Investigation of corrosion behavior of Cr13Ni5Mo2 supermartensitic stainless steel pipe for oil and gas applications

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Abstract: Corrosion is one of the most severe undesired phenomenon of deterioration the materials, (CRA) Corrosion resistant alloys like a supermartensitic stainless steel is one of many materials developed for oil and gas applications. This study focuses on the electrochemical characterization behavior of a supermartensitic stainless steel Cr13Ni5Mo2 in NaCl and Na2SO4 solutions. Polarization curves and electrochemical impedance measurements were obtained for different experimental conditions. The effect of heat treatment on the mechanical and corrosion properties was evaluated by treated quenching at 1050 °C for 15 minutes and tempering for 1 hour at (550 and 650 °C). A variety of examination techniques were used like optical microscopy (OM), scanning electron microscopy (SEM), energy dispersive spectrometer (EDS). The results showed that 650 °C tempered specimen much better corrosion resistance than that tempered at 550 °C in 0,5 M Na2SO4 and 0,5 M Na2SO4 + 5% NaCl solutions.

Keywords: 13Cr Supermartensitic stainless steel, heat treatment, corrosion