

STUDY OF THE EFFECT OF ELECTROLYTE ON ELECTROCHEMICAL
HYDROCARBON OXIDATION

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ABSTRACT

The influence of the electrolyte upon the kinetics of the electrochemical oxidation of hydrocarbons is discussed in terms of reactant gas solubility and the general interaction of the electrolyte with the electrode. It is shown, through the use of the voltage sweep technique, that electrolytes normally employed in these studies are relatively active. Thus the current response to a voltage sweep, both in the presence and absence of active species, evolves in such a way as to indicate that adsorption competition occurs between the reactant gas and the electrolyte. This renders the adsorption process involved in hydrocarbon oxidation more complex than previously considered. A preliminary indication of this is the decrease of peak hydrogen currents with a respective increase in the oxidation current of the competing species. This phenomenon is discussed in terms of the proposed mechanisms involving dehydrogenation of the hydrocarbon with subsequent H adsorption. A comparison of the behaviors of H_2SO_4 , H_3PO_4 and CF_3COOH in the presence and absence of gaseous hydrocarbons is given. The different rates of hydrocarbon adsorption indicate the degree of influence which the electrolyte has upon hydrocarbon oxidation.