

**Effect of KCNS and Na<sub>2</sub>HAsO<sub>4</sub> Additions on Kinetics of Hydrogen Evolution Reaction on Iron and Hydrogen Diffusion through the Steel Membrane in C<sub>2</sub>H<sub>4</sub>(OH)<sub>2</sub>-H<sub>2</sub>O-HCl System**

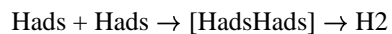
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The influence of CNS- - anions and arsenic-containing particles (H<sub>3</sub>AsO<sub>4</sub>, H<sub>2</sub>AsO<sub>4</sub><sup>-</sup>, HAsO<sub>4</sub><sup>2-</sup>) on the hydrogen overvoltage and a nature of the rate-determining step of the hydrogen evolution reaction on iron in the HCl ethylene glycol solutions with a constant ionic strength has been studied. Simultaneously the regularities of hydrogen diffusion through the steel membrane under the same conditions have been investigated. The influence of water concentration (0.4 – 100 mas.%), the concentration of the stimulators of hydrogen entry into the metal (0.0005 – 0.01 M), HCl concentrations (0.005 – 0.05 M), a duration of the experiments on the flow of hydrogen diffusion into the steel membrane is considered. Additions of water (2 – 90 mas.%), CNS- and HAsO<sub>4</sub><sup>2-</sup> cause a substitution of the rate-determining discharge step by the rate-determining recombination step but this fact doesn't define a change of the solid-phase diffusion flow of hydrogen.

The influence of Hads surface diffusion and kinetics of the intermediate steps of the reaction



on the hydrogen entry into the metal is considered. By the mathematic modeling method the kinetic equation allowing a prediction of the influence of the various factors on kinetics of hydrogen solid-phase diffusion has been received and it has been compared with the experimental data.