

Exudate Gum from Acacia Trees as Green Corrosion Inhibitor for Mild Steel in Acidic Media

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Abstract: The inhibition effect of exudate gum from Acacia trees (Gum Acacia, GA) on the corrosion of mild steel in acidic media was studied by weight loss, hydrogen evolution, and electrochemical polarization methods; also, surface morphology was analyzed by Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and X-ray photoelectron spectroscopy (XPS) techniques. The results of weight loss, hydrogen evolution, and electrochemical polarization methods indicated that inhibitor efficiency (I%) increased with increasing inhibitor concentration. The inhibitor efficiency (I%) in hydrochloric acid is much more than those in sulfuric acid due to the synergistic effect. The percentage inhibition efficiency (I%) of steel corrosion with GA is highly increased in the presence of an external magnetic field. Results of weight loss method are highly consistent with those obtained by hydrogen evolution method, and both indicate that inhibitor efficiency increases with increasing inhibitor concentration and the presence of external magnetic field. Electrochemical polarization studies showed that Gum Acacia acts as mixed type inhibitors. The results reveal that Gum Acacia provided a very good protection to mild steel against corrosion in acidic media. FTIR, SEM and XPS confirmed the existence of an absorbed protective film on the mild steel surface.