

Co-oxidation of p-xylene and p-toluic acid to terephthalic acid in water solvent :
kinetics and additive effects

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Co-oxidation of p-xylene (PX) and p-toluic acid (p-TA) to terephthalic acid (TA) in water with Mn acetate catalyst has been studied. Mn acetate showed better catalytic activity than Co acetate and no synergism was observed between two catalysts. During the reaction, PX was transformed to p-TA while p-TA was converted to TA by a radical reaction. In the co-oxidation, radicals generated from facile PX to p-TA conversion would assist more difficult p-TA to TA conversion. Addition of CO₂ in the oxygen promoted the TA formation and suppressed the CO₂ formation from the reactants. Additional transition metals such as Ni and Ti also promoted the catalytic activity of Mn catalyst. Furthermore, a synergism was observed between added CO₂ and the added transition metal. Finally, the yield of terephthalic acid reached about 95% with Mn + (Ti, Ni or Cr) catalyst system and CO₂ addition.