

Study on the Effect of 1-(3-nitrobenzilidene) thiosemicarbazide on the Inhibition of carbon steel in acidic solution with electrochemical methods

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Abstract:

The use of inhibitors is one of the most practical methods for protection against corrosion, especially in acidic solution [1]. The organic compounds are widely used as acid inhibitors in industrial operations, such as pickling, cleaning, acidization of oil wells, to protect metals and alloys[2]. In the present work, the efficiency of a new synthesized organic compound (1-(3-nitrobenzilidene) thiosemicarbazide) as inhibitor (A) for the corrosion of mild steel in 0.5 M sulphuric acid is discussed on the basis of weight loss, electrochemical impedance spectroscopy (EIS), Tafel polarization data and scanning electron microscopy (SEM). Anodic and cathodic polarization curves for mild steel in 0.5M H₂SO₄ with various conc. of inhibitor (A) are shown in fig1. A decrease in both anodic and cathodic currents is noted. It was found from the polarization curves (Fig.1) that the used inhibitor is mixed type inhibitor on the other hand changes in polarization and impedance parameters value (I_{corr} , R_{ct} and C_{dl}) are obtained from Fig.1 and Fig.2 indicate that the absorbed protective film grows with increasing concentration of inhibitor. The impedance spectrums show a clear and slightly depressed semicircular shape in the complex impedance plane, with the center under the real axis. The equivalent circuit for this kind of complex impedance plane is plotted in fig3. by using Zsimpwin3.21 software Excellent fit with the model is obtained for all experimental data.

Keywords:

inhibitor, mild steel, AC impedance, corrosion

References:

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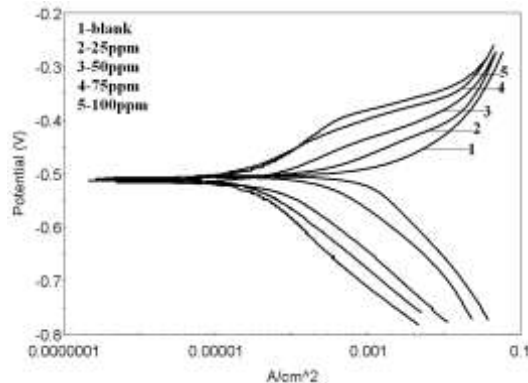


Fig1. Polarization curves for mild steel in 0.5M H₂SO₄ with various conc. of inhibitor (A)

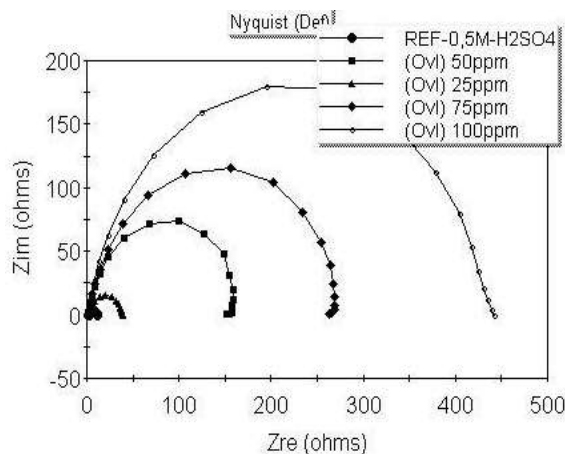


Fig2. Nyquist plots for mild steel in 0.5M H₂SO₄ with various conc. of inhibitor (A)

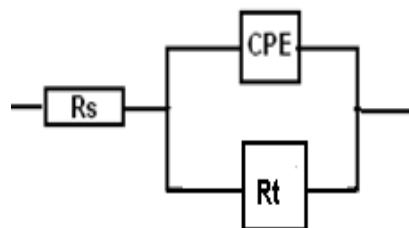


Fig 3.The suggested equivalent circuit model for the studied system