Enhanced degradation of quinoline in three-dimensional electro-Fenton system using catalytic Fe-Co-Ni-P/g-C3N4 particles

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Received: 8 November 2022 / Accepted: 23 December 2022 / Published: 27 December 2022

With high toxicity, carcinogenicity and teratogenicity, quinoline has been threatening human health and ecological environment. Herein, Fe-Co-Ni-P/g-C3N4 particles are developed as electrochemical reactors to form a three-dimensional catalytic particle electrode system (3D-CPE) for efficient removal of quinoline from wastewater by electro-Fenton (EF) oxidation process. with reaction time of 30 min, the particles dosage of 50 g/L, pH of 3, conductivity of 11.5 ms/cm, and current density of 37.04 mA/cm², the chemical oxygen demand (COD) removal rate can up to 90.95%. In addition, electron paramagnetic response (EPR) and radical scavenging tests are performed to determine the hydroxyl radicals of electrochemical processes produced. The degradation products are analyzed by high performance liquid chromatography-mass spectrometry (HPLC-MS). Finally, through theoretical calculation and analysis of degradation products, a reasonable degradation mechanism is proposed.

Keywords: Electro-Fenton oxidation; Fe-Co-Ni-P/g-C3N4 particles; 3D-CPE; Hydroxyl radicals; Degradation Mechanism

FULL TEXT

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