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Degradation mechanism, kinetics, and toxicity investigation of 4-bromophenol by electrochemical reduction and oxidation with Pd–Fe/graphene catalytic cathodes

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Abstract:

This study aimed to elucidate the electrodegradation intermediates, kinetics, and toxicity evolution of 4-bromophenol (4-BP), a compound abundant in water. In this study, 4-BP was subjected to electrochemical reduction and oxidation using a divided cell with two prepared Pd–Fe/graphene catalytic cathodes and a Ti/IrO_2/RuO_2 anode. In the cathodic compartment, reduction debromination in the presence of a Pd–Fe/graphene catalyst was processed with adsorbing hydrogen on the cathode. The cathode also generated hydroxyl radicals in aid of the feeding air to promote the oxidative degradation of 4-BP. At 60 min, the removal rate of 4-BP was 100% in the two catholytes and 99.5% in the anolyte. Most of the intermediate products formed during degradation were identified using liquid chromatography/mass spectrometry.

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