

Activity of aqueous extract of *Punica granatum* peels and mesocarp by cyclic voltammetry and correlation with corrosion inhibition behavior in acid medium

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Palavras-Chave: Corrosion, Green Inhibitors, Pomegranatum extract, Cyclic Voltammetry, Carbon Glassy

Introduction

Corrosion is responsible for important lost in industry. Corrosive process is spontaneous and can be recognized by different ways like alveolar, intergranular, transgranular, under tension and etc. Plant extracts are an incredibly rich source of natural chemical compounds that can be extracted by simple procedures with low cost and are biodegradable in nature. Corrosion inhibition of the extracts of *Azadirachta indica*, *Ferula gammosa*, *Black pepper* and *Punica granatum* were studied as corrosion inhibitors in acid medium. In this work we studied aqueous extract of *Punica granatum* peels and mesocarp by carbon glassy cyclic voltammetry and correlated the results with inhibition corrosion on microalloyed steel in chloride acid medium.

Results and Discussion

The aqueous extract of extract of *Punica granatum* was obtained as proposed by Phytotherapy formulary (ANVISA). The Extract was studied electrolytic cell composed by carbon glass as working electrode and a saturated calomelan as reference and platine wire as counter electrode. The voltammogram show a signal at 0,5 V at 50 mV/s as shown in figure 1.

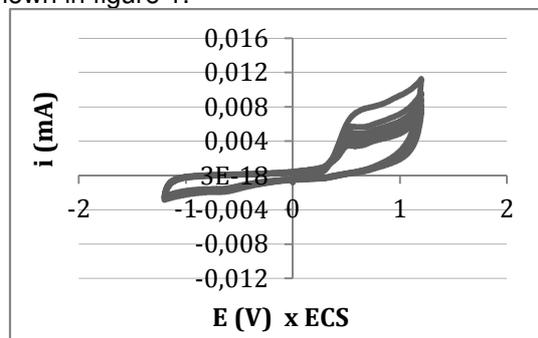


Figure 1. Cyclic voltammogram fo extract.

The effect of the inhibition corrosion on microalloyed steel in chloride acid medium by extract has been studied for polarization techniques. The acid solutions (0.1 M HCl) with and without presence of the extract were prepared by diluting of 37% HCl,

using deionized water. The electrochemical tests were made using a three-electrodes cell at room temperature (work electrode – micro alloyed steel, counter electrode – platinum, reference electrode – saturated calomel). The polarization experiments were obtained in an potentiostat/galvanostato- PGSTAT 302N). Polarization curves were realized with a scan rate of 1mV.s⁻¹ in the potential range from -1.5 to +0,7 V. Before all experiments, the work electrode was immersed in test solution for 1800 s, to ensure open circuit potential (OCP) to reach steady state; The preliminaries results shows that the presence of extract cause of a shift in the corrosion potential to more positive potentials (anodic direction). The corrosion current density decreases in the presence of the extract. It was possible to observe the decrease of the current on both sides of the polarization curve (anodic and cathodic). These preliminary results suggest that extract of the *Punica granatum* presents a mixed inhibition behavior in hydrochloric acid medium.

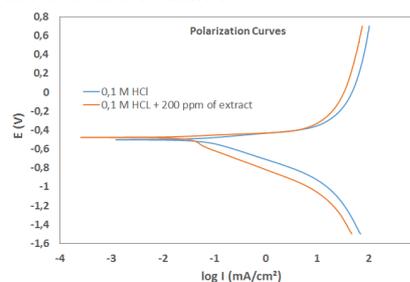


Figure 2. Polarization curves for the microalloyed steel in 0,1M HCl with e without extract.

Conclusions

The results of cyclic voltammetry and polarizations suggest a better study of chemical compound responsible of the behavior of corrosion green inhibition.

Knowledgments

The authors thank Prof. Angelo Silva and Carmelita G. Silva IFRJ/Nilopolis – Laboratório de Pesquisa I by support and FAPERJ.

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