

## **Comparative study of electrocoagulation and electrochemical Fenton treatment of aqueous solution of benzoic acid (BA): Optimization of process and sludge analysis**

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### **Abstract:**

Benzoic acid containing synthetic solution was pretreated by acid precipitation at various pH (1-3) and temperature (15-60 °C). Pre-treated solution was further treated by electrocoagulation (EC) and electrochemical Fenton (EF) processes using iron anode and graphite cathode. Optimization of independent operating parameters, namely, initial pH: (3-11), current density (A/m<sup>2</sup>): (15.24-76.21), electrolyte concentration (mol/L): (0.03-0.07) and electrolysis time (min): (15-95) for EC process and pH: (1-5), current density (A/m<sup>2</sup>): (15.24-76.21), H<sub>2</sub>O<sub>2</sub> concentration (mg/L): (100-500) and electrolysis time (min): (15-95) for EF process, was performed using central composite design (CCD) in response surface methodology (RSM). Maximum removal efficiencies of BA- 76.83%, 88.50%; chemical oxygen demand (COD) - 69.23%, 82.21% and energy consumption (kWh/kg COD removed) - 30.86, 21.15 were achieved by EC and EF processes, respectively, at optimum operating conditions. It was found that EF process is more efficient than EC process based on removal of BA and COD with lower energy consumption. The sludge obtained after EC and EF treatments was analyzed by XRD, FTIR, DTA/TGA and SEM/EDX techniques.

**Link:** <https://link.springer.com/article/10.1007/s11814-016-0343-8>