**Abstract**

The anticorrosion potential of thiadiazole derivatives on mild steel in 1 M H2SO4 medium has been studied using weight loss