
Volatile Species during Oscillatory Ethanol Electro-Oxidation on Pt and PtSn Catalysts by OLEMS

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The electro-oxidation of ethanol on Pt and PtSn/C catalysts in acidic media generates volatile products such as acetic acid, acetaldehyde, and CO₂. This study investigated their formation during oscillatory regimes using online electrochemical mass spectrometry (OLEMS). [1] The PtSn/C catalyst (80 wt.%), synthesized with NaBH₄, was compared to commercial Pt/C. Signals of acetaldehyde (m/z 25, 29), CO₂ (m/z 22, 44), and acetic acid (m/z 60) were monitored. PtSn/C showed earlier oxidation onset and better performance than Pt/C. Multivariate linear regression (MLR) [2] quantified volatile production and linked ionic signals to faradaic current. MLR indicated acetic acid and acetaldehyde as major contributors, with higher acetic acid formation on PtSn/C. The bimetallic system also influenced adsorption mechanisms, leading to more stable potential oscillations at lower potentials (~0.7 V) compared to Pt/C (~1 V), which showed stronger deactivation and product signal decay. These findings reveal the role of Sn in enhancing catalyst efficiency, selectivity, and stability in EEOR.

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References:

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