Antioxidant activity evaluation using electrogenerated HO radicals

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Generation of HO radicals by means of the electrooxidation of water have been demonstrated using different anode materials. The extent and rate of the oxidation reactions of electrogenerated HO radicals depend strongly on the degree of adsorption of these radicals at the anode surface.

The use of these radicals in antioxidant assays is demonstrated. The nature of the anode material is illustrated in Fig. 1A that reports the BA consumption in galvanostatic electrolysis using Pt and BDD (boron doped diamond). Despite the differences in the reaction rates the organics consumption followed 1st order reactions characterized by different k_{app} values. The effects of the electrolysis current density, j, on k_{app} was analysed for electroactive and non-electroactive species (Fig. 1B). Results were analysed considering the variation of the anode surface coverage by HO radicals and the occurrence of direct electron transfer reactions. In the presence of a HO radical scavenger the k_{app} of a probe molecule diminishes due to the decrease of the HO radicals surface concentration as illustrated in Fig. 1C. The k_{app} decrease is a function of the radical scavenger as shown in Fig. 1D. The treatment present allows the characterization of the kinetics of the reaction between species and electrogenerated HO radicals.

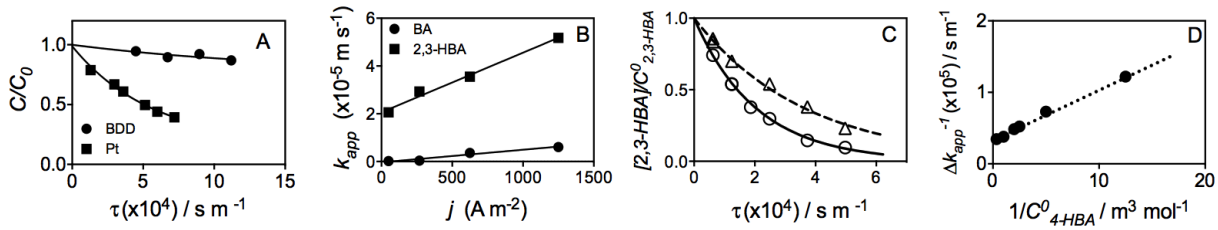

Figure 1 – Kinetic study of benzoic acid derivatives consumption in galvanostatic electrolysis with electrogenerated HO radicals. Effect of the anode material on *[BA]* (A); effect of j on k_{app} (B); effect of 4-HBA presence in the consumption of 2,3-HBA (C); $C^0_{4\text{-}HBA}$ effect on Δk_{app}^{-1} of 2,3-HBA (D).