METHODS OF PREPARATIONS OF AROMATIC CARBOXYLIC ACIDS

1. Oxidation of alkyl benzene and other benzene derivatives containing side chain:

The side chain on oxidation is converted to carboxyl group (-COOH), hence the benzene ring is sufficiently stable towards oxidising agents.

$$C_{6}H_{5}-CH_{3}$$

$$C_{6}H_{5}-CH=CH_{2}$$

$$C_{6}H_{5}-CH_{2}-CI$$

$$C_{6}H_{5}-CH_{2}-OH$$

$$C_{6}H_{5}-CH_{2}-OH$$

$$C_{6}H_{5}-CH_{2}-CH_{3}$$

$$C_{6}H_{5}-CH_{2}-(CH_{2})_{n}-CH_{3}$$

Note: The oxidation of side chain, it is oxidised all the way back to the carbon atom linked to aromatic ring, due to greatest reactivity of benzylic carbon atom.

2. Oxidation of aromatic aldehydes:

Aromatic aldehyde on oxidation give aromatic carboxylic acid.

Ar—CHO

$$K_2Cr_2O_7/H^+$$

Ar—COOH

Aromatic aldehyde

Aromatic benzoic acid

3. Hydrolysis of aryl nitriles:

Aryl nitriles on hydrolysis gives corresponding acids.

$$H_2O/H^+$$
 $N \equiv C$
 CH_3
 H_2O/H^+
 $Or H_3O^+$
 $COOH$
 P -Methylbenzoic acid

4. From Grignard's reagent:

Aryl magnesium halides, on reaction with carbon dioxide, produce aromatic acids.

$$Ar^{+}-Mg^{+}X + C = O$$

$$Ar - C - O - MgX$$

$$Aromatic magnesium halide$$

$$Ar - C - OH + Mg$$

$$O$$

$$Aromatic acid$$

$$OH$$

5. By Friedel Craft's reaction:

Reaction of arenes with carbonyl chloride in the presence of anhydrous aluminium chloride gives aryl chloride which, on hydrolysis, form aromatic acids.