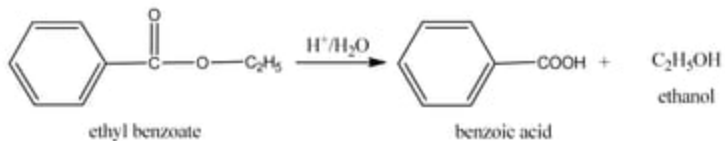




- Hydrolysis Reaction
  - Hydrolysis of Aromatic Nitriles

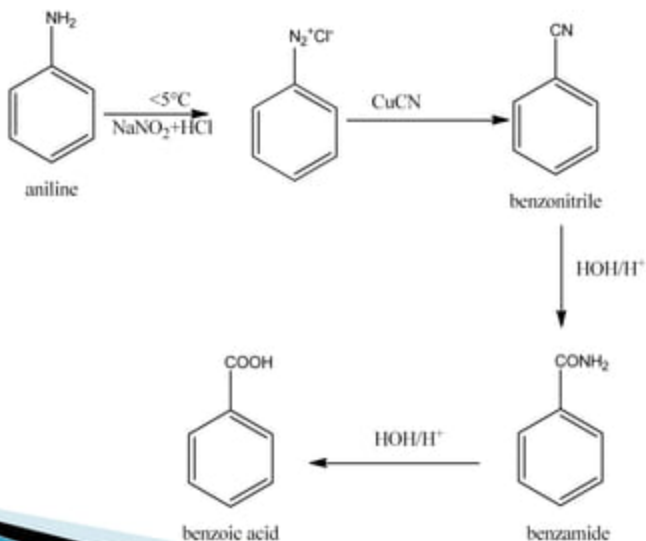


## ► Hydrolysis of Esters



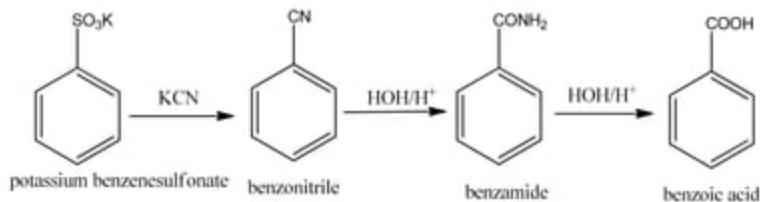
## ► Sandmeyer's Reaction

- Aniline on diazotization gives benzenediazonium chloride which on reaction with  $\text{CuCN}$  produce Benzonitrile. Benzonitrile, in the presence of water gives benzoic acid via formation of an amide.



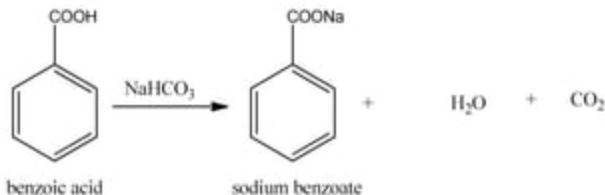
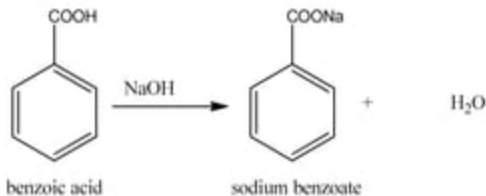
## ► From Sulphonic Acid

- When the potassium salt of an aromatic sulphonic acid is fused with potassium cyanide, we get a nitrile, which on hydrolysis, gives an aromatic acid via formation of an amide.



