CORROSION INHIBITION OF AZOMETHINE COMPOUNDS FOR MILD STEEL IN 1M SULFURIC ACID

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MAY 2010

ACKNOWLEDGEMENTS

First of all, I would like to express my gratitude to Allah S.W.T. for giving me opportunity to complete my final year project. Sincere gratitude to my supervisor, Prof. Madya Dr. Hadariah Bahron for her entire valuable guidance, advice, comments and assistance in the course of this final year project.

My gratitude also goes to my co-supervisor, Cik Shadatul Hanom Rashid, Cik Noor Laila, and En. Ahmad Fauzi Abu Bakar for their guidance and advices. My final year project would not be successful without the guidance and help from them.

Last but not least, I would like to express my appreciation to my parents and friends for their endless support and encouragement in completing this final year project.

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ABSTRACT

CORROSION INHIBITION OF AZOMETHINE COMPOUNDS FOR MILD STEEL IN 1M SULFURIC ACID

Four Schiff base compounds namely NO_2sal-DET, NO_2hap-DET, NO_2sal-DMPDA and NO_2hap-DMPDA were successfully synthesized and characterized by elemental analysis, Infrared and ^1H NMR spectroscopy analysis as well as melting point determination. The inhibition effects of the Schiff bases on the corrosion of mild steel in 1M H_2SO_4 were studied by weight loss method. Results showed that NO_2sal-DET was the best inhibitor with efficiency of 84.21% at 1 x 10^{-2} M of inhibitor concentration. On the other hand, NO_2hap-DMPDA was the least efficient inhibitor with efficiency of 66.67% at concentration of 1 x 10^{-2} M. The inhibition efficiency increased with increasing concentration of the Schiff bases. The inhibitor performance seemed to be affected by the functional groups attached to the structure of the Schiff bases. The methyl (CH_3) group on the structure introduced steric hindrance that prevented the proper adsorption of the inhibitor on metal surfaces. As the amount of CH_3 increased in the Schiff base structure, the inhibition efficiency of the compound decreased.

CHAPTER 1

INTRODUCTION

1.1 Background and problem statement

Mild steel has a variety of applications industrially, for mechanical and structural purposes, like bridgework, buildings, steam engine parts and automobiles. It finds various uses in most of the chemical industries due to its low cost and easy availability for fabrication of various reaction vessels, tanks, pipes etc. Since it suffers from severe corrosion in aggressive environment such as in acidic media, it has to be protected. Acids such as HCl and H_2SO_4 have been used in drilling operations, pickling baths and in descaling processes (Sethi *et al.*, 2007).

Corrosion commonly occurs at metal surfaces in the presence of oxygen and moisture, involving two electrochemical reactions. Oxidation takes place at anodic site and reduction occurs at cathodic site. In an acidic medium, hydrogen evolution reaction predominates. Corrosion inhibitors reduce or prevent these reactions. They are adsorbed on metal surface and form a barrier to oxygen and moisture by complexing with metal ions or by removing corrodants from the environment (Sethi *et al.*, 2007). The process of corrosion is shown in Figure 1.0.