

Evaluation of cysteine as corrosion inhibitor for API 5L X65 carbon steel in CO₂-saturated NaCl solutions with acetic buffer controlled-pH

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Abstract

Cysteine as green corrosion inhibitor for API 5L X65 carbon steel in CO₂-saturated NaCl solutions with acetic buffer controlled-pH has been studied using potentiodynamic polarization and electrochemistry impedance spectroscopy (EIS) methods. Inhibition efficiency about 86% in CO₂-saturated NaCl solutions without buffer pH adjustment, and it decrease in line with diminishing of pH. Based on measurement of potentiodynamic polarization indicates that process of corrosion inhibition by suppressed Fe²⁺ ionic dissolution and improves barrier potential of hydrogen evolution, so that cysteine is categorized as mix-type inhibitor. Based on impedance data of EIS analyzed using equivalent electrical circuit model indicates that mechanism of corrosion inhibition through film forming of single molecules of cysteine adsorpted at carbon steel surface physically.

Keyword: cysteine, corrosion inhibitor, API 5L X65 carbon steel, Potentiodynamic polarization, Tafel, EIS