

Electrochemical reduction of carbon dioxide into formate

Abstract

The electrochemical reduction of CO₂ dioxide into HCOO⁻ on a Sn cathode is well described in literature. However, the issue of deactivation and loss of Sn and a suitable non-aqueous supporting electrolyte remains unresolved. This work aims to develop and characterize Sn as a cathode material and describe a suitable nonaqueous supporting electrolyte for CO₂ solvation. A Sn plated glassy carbon rotating disc is the cathode, and Pt wire as the anode. The catholyte to be investigated are H₂O and CH₃OH while the anolyte will remain as KOH. The reactor is batch type with separation of the catholyte and anolyte achieved using a Nafion membrane. CO₂ gas will be bubbled into the catholyte and reduced at the Sn plated cathode. Linear sweep voltammetry with a maximum potential of -1.5 V vs. SHE is to be carried out on the system. Results will then be analysed and compared with past works by other authors. Acquired data will be used to elucidate the efficiency of the Sn electrode in the reduction of CO₂, the effects and extent of the cathode degradation and the solvent type in the reduction of CO₂. At completion, this work is able to describe the optimal conditions for electrochemical reduction of CO₂ into HCOO⁻ within the scope of study.

Keywords

Electrolyte; Electroreduction; HCOO⁻