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Use of *Sida cordifolia* Extract as Green Inhibitor for Mild Steel in 0.5 M H_2SO_4

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Highlights

- *Sida cordifolia* extract was recycled as a green corrosion inhibitor.
- The inhibition performance of *Sida cordifolia* extract was studied.
- The inhibition efficiency was calculated by polarization measurements and EIS study.
- The adsorption of *Sida cordifolia* extract was investigated by using SEM and AFM.

Abstract

The corrosion inhibition effect of *Sida cordifolia* extract, a perennial subshrub of the mallow family *Malvaceae,* has been examined on mild steel corrosion in 0.5 M H_2SO_4 by using weight loss measurements, potentiodynamic polarization measurements and electrochemical impedance spectroscopy (EIS) techniques. The presence of this Vasicinone, Vasicine and Vasicinol containing extract decreases the corrosion rate of mild steel in acidic solution. The best inhibition effect of *Sida cordifolia* extract for mild steel in 0.5 M H_2SO_4 was obtained at 500 mg/L using electrochemical and weight loss measurements. The adsorption of *Sida cordifolia* extract on the surface of mild steel has been investigated by using AFM study, SEM study and absorption spectroscopic techniques. Due to the existence of hetero atoms in the main components, *Sida cordifolia* extract is considered to be a good inhibitor.

Keywords: *Sida cordifolia*; Mild Steel; Electrochemical Impedance Spectroscopy; Polarization Measurements; SEM; AFM.

1. Introduction: Mild steel is utilized to make an extensive variety of hardware and metallic structures because of its minimal effort and great mechanical quality. A great economic loss may be caused during the process of acid pickling of mild steel (MS) in the industry because the compounds that we use to remove the impurities and unwanted surface deposits from the metal surface, consist of strong acids [1]. To overcome this phenomenon, lots of materials were developed as corrosion inhibitors [2-7]. However the synthetic compounds may have some