Natural Product Research, 2014
Vol. 28, No. 15, 1206–1209, http://dx.doi.org/10.1080/14786419.2014.919288

SHORT COMMUNICATION

Mentha pulegium extract as a natural product for the inhibition of corrosion. Part I: electrochemical studies

Abdelkader Khadraoui[a]*, Abdellah Khelifa[a], Hocine Boutoumi[a] and Belkheir Hammouti[b]

[a]*Laboratoire de Génie Chimique, Département de Chimie Industrielle, Faculté de Technologie, Université Saâd Dahlab de Blida, BP 270, Route de Soumaâ, Blida 09000, Algeria;* [b]*LCAE-URAC18, Faculté des Sciences, Université Mohammed Premier, Oujda, Morocco*

(*Received 5 November 2013; final version received 25 April 2014*)

The inhibitory effect of *Mentha pulegium* extract (MPE) on steel corrosion in 1 M HCl solution was investigated using potentiodynamic polarisation and electrochemical impedance spectroscopy. The inhibition efficiency of MPE was found to increase with the concentration and reached 88% at 33% (v/v). Polarisation measurements show that the natural extract acted as a mixed inhibitor. The remarkable inhibition efficiency of MPE was discussed in terms of blocking of electrode surface by adsorption of inhibitor molecules through active centres. The adsorption of MPE was found to accord with the Temkin isotherm.

Keywords: natural plant; *Mentha pulegium*; extract; green inhibitor; adsorption; steel

1. Introduction

Natural products were previously used as corrosion inhibitors for different metals in various environments (Khadraoui and Khelifa 2013; Khadraoui, Khelifa, Hamitouche, et al. 2014), and their optimum concentrations were reported. The obtained data showed that the plant extracts could serve as effective corrosion inhibitors and they have become important because they are environmentally acceptable, readily available and renewable source for a wide range of needed inhibitors. Plant extracts are viewed as an incredibly rich source of naturally synthesised chemical compounds that can be extracted by simple procedures with low cost. The extracts from the leaves, seeds, heartwood, bark, roots and fruits of plants have been reported to inhibit metallic corrosion in various acidic media (El-Etre et al. 2005; Okafor et al. 2005; Bouyanzer et al. 2006; Oguzie et al. 2006; Khadraoui et al. 2013).

Mentha pulegium is a species of flowering plant in the family Lamiaceae. The leaves exhibit a very strong fragrance similar to spearmint. It is a traditional culinary herb, folk remedy and abortifacient. *M. pulegium* plants are sources of diverse classes of natural products such as flavonoids, alkaloids and essential oils (Lorenzo et al. 2002). All oils were found to be rich in oxygen monoterpene hydrocarbons especially menthol, menthone, 1,8-cineole, pulegone and *p*-menthan-3-one (Marzouk et al. 2007).

In this work, the inhibitory action of *M. pulegium* extract (MPE) as a cheap, eco-friendly and naturally occurring substance on the corrosion behaviour of steel in 1 M HCl has been investigated through potentiodynamic polarisation and electrochemical impedance spectroscopy (EIS) methods.

*Corresponding author. Email: khadraoui.abdelkader@gmail.com