

Inhibitive effect by extract of *Mentha rotundifolia* leaves on the corrosion of steel in 1 M HCl solution

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Abstract An extract of *Mentha rotundifolia* leaves (*EMRL*) was tested as a corrosion inhibitor of steel in 1 M HCl using electrochemical impedance spectroscopy, Tafel polarization methods, and weight loss measurements. The inhibition efficiency of the extract of *Mentha rotundifolia* leaves was calculated and compared. We note good agreement between these methods. The results obtained revealed that the inhibitor tested differently reduced the kinetics of the corrosion process of steel. Its efficiency increases with the concentration and attained 92.87 % at 35 %. The effect of temperature on the corrosion behavior of steel in 1 M HCl was also studied in the range 298 and 338 K. The thermodynamic data of activation were determined. *Mentha rotundifolia* extract is adsorbed on the steel surface according to a Langmuir adsorption model.

Keywords Corrosion · Steel · Green inhibitors · *Mentha rotundifolia* extract · Acid medium

Introduction

Use of inhibitors is one of the most practical methods for protection against corrosion, especially in acid solutions to prevent unexpected metal dissolution and acid consumption [1, 2]. The corrosion inhibitors are one of the largest products within the water treatment chemicals market, and the global corrosion inhibitor market is expected to grow from ca. US\$ 5 billion in 2010 to ca. US\$6 billion in 2015 [3].

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