

Study of Corrosion Behavior of Experimental Alloys with Different Levels of Cr and High Levels of Mo Compared to Aisi 444

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Abstract : The fight against accelerated wear of the equipment used in the oil and gas sector is a challenge for minimizing maintenance costs. Corrosion being one of the main agents of equipment deterioration, we seek alternative materials that exhibit improved corrosion resistance at low cost of production. This study aims to evaluate the corrosion behavior of experimental alloys containing 15% and 17% of chromium (Cr) and 5% of molybdenum (Mo) in comparison with an AISI 444 commercial alloy. Microstructural analyzes were performed on samples of the alloys before and after the electrochemical tests. Two samples of each solubilized alloy were also taken for analysis of the corrosion behavior by testing potentiodynamic polarization (PP) and Electrochemical Impedance Spectroscopy (EIS) with immersion time of 24 hours in electrolytic solution with acidic character. The graphics obtained through electrochemical tests of PP and EIS indicated that among the experimental alloys, the alloy with higher chromium content (17%) had a higher corrosion resistance, confirming the beneficial effect of adding chromium. When comparing the experimental alloys with the AISI 444 commercial alloy, it is observed that the AISI 444 commercial alloy showed superior corrosion resistance to that of the experimental alloys for both assays, PP and EIS. The microstructural analyzes performed after the PP and EIS tests confirmed the results previously described. These results suggest that the addition of these levels of molybdenum did not favor the electrochemical behavior of experimental ferritic alloys for the electrolytic medium studied.

Keywords : corrosion, molybdenum, electrochemical tests, experimental alloys

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