

Oxidation of organic compound on different anode materials

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Abstract

Industry often produces wastewater containing toxic and non-biodegradable organic pollutants, which have to be treated before the water can be discharged. Thus the decrease of the pollution has become a primary goal of chemical science in recent years. Improvement of efficiency and selectivity of synthesis processes, and degradation of their polluting by product are, in this frame, mandatory and in this field electrochemical science can afford tools.

In this work, the electrochemical oxidation (or combustion) of organics has been investigated using different electrode materials[1]. A simplified mechanism for the electrochemical oxidation of organics is presented, according to which selective oxidation occurs with oxide anodes (MO_x) for which the formation of higher oxides (e.g.: MO_{x+1}) is possible. Combustion occurs at electrodes at the surface of which $\cdot OH$ (hydroxyl) radicals are formed by water discharge at different anodes and preparative electrolysis investigated confirm the proposed mechanism.

Typical example of synthetic wastewater containing EDTA (figure1) and EDTA-copper has been investigated on boron doped diamond and the obtained results are in agreement with the predicted model[2].

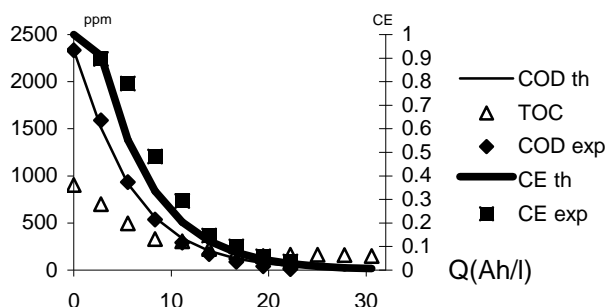


Figure1: Trends of chemical oxygen demand (COD), (Total Organic Carbon (TOC) and Current Efficiency (CE) during the electrolysis of EDTA on Boron Doped Diamond.
 $j=50\text{mA}/\text{cm}^2$, mass transport control, EDTA

[1]: L. Ouattara, T. Diaco, I. Duo, M. Panizza, G. Foti and Ch. Comninellis, J. of Electrochem. Soc., in Press
[2]: M. Panizza, P. A. Michaud, G. Gerisola, Ch. Comninellis, J. of Electroanal. Chem. **507** (2001) 206-214