

Electrochemical Behavior of Porous Titanium Electrodes in Phosphoric Acid

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The methods of cyclic voltammetry and potentiometry are used to study the electrochemical processes running on the surface of porous titanium electrodes in solutions of phosphoric acid. In concentrated solutions, the electrode potential is equal to -0.30 – -0.35 V, regardless of the method of preconditioning, which indicates the presence of corrosion activation. The difference of potentials of the cathodic and anodic peaks on cyclic voltamperograms is close to 200 mV, which allows the realization of several interconnected processes, such as the changes in the phase compositions of the surface layers on titanium and the redox processes with participation of soluble forms in the form of Ti^{3+} and TiO^{2+} ions. It is shown that the corrosion of titanium in strongly acidic solutions is intensified by Ti^{3+} ions accumulated on the surface of the electrode due to the slow diffusion in its pores. The corrosion process is inhibited as a result of the decrease in the concentration of solution, which leads to the hydrolysis of corrosion products accompanied by the formation of insoluble compounds.

Keywords

monitoring of atmospheric air titanium phosphoric acid corrosion porous electrode titanium ions insoluble compounds