

INHIBITION OF CORROSION OF CARBON STEEL 1018 IN ACID MEDIUM WITH ETHOXYLATED ALIPHATIC ALCOHOLS

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The effectiveness of inhibition of carbon steel 1018 in 1 M solution of HCl by three ethoxylated aliphatic alcohols with a different number of ethylene oxide units was investigated by measuring the weight loss of the steel and galvanostatic polarization. An increase in the effectiveness of inhibition with an increase in the concentration of the inhibitor, number of ethylene oxide units in its molecule, and decrease in the temperature was found. Inhibition of corrosion is due to adsorption of ethylene oxide groups in the inhibitors on the metal surface. Adsorption is described by a Langmuir isotherm. The effect of the temperature on the corrosion rate in the presence and absence of inhibitors was investigated. Some thermodynamic parameters of corrosion were calculated.

Key words: carbon steel 1018, ethoxylated aliphatic alcohols, corrosion inhibitors.

Solutions of acids are usually used in many industrial processes for removing scale and rust. Hydrochloric acid is widely used for acid treatment of steel. The use of inhibitors is one of the most practical methods of protecting metal from corrosion in acid solutions to prevent dissolution of the metal and consumption of acid [1]. Most corrosion inhibitors must displace water from the surface of the metal, react with anode or cathode reaction sites to slow redox corrosion reactions, and prevent migration of the ions of water and corrosive compounds to the surface of the steel [11].

Metal corrosion inhibitors can be divided into four types: inorganic, organic, surface-active, and mixed. Surface-active inhibitors are characterized by a number of advantages: high inhibition effectiveness, low cost, low toxicity, and ease of manufacture. Surfactant (SF) molecules consist of nonpolar hydrophobic and polar hydrophilic groups. In the general case, the inhibiting effect of these compounds in aqueous solutions is due to physical (electrostatic) or chemical adsorption on the metal surface and hydrocarbon chain transfer from solution to solid surface [12-17]. Adsorption of SF markedly affects the corrosion resistance of the metal, so that investigating the correlation between adsorption and inhibition effectiveness is especially important [18-20].

We investigated the inhibition effectiveness for carbon steel 1018 with three ethoxylated aliphatic alcohols in 1 M HCl solution by measuring the weight loss of the steel and the galvanostatic polarization. We also investigated the effect of the temperature on dissolution of carbon steel in this solution at an inhibitor concentration of 1000 ppm.

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