Experimental and Theoretical Evaluation of Asymmetric Thioureas on the Corrosion of Carbon Steel in Acidic Medium

Arthur Valbon¹, Marcelo. A. Neves², Aurea Echevarria^{1,*}

¹ Departamento de Química, Instituto de Ciências Exatas, Universidade Federal Rural do Rio de Janeiro, 23890-000, Seropédica – Rio de Janeiro, Brasil

² Departamento de Física, Instituto de Ciências Exatas, Universidade Federal Rural do Rio de Janeiro, 23890-000, Seropédica – Rio de Janeiro, Brasil

*E-mail: echevarr@ufrj.br

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The inhibitory effects of *N*-(*p*-X-phenyl)-*N'*-benzyl-thiourea (THIOB1 and THIOB2) and *N*-(*p*-X-phenyl)-*N'*-phenethyl-thiourea (THIOF1 and THIOF2) on the corrosion of AISI 1020 carbon steel in 1 mol L⁻¹ HCl were evaluated by polarization curves (PP), Linear Polarization Resistance (LPR), Electrochemical Impedance Spectroscopy (EIS) and molecular modeling. The corrosion inhibition efficiency of phenetyl-thioureas slightly exceeded that observed for benzyl-thioureas; also, all thioureas acted as mixed inhibitors. 98% was the maximum anticorrosion efficiency for THIOF2, obtained by LPR. The adsorption of the evaluated inhibitors followed Langmuir isotherm. Theoretical results were corroborated by experimental data that showed phenetyl-thioureas were slightly better corrosion inhibitors than benzyl-thioureas.

Keywords: Carbon steel, Polarization, EIS, Modeling studies, Acid corrosion

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