



Extract of the Green Corrosion Inhibitor for Carbon Steel in 1N and 2N HCl (An Experimental and Theoretical Study)

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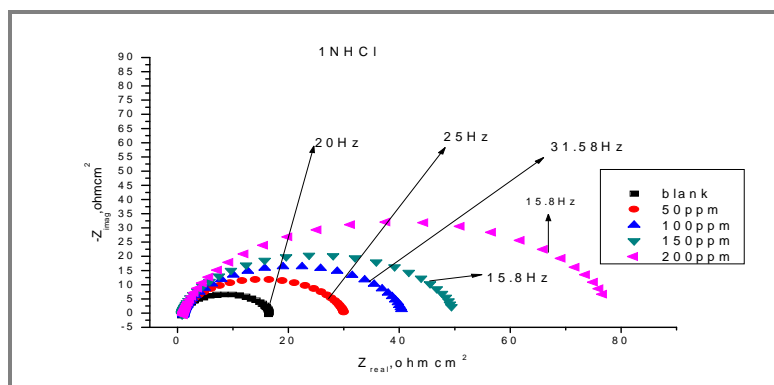
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Accepted on 26th August, 2019

ABSTRACT

In our study the adsorption behavior of coffee husk extract and corrosion safeguard for carbon steel (C.S) in different concentrations from hydrochloric acid (1N and 2 N HCl solutions) have been examined using the gravimetric method, electrochemical methods [impedance spectroscopy (EIS), potentiodynamic polarization (pp), Electrochemical frequency modulation (EFM)], surface analysis [SEM, EDX, UV-Visible spectroscopy and FT-IR] and theoretical study. The electrochemical measurements and gravimetric method designated that the extract of coffee husk shows best protection productivity of up to 92.4% and 69.7% for C.S at 200 ppm from coffee husk extract in 1N and 2N HCl solutions at 25°C respectively. The impact of temperature on protection efficiency, thermodynamic parameters, and adsorption isotherms for the coffee husk extract was studied. It was found that the adsorption occurred spontaneously, and the adsorption of coffee husk extract follows the Langmuir and Temkin adsorption isotherms. Potentiodynamic polarization measurements established that the extract of coffee husk performances as a mixed kind of inhibitor. The surface examination demonstrates the corrosion retardation of the coffee husk extract by the creation of a protective layer on the surface of C.S.

Graphical Abstract



Keywords: Coffee husk, Carbon steel, Corrosion, Electrochemical studies, Theoretical study.