Reactivity of hydroxybenzoic acid derivatives towards electrogenerated HO radicals

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In the last decade there has been a lot of interest in the study of reactive oxygen species (ROS) and their role in many areas such as medicine, biology and chemistry. Among the ROS, HO radicals are the most reactive species and the extension of their reaction with organics can lead to the formation of CO_2 thus the generation of these radicals is an important process in applications such as detoxification of effluents.There are reports of severall methods used in this area to produce HO radicals such as Fenton, photo-Fenton, electro-Fenton and by the electrochemical oxidation of water.

Electrochemically generated HO radicals have proved to be adequate for the destruction of organics in aqueous media. The reactivity and selectivity of the radicals generated at the surface of the electrode are related to the anode material. Although most of the available studies deal with high oxidation power anodes, like BDD, the use of anodes with low oxidation power, Pt, can have important applications particularly when a certain degree of selectivity is required for the oxidation.

In this work we present a kinetic study on aromatic compounds oxidation by electrogenerated HO radical with simultaneous direct electron transfer at a Pt anode. Experimental conditions such as concentration, electrolysis times and electrochemical cell were selected in order to minimize the contribution from secondary reactions and from reactions taking place at the cathode. Kinetic data is analysed considering the presumed reactivity of these species suggested from charge density values on carbon atoms of the aromatic ring.