Enhancement the Inhibition Efficiency of Synthesized Polymeric Surfactants for carbon steel using silver nanoparticles

E. M. S. Azzam, M. A. Migahed and A. A. A. Abd Elaal

Egyptian Petroleum Research Institute, Ahmed Al-Zomor Street, Nasr City, Cairo 11727, Egypt

In the present work the polymers of some monomeric thiol surfactants namely (6-(3-amino phenoxy) hexane-1-thiol, 8-(3-amino phenoxy) octane-1-thiol, 10-(3-amino phenoxy) decane-1-thiol, 12-(3-amino phenoxy) dodecane-1-thiol) were prepared. The chemical structure of the polymeric surfactants was confirmed using FTIR, TGA, DSC and XRD analysis. The self assembling of these surfactants on silver nanoparticles was investigated. The self-assembling of these surfactants on silver nanoparticles was characterized using different techniques such as UV spectroscopy, powder X-ray diffraction (XRD), Electron Diffraction (ED) and Transmission Electron Microscopy (TEM). The application of these surfactants and their nanostructure with the prepared silver nanoparticles as corrosion inhibitors for carbon steel was studied. Various techniques were used for evaluation of these surfactants and their nanostructure as corrosion inhibitors such as Weight loss, Polarization and Energy dispersive analysis of X-rays (EDAX) Techniques. The weight loss, polarization and EDAX results show that, the synthesized polymeric thiol surfactants have ability to act as corrosion inhibitors for the carbon steel. The inhibition efficiency of the synthesized surfactants increase as the alkyl chain length in the hydrophobic moiety increase. The nanostructure of the synthesized polymeric thiol surfactants with silver nanoparticles has more inhibition efficiency than the individual surfactants, which gives a clear indication about the effect of silver nanoparticles in the enhancement of the inhibition efficiency for these surfactants.