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Synthesis, Identification and the Study of Some New Azo Dyes as Corrosion Inhibitors for Copper in (1M) HCl

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Abstract

Three azo dye compounds were prepared such as (A_1, A_2, A_3) derived from reaction of 1,5- di hydroxy naphthalene with 4- amino benzoic acid , 4- amino benzene sulfonic acid and 4- nitro aniline. These azo dyes were identified by (CHN), infrared , ^{1}HNMR, and Mass spectroscopy . The effect of these azo dyes on the dissolution of copper in (1M HCl) solution was studied by weight loss and galvanostatic polarization techniques . The effect of temperature on the corrosion of copper at (303, 313, 323°K) was studied. The results indicated that inhibition efficiency increased with increasing temperature to reach (68.75 ,71.88 , 76.56) of (A_1, A_2, A_3) respectively at concentration (1000ppm) , (240min) and temperature (323°K) . The effect of temperature on the corrosion rate and some thermodynamic parameters (corrosion current , activation energy , enthalpy , entropy and free energy) were evaluated . The results showed that these azo dyes as good inhibitors for corrosion of copper . Inhibition is due to formation of complex adsorbed on the copper surface . The adsorption follows Langmuir adsorption isotherm.

Key Words : Azo compounds , Corrosion inihibitors , 1,5- Di hydroxy naphthalene, Copper Corrosion

1. Introduction

The use of inhibitors is one of the most practical methods for protecting materials against corrosion , especially in acidic media[1]. Acid solutions are widely used in industry , some of the important fields of application being acid pickling of copper , chemical cleaning and processing , are production and oil well acidification . As acidic media , HCl are often used as industrial acid cleaning and pickling acids . Because of the general aggression of acid solutions , inhibitors are commonly used to reduce the corrosive attack on metallic materials[2] – most well – known acid inhibitor are organic compounds containing nitrogen ,sulphur, and oxygen atoms . The efficiency of these compounds mainly depends on their abilities to be adsorbed on the metal surface with the polar groups acting as the adsorptive centers . Among them , organic dyes whose molecules meet certain desirable characteristics as potential corrosion inhibitors , have received a considerable amount of attention , many