Hydroxylation of benzoic acid by electrochemical generated hydroxyl radicals

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The generation of hydroxyl radicals is an important process in many applications such as organic synthesis [1], oxidative stress studies [2] and detoxification of effluents [3].
Due to the high instability of these radicals they are usually produced in situ by means of different methods, such as disproportionation of peroxynitrous acid or dissociation of hydrogen peroxide by UV action. The generation of hydroxyl radicals based on metal catalyzed decomposition of hydrogen peroxide, Fenton or Fenton-like reactions, is the most spread method.
The electrochemical generation of hydroxyl radical, as an intermediate in the oxygen formation from the oxidation of water is a well-known process. The ability of boron doped diamond electrodes (BDD) to produce hydroxyl radicals is extensively described on the oxidation of organics for wastewater [4]. Although the mineralization of several electroactive species is reported, the role of hydroxyl radicals in the initial phase of these reactions is not well established.
In this work we present a study on the performance of Pt and BDD anodes on the hydroxylation of benzoic acid (a non-electroactive species) comparatively to electroactive species, such as quinol and p-hydroxybenzoic acid.
The reactions were monitored by fluorescence, cyclic voltammetry and HPLC (UV detection).

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References

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