ELECTROCHEMICAL CONVERSION OF CARBON DIOXIDE TO FORMIC ACID AT TIN CATHODES IN PRESSURIZED CELLS

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To limit the negative effect of carbon dioxide as a greenhouse gas, an interesting approach is the utilization of Carbon Capture and Conversion (CCC) methodology, which is focused on the use of CO_2 waste as a feedstock to produce added-value products by using the excess electric energy from renewable source [1]. In this framework, an increasing attention has been devoted to the electrochemical conversion of carbon dioxide to formic acid in water [2-4], which is considered one of the more attractive pathways to convert CO_2. Since the main hurdle of the CO_2 reduction from aqueous solution is the low CO_2 solubility in water, in this work, the effect of some operating parameters, including pressure, on the conversion of CO_2 at tin flat cathodes to formic acid was studied using various kinds of pressurized undivided cells. It has been shown that the carbon dioxide reduction to formic acid can strongly benefit from the utilization of CO_2 pressures. In spite of the good results achieved, many data were not clearly understood; hence, in order to better understand, rationalize and optimize the process, a simple first-approximation model was developed based on one hand on the cathodic conversion of pressurized CO_2 to HCOOH at tin cathode and on the other on its anodic oxidation.

References

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