"TO STUDY THE CORROSION INHIBITION OF ALLOYS IN AQUEOUS MEDIUM USING ORGANIC INHIBITORS"

Scholar

Monika

Supervisor

Dr. Wequar Ahmad Suddiqui
Department of Applied Science & Humanities
Jamia Millia Islamia

Co-Supervisor

Dr. Masood Alam
Department of Applied Science & Humanities
Jamia Millia Islamia

Corrosion is defined as the destruction or deterioration of material because of reaction with its environment. Corrosion can be fast or slow and is of many types depending on the mechanism of corrosion processes, the nature of environment, types of corrosion deteriorations and types of corrosion reactions. Most of the efficient inhibitors used are organic compounds that mainly contain nitrogen atom, oxygen atom and multiple bonds in molecules through which they are adsorbed on the metal surface. Even though a large number of organic compounds are available, the choice of selecting an appropriate inhibitor for a particular system is very limited due to specificity of their inhibition and the great variety of corrosion system. There always exist a need for developing new organic corrosion inhibitor. Therefore in the present work, the study has been undertaken on corrosion inhibition of alloys in acidic media by using certain organic compounds namely Tetra-N-butyl ammonium iodide (TBAI), N-Cetyl-N,N,N-trimethyl ammonium bromide (CTMAB), 1-3-di amino-propane (DAP) and 3-Hydroxy-2-methyl-4-pyrone (HMP). These inhibitors have been chosen due to their ability to be adsorbed on metal surface.

The first chapter deals with general introduction about the corrosion inhibition and its types. A detailed discussion of past work from various aspects has been included along with the all-relevant references for corrosion inhibition. The problem has been clearly defined with the objects of present work in this chapter.

In second chapter, preparation of alloys coupons and electrodes along with the experimental techniques like galvanostatic poilarization, infrared (IR) spectroscopic and surface characterizations by using scanning electron microscope have been defined briefly. The various circuit diagrams have also been presented.

The third chapter includes the weight loss studies of alloys at different temperatures 298K, 308K, 318K, 328K in presence of various concentrations viz. 10^{-1},10^{-3},10^{-}

^{5} and10^{-7}M. The inhibition efficiencies of inhibitors have been obtained at various concentrations and temperatures.

The fourth chapter gives about the study of galvanostatic polarization in absence and presence of inhibitors at various concentrations and temperatures, which show that four additives are mixed type with slight dominance of anodic character. The inhibition efficiency increases with the increase in concentration and decreases with the rise in temperature. These additives, Tetra-N-butyl ammonium iodide (TBAI), N-Cetyl-N,N,N-trimethyl ammonium bromide (CTMAB), 1-3-di amino-propane (DAP) and 3-Hydroxy-2-methyl-4-pyrone (HMP), are very useful set of inhibitors when the corrosion inhibition is acquired for the range of temperatures.

The fifth chapter has all the detail of temperature kinetic studies carried out at various temperatures viz. 298K, 308K, 318K, 328K in presence of various concentrations of inhibitors viz. Tetra-N-butyl ammonium iodide (TBAI), N-Cetyl-N,N,N-trimethyl ammonium bromide (CTMAB), 1-3-di amino-propane (DAP) and 3-Hydroxy-2-methyl-4-pyrone (HMP). Surface coverage has been calculated from galvanostatic study data and from these data an attempt has been made to fit this in Langmuir's adsorption isotherm. Heat of adsorption and activation energy has been calculated from various plots.

In the sixth chapter, Fourier Transform Infrared (FTIR) spectroscopic studies of all these pure and adsorbed additives have been reported. Certain peaks either disappeared completely or reduced in intensities. This proves that adsorption of additives have taken place on solid surface.

The seventh chapter deals about the surface morphology of alloys with the help of scanning electron microscope. The micrographs of plain alloys, corroded surface in 1N H_2SO_4 acid and inhibited surfaces in presence of highest 10^{-1}M and lowest 10^{-7}M concentrations of these additives have been obtained.

The chapter eight, gives the overall conclusion drawn from the weight loss, galvanosatic polarization, Fourier Trnasform infrared (FTIR) spectroscopic and scanning electron microscopic (SEM) studies in 1N H_2SO_4 in presence of TBAI, CTMAB, DAP and HMP additives.