**ABSTRACT**

Polyurethanes synthesized from soya bean oil were characterized by Fourier-transform infrared spectroscopy, scanning electron microscopy (SEM), X-ray diffraction and energy-dispersion X-ray analysis methods. Thermal stability of the polyurethanes was investigated by thermogravimetric analysis. The corrosion inhibition effect of polyurethanes on mild steel in 1 M H2SO4 was studied using weight loss, potentiodynamic polarization and electrochemical impedance spectroscopy methods. The effect of temperature on the corrosion behaviour of mild steel was studied in the temperature range (303–333 K) with optimum inhibitor concentration. The adsorption of the inhibitors was found to obey the Langmuir adsorption isotherm. It was found that the inhibition efficiency increased with increase in concentration but decreased with increase in temperature. The associated activation energy and other thermodynamic parameters such as adsorption–desorption equilibrium constant (Kads), standard free energy of adsorption (ΔG◦ads), enthalpy of adsorption (ΔH◦ads) and entropy of adsorption (ΔS◦ads) were calculated to elaborate the corrosion inhibition mechanism. Surface morphology of the mild steel plate immersed in 1 M H2SO4 was characterized by SEM and AFM techniques.