

Enhancement of the Glycerol Electrooxidation Reaction Using PdCu/XC-72 as Electrocatalyst

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ABSTRACT

Pd-Cu electrocatalyst was synthesized by chemical reduction method using CuSO_4 and K_2PdCl_4 as metallic precursors in the presence of ethylene glycol as surfactant and sodium borohydride as reducing agent. This electrocatalyst was electrochemically and physicochemically characterized by means of cyclic voltammetry, chronoamperometry, X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF) and Transmission Electron Microscopy (TEM). The electrocatalyst presented a homogeneous distribution, with an average particle size around 5 nm. According to XRF results, the mass content of active phase is Pd 80%, Cu 20% for a catalyst with a composition of 60-40 (PdCu / Vulcan XC-72 as support). The electrocatalytic activity of Pd-Cu was evaluated in terms of glycerol electrooxidation reaction at three concentrations (0.1, 1 and 3M) in 0.3 M KOH aqueous solution. The results obtained from voltamperometric studies showed that the current density achieved with Pd-Cu electrocatalyst is 3 times higher than that reached with commercial Pd (30% from ETEK) and a shift to negative values for electrooxidation potential about 100mV.

Keywords: Glycerol electrooxidation, chemical reduction, Pd-Cu electrocatalyst.

