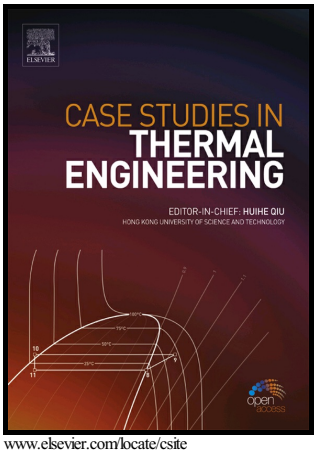

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Case Study on Thermal Impact of Novel Corrosion Inhibitor on Mild Steel

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ABSTRACT

Just a few investigations have studied the function of various temperatures in distribution system mild steel corrosion. Generally, increasing temperatures caused the accelerated corrosion of mild steel. In addition, the average of chemical processes were increased as the temperatures were increased regarding to Arrhenius' Law. The synthesis and characterization of a novel organic corrosion inhibitor 4-(((5-ethyl-1,3,4-thiadiazol-2-yl) imino) methyl) phenol, for mild steel in hydrochloric acid was successfully reported for the first time. This inhibitor is tested as corrosion inhibitor on a mild steel sample MS in 1M hydrochloric acid solution using Potentio-dynamics (PD) and Electrochemical Frequency Modulation (EFM) method. The results obtained indicate that inhibitor acts as an excellent corrosion inhibitor for mild steel sample in HCl solution with efficiency above 90%. Changes in the results parameters suggested adsorption on the surface of mild steel sample, which it leading to the formation of protective coating layer. However, this protective layer becomes weak when the temperature of the solution increases.

Keywords: 4-(((5-ethyl-1,3,4-thiadiazol-2-yl) imino) methyl) phenol, mild steel, corrosion inhibitor, Potentio-dynamics (PD).

INTRODUCTION

Industrial equipment exposed to corrode through using materials to clean them such as hydrochloric acid and sulphuric acid which are using in wide rang to clean and remove rust on metal surface after end of processes and in, this case protection form corrosion should apply to protect metal from corrode [1]. The effective of corrosion inhibitor incorporation was been among the present and give promising strategies to reduce the rate and effects of corrosion process in past few years [2]. The more efficient inhibitors are the organic inhibitors which contain hetroatoms such as nitrogen, sulfur and oxygen [3,4]. The adsorption of organic molecules at the metal-solution interface is of great interest in surface science and can be noted change the corrosion resistance of the metal [5]. It is generally accepted that the first step in the adsorption of an organic inhibitor on a metal surface usually involves replacement of one or more water molecules adsorbed at the metal surface [6]. In adsorption process on the metal surface the function of organic inhibitors is for blocking the active sites through displace the water molecules form the metal surface then forming a compact layer film to decrease the corrosion process rate [7]. The inhibitor adsorption process on the metal-solution interface can be effected by, nature and surface charge of the metal; the aggressive electrolyte type in the solution; and the chemical structure of the inhibitors that used to protect the metat surface [8]. This

In continuation of previous studies [9-19], here in we had focused tested of 4-(((5-ethyl-1,3,4-thiadiazol-2-yl) imino) methyl) phenol as organic and green inhibitor, 4-(((5-ethyl-1,3,4-thiadiazol-2-yl) imino) methyl) phenol is synthesized, and its chemical structure was cleared and confirmed by using spectroscopic techniques. The effect of temperature on corrosion inhibitor effectiveness was investigated by using Potentio-dynamics and Electrochemical Frequency Modulation (EFM) measurements.

EXPERIMENTAL SECTION