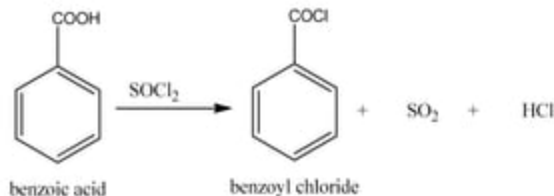
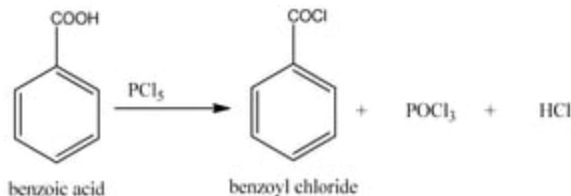
# CHEMICAL PROPERTIES

- ▶ Reaction of benzoic acid are divided into –:
  - Reaction of COOH group
  - Salt Formation
  - Benzoic acid reacts with sodium hydroxide or sodium bicarbonate to form sodium benzoate.

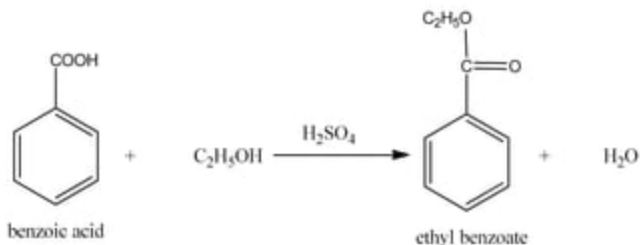


## ► Acyl Halide Formation

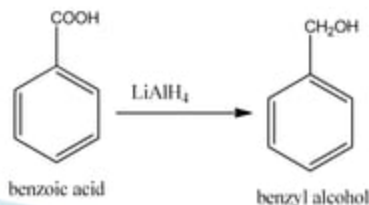
- Benzoic acid reacts with phosphorus pentachloride or thionyl chloride to form benzoyl chloride.



## ► Ester Formation



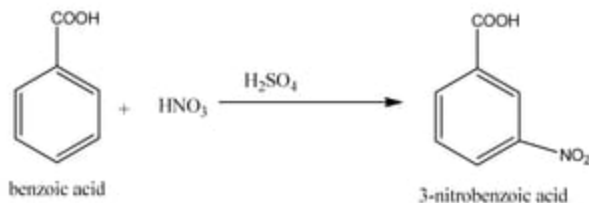
- Reduction to Benzyl alcohol
- Benzoic acid undergoes reduction with lithium aluminium hydride gives benzyl alcohol.



## ► Decarboxylation



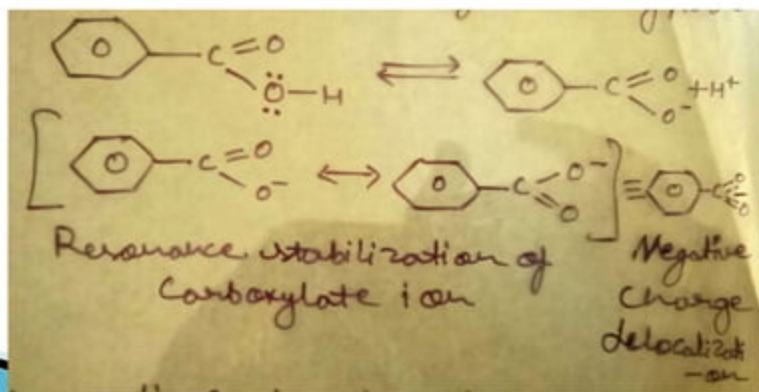
## ► Reaction of Benzene Ring Nitration of Benzoic acid



Uses– Benzoic acid is used in mouth washes because it inhibits bacterial growth.

# ACIDIC CHARACTER OF AROMATIC CARBOXYLIC ACIDS: A GENERAL DISCUSSION

- ▶ The acidic strength of aromatic carboxylic acid is attributed to resonance stabilization of carboxylate ion formed by loss of proton.



## EFFECT OF SUBSTITUENTS ON ACIDIC STRENGTH

- ▶ The presence of electron withdrawing groups increases the acidic strength as these groups delocalize the negative charge and stabilize the carboxylate ion.
- ▶ However, the electron releasing groups decrease the acidic strength by intensifying the negative charge and thus destabilize the carboxylate ion.





THANK YOU