

## **A New Strategy for Preparation of Terephthalic acid by Oxidation of p-Xylene in Aqueous Medium**

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Terephthalic acid (TPA) is an important bulk chemical for fibre industry. Commercially, most of TPA is produced by the homogenous liquid-phase oxidation of p-Xylene (pX) with air or O<sub>2</sub> in acetic acid (HAc) in the temperature range of 180–250°C and 25–35 bar in presence of cobalt acetate and manganese acetate catalyst with bromide promoters.

In the quest for a ecofriendly, safe and cost effective process to produce TPA a new strategy for the preparation of TPA by oxidation of p-X in liquid phase through a two step process is explored. The first step involves the aerobic oxidation of pX in aqueous medium in the presence of Cobalt based homogeneous catalyst. Effect of various reaction parameters like pressure, temperature, catalyst, concentration etc have been studied. The product composition could be varied with respect to p-toluic acid (p-TA), TPA and 4-carboxy benzaldehyde (4-CBA) by adjusting the operating conditions. Incorporation of co-catalysts like Mn, Ce affects the composition of reaction products. Oxidation of pX at 130°C yielded a product consisting of p-TA 80%, TPA-16%, 4-CBA 3%, at 80% conversion of pX. The reaction product obtained in the first step was further oxidized at 130-150°C in acetic acid medium in the presence of Co based catalyst to give TPA as a major product. Typical product composition ex-oxidation reactor was Terephthalic acid (86%) with p-Toluic acid (12%) and 4-CBA(2.0).

Oxidation of pX in aqueous medium makes the process safe from high exothermicity of the reaction. Since no bromine compound is used as initiator or otherwise, the overall process can become environment friendly. Unreacted pX, partially oxidized products and catalyst can be recycled. The presence of p-TA and 4-CBA in the final product can be addressed as in existing process.