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USE OF ELECTROCHEMICAL METHOD IN EVALUATION OF CORROSION INHIBITOR CONTENT IN WATER AND OIL-WATER EMULSION

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Introduction. Intensive corrosion of the collection and transportation systems of oil and water mixtures at many fields is the most important problem of the oil-producing industries and entails significant losses for companies. The use of corrosion inhibitors is one of the most effective solutions to this problem, as it reduces the risk of destruction of metal structures interacting with aggressive oil-water fluids [1]. However, the high content of corrosion inhibitor in oil is the reason for the supply of low-quality raw materials for further conversion into fuel [2]. While the low content entails the destruction of metal structures. For this reason, there is a need to monitor the concentration of the inhibitor in the flow mode.

Main part. To determine the concentration, we used the electrochemical method of cyclic voltammetry. This method is based on the study of the dependence of the current strength on the value of the electrode potential (voltammogram). Using this highly sensitive method, the researcher receives information about the nature and content of substances that can be oxidized and reduced at the electrode, as well as about the nature of this process.

In this study, steel electrodes were selected to study the corrosion of metal structures. 4 corrosion inhibitors were selected for the study: TN IK8, ITPS-508, Sonkor 9920 A, Satis B. The collected database consists of electrochemical characteristics of samples of reservoir water, which is part of the extracted oil. To identify the dependence, different inhibitor content in reservoir water was used: 2, 6, 10, 15, 20, 25, 50, 75, 100 g/m^3.

Conclusions. The voltammograms of each sample are taken in stages, with a certain number of cycles. For each of the given concentrations of all four inhibitors, it was chosen to analyze 5 cycles, since after the 5th cycle the redox peaks change slightly. This amount is sufficient to analyze the concentration of a given inhibitor in an oil-water emulsion, and this approach also makes it possible to optimize the time spent on research.

The voltammograms shows clearly shows the difference in redox peaks at a given inhibitor content in the studied samples, and also reflects the difference between these concentrations. The comparison of the voltage curves reflects the dependence: the larger the area of the peaks of oxidation and reduction, the lower the concentration of the corrosion inhibitor in the test sample. The research confirms the effectiveness of using the electrochemical method in assessing the content of the inhibitor. During the study, electrode models were sketchily developed, which will later be implemented in an 8-channel potentiostat. This will allow the solution to be examined simultaneously using 8 working electrodes in the solution.

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