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Investigations of the influence of di-2-ethyl-hexyl phosphoric acid on the parameters of electrolysis of zinc from acidic solutions

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Abstract

The aim of this work was to obtain data on the constants of zinc electrolysis in the presence of a extragent – di-2-ethyl-hexyl phosphoric acid (**I**) during potentiostatic and galvanostatic studies using a potentiostat.

As a result of the work carried out, it was shown that additions of the extragent **I** reduce the rate of the electrochemical process and the total polarization capacity. At the same time, molecules organic substances have relatively large dimensions, and their adsorption leads to an increase in the distance between the plates of the capacitor in the double layer and, thereby, reduces of the polarization capacitance.

When the **I** is introduced into the electrolyte in an amount of 40 mg/l, the exchange current is markedly reduced from 10^{-4} to 10^{-11} -10^{-13} A/cm^2, and the transfer number increases from 0.20-0.25 to 0.55-0.65. Thus, a decrease in the discharge rate is associated with a decrease in the exchange of current due to the formation of adsorption films on the zinc electrode. This addition to the electrolyte also affects the symmetry factor or transport of coefficient, which denotes the fraction of the distance between the two planes where the transition state is localized. The transfer of coefficient for the electroreduction of zinc from sulfate solutions decreases with stirring of the electrolyte and in the presence of sulfuric acid. In this experiment, the extragent covers the surface of the electrode, increasing the transfer coefficient of zinc reduction, but at the same time the potential in the region of the transition state «activation energy» increases, which leads to a decrease in the exchange of current.

The performed studies made it possible to obtain new data on the effect of the extragent **I**, used in zinc production for indium extraction, on the electrochemical parameters of zinc electrolysis.

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