

## **A comparative study of electrochemical degradation of benzoic acid and terephthalic acid from aqueous solution of purified terephthalic acid (PTA) wastewater**

**Vishal Kumar Sandhwar, Basheshwar Prasad**

Department of Chemical Engineering, Indian Institute of Technology Roorkee, Roorkee, 247667,  
Uttarakhand, India

### **Abstract:**

In this article, studies have been performed on the treatment of benzoic acid (BA), terephthalic acid (TPA) and COD from synthetic binary solution of PTA wastewater. Acid precipitation pretreatment of aqueous solution was performed initially at different pH (2–5) and temperature (15–60 °C). The acid treated solution was re-treated by electrochemical oxidation (EO) and electro-Fenton (EF) techniques using graphite electrodes. Independent operating parameters namely initial pH: (1–9), current density (A/m<sup>2</sup>): (30.48–91.45), electrolyte concentration (g/L): (0.5–1.5) and electrolysis time (min): (10–90) for EO process and pH (1–5), current density (A/m<sup>2</sup>): (30.48–91.45), Fe<sup>2+</sup> concentration (mmol/L): (0.5–1.5) and electrolysis time (min): (10–90) for EF process were modeled and optimized by central composite design (CCD) in response surface methodology (RSM). The maximum removal efficiencies of the process during EF treatment were 80.45% of BA, 76.83% of TPA and 73.70% of COD with energy consumption (kWh/kg COD removed) – 19.39 at optimum operating conditions. During EC treatment removal capacities were 70.76%, 68.52% and 67.27% with 31.01 (kWh/kg COD removed) respectively. It was observed that EF process was more efficient than EO based on removals of BA, TPA and COD with minimum energy consumption.

### **Keywords:**

Benzoic acid, Terephthalic acid, Electrochemical oxidation, Electro-Fenton, Graphite electrode

**Link:** <https://www.sciencedirect.com/science/article/abs/pii/S2214714416303592>