

Ethanollic extract of *Ruta chalepensis* as an eco-friendly inhibitor of acid corrosion of steel

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Abstract *Ruta chalepensis* extract (Ruta) was tested as a corrosion inhibitor for steel in 1 M HCl. Weight loss measurements, potentiodynamic polarization, and electrochemical impedance spectroscopy (EIS) were used. The inhibiting action increases with increasing concentration of the tested inhibitor. Efficiency is highest, 87 %, for 3.5 g/L Ruta extract. It acts on the cathodic domain without modifying the reduction mechanism. We note good agreement between gravimetric and electrochemical methods (potentiodynamic polarisation and EIS). Polarization measurements also show that Ruta extract is a good mixed inhibitor. The effect of temperature on the corrosion behaviour of steel in 1 M HCl was also studied in the temperature range 298–338 K. Thermodynamic data for activation were determined. Ruta extract is adsorbed on the steel surface in accordance with a Temkin adsorption model.

Keywords Corrosion · Steel · Inhibition · *Ruta chalepensis* extract · Acid medium

Introduction

Steel corrosion is receiving increasing attention of researchers [1, 2] in a variety of applications including oil well acidification, acid pickling, acid cleaning, and acid descaling. Inhibitors are used to protect steel against corrosion [3–5]. The major purpose of inhibitors is to form a barrier between the metal surface and the aggressive solution and prevent reaction with the hydrogen ion. Despite the wide range of organic compounds available as corrosion inhibitors, successful utilization of most corrosion inhibitors has been hindered by their toxic nature.

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