CORROSION INHIBITION OF MILD STEEL
BY SOME THIOPHENE COMPOUNDS IN HYDROCHLORIC ACID

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Mild steel is widely used in a variety of industrial applications such as petroleum industries, power plants, etc. Hydrochloric acid solutions are widely used for pickling, descaling, acid cleaning, oil-well acidifying, etc. [1]. The use of the inhibitor is one of the best known methods of corrosion protection. The efficiency of the inhibitor depends on the nature of environment, nature of metal surface and electrochemical potential at the interface, and the structural feature of the inhibitor, which includes the number of adsorption centres in the molecule, their charge density, the molecular size, and mode of adsorption, formation of metallic complexes and the projected area of inhibitor on the metal surface [2-3]. Organic compounds containing hetero-atoms such as N, O and S have been reported as efficient corrosion inhibitors for metals and alloys [4,5]. In acidic environments, organic compounds with more than one hetero atoms containing the pi-electrons exhibit high inhibiting properties by providing electrons to interact with metal surface [6]. 2-thiophene acetic acid (2-THA) and 3-thiophene acetic acid (3-THA) contain two kinds of heteroatoms (sulfur and oxygen) as well as pi electrons, which are assumed to be active centers of adsorption.

In this study, the inhibition effect of 2-thiophene acetic acid (2-THA) and 3-thiophene acetic acid (3-THA) on the corrosion behavior of mild steel in 0.1 M HCl solution was studied with the help of potentiodynamic polarization, linear polarization resistance and electrochemical impedance spectroscopy techniques. The experimental results showed that 3-THA inhibits the corrosion of mild steel in HCl solution and the inhibition efficiency depends on its concentration. The inhibition efficiency was related to the protective film formation on the metal surface.

![Figure 1](image_url)

**Figure 1.** Nyquist plots for the mild steel electrode in 0.1 M HCl (a) solution and containing 1.10^{-2} \text{ M/L}, a) 3-THA (●), and b) 2-THA (●).

References