Electrocatalytic oxidation of methanol on the Ni-Salen modified Glassy Carbon Electrode in alkaline medium

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Direct methanol fuel cells (DMFCs) are promising electrochemical energy systems suitable for a variety of applications. They offer simplicity, low pollution, and high efficiency energy conversions. Methanol is an attractive fuel for fuel cells due to its low price and easy handing, storage but fuels like methanol suffer from the large overpotentials. There is extensive attempt to decrease this overpotential and increase current by using electrocatalysts, capable of mediating fast electron transfer to methanol. For the electrochemical oxidation of methanol, generally electrocatalysts based on Pt have been developed \cite{1,2}. Pt electrodes have been reported to be most active in acidic medium, but their activity is not satisfactory high.

In recent contexts, nickel complexes modified electrodes most widely have been used for electrocatalytic oxidation of alcohols especially methanol\cite{3}

Electrocatalytic oxidation of methanol on a glassy carbon disc electrode modified with Ni-Salen complex and conditioned by cyclic voltammetry in a potential range between 0 and 800 mV in alkaline medium is studied. Cyclic voltammetry (CV), (Rotating disk electrode)RDE,EIS and chronoamperometry has been employed to characterize electrocatalytic oxidation of methanol. This modified electrode showed a catalytic activity towards methanol oxidation.

The result obtained allowed our conclusion that Ni-Salen effects on the properties of the catalyst via Ni(II) species. A plausible mechanism was proposed for catalytic oxidation of methanol at Ni-Salen modified glassy Carbon electrode. The effects of various parameters such as methanol concentration, Ni-Salen complex concentration, Number of complex solution drops, potential range were investigated.

References: