

Electrochemical oxidation for waste water purification

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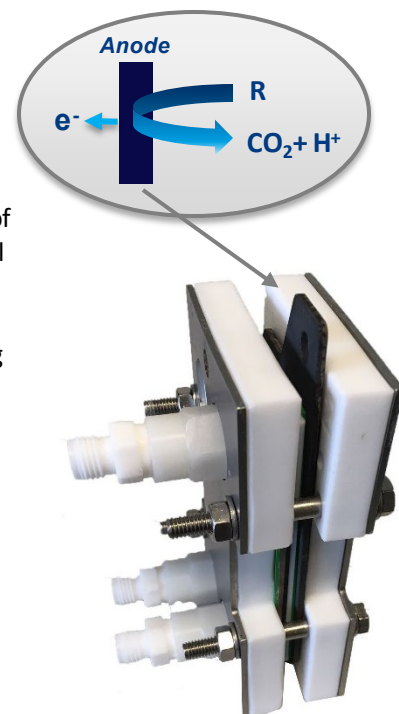
Introduction

Disposal of waste streams in the chemical industry is harmful for the environment and therefore subject to strict regulations. It was shown that electrochemical oxidation is an effective method to purify wastewaters from a wide variety of industries and processes. It is of current interest to study electrochemical oxidation on boron doped diamond electrodes as a purification method for waste streams. It was shown that many organic compounds can be oxidized completely to CO_2 on boron doped diamond electrodes.

Project summary

The electrochemical oxidation is studied in a parallel plate reactor, which consists of two electrodes positioned parallel to each other. The electrolyte flows through the reactor, where the electrochemical oxidation takes place at the anode. Different factors influence this oxidation, for example the type of electrode, the flow rate, the potential applied and the type and concentration of the organic compound in the waste stream. The main focus of our experimental work is the study of the differences in oxidation rate and current efficiency between different organics and the determination of the various intermediate compounds that can be formed. In addition to the parallel plate we use rotating disk electrodes to gain more understanding on the effects of kinetics and mass transfer on the oxidation of organics on boron doped diamond electrodes.

Furthermore, depending on the applied potential, oxygen is formed as a by-product in the system. It is apparent that the formation of oxygen decreases the overall current efficiency of the process. However, the effect of the oxygen formation on the mass transfer is not well studied. It is of current interest to study the influence of oxygen bubbles on the mass transfer in this reactor.



Project goals

Examples of projects that are studied:

- Effect of mass transfer on the oxidation of organic compounds on boron doped diamond electrodes
- Study of the differences in oxidation rate and current efficiency between different organic compounds and the determination of the various intermediate compounds that are formed
- Effect of oxygen formation on mass transfer in the electrolyzer

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