Corrosion inhibition effect of 1-butyl-3-methyl-1H-benzimidazolium iodide for 2205 duplex stainless steel in hydrochloric acid solution

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The anticorrosion properties of 1-butyl-3-methyl-1H-benzimidazolium iodide (BMBM) for 2205 duplex stainless steel in 1.0 M HCl solution has been evaluated by electrochemical techniques (potentiodynamic polarization and electrochemical impedance spectroscopy) and scanning electron microscopy. The effect of temperature and concentration on the inhibition efficiency have also been studied. The results reveal that BMBM is a mixed-type inhibitor whose adsorption obeys the Langmuir adsorption isotherm. The inhibition efficiency increased with increase in concentration, but decreased when the temperature was raised. The results obtained from kinetic analysis were compared with those of electrochemical techniques and they confirmed that BMBM is an effective green corrosion inhibitor for 2205 duplex stainless steel in 1.0 M HCl.

Keywords: 2205 duplex stainless steel, Hydrochloric acid, Corrosion inhibitor, Adsorption isotherm, Kinetic analysis

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