

Turkish Journal of Chemistry

Turkish Journal
of
Chemistry

Comparative Mechanistic Studies on the Oxidation of Aromatic and Aliphatic Hydroxyl Derivatives in an Alkaline Medium at Preanodized Pt, Au and Pt/Au Electrodes in Presence of Redox Mediators

Sasha KALCHEVA, Philip IOTOV
University of Chemical Technology and Metallurgy,
1756 Sofia, PO Box 32, BULGARIA

 [Keywords](#)
 [Authors](#)



chem@tubitak.gov.tr

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Abstract: The role of redox mediators obtained from Pt, Au, and Pt/Au electrodes in the process of electrocatalytic oxidation of aromatic/aliphatic hydroxyl derivatives in an alkaline medium has been studied by applying cyclic voltammetry. Phenol and glycerol were used as aromatic and aliphatic hydroxyl derivatives in the electrochemical oxidation experiments. The results revealed that the presence of redox mediators formed by preliminary electrode anodization is crucial for the process of oxidation of aromatic compounds and imposes a different oxidation route for the aliphatic hydroxyl derivatives. The effect of preanodization has been related to the formation and dissolution of the corresponding higher hydrous oxides which accounts for the presence of M^{n+} in the solution. On subsequent positive scanning $M^{(n-x)+}$ -species are formed on the electrode surface thus increasing the active sites number. A tentative mechanism accounting for the oxidation process in the presence of redox mediators is suggested.

Turk. J. Chem., **23**, (1999), 369-380.

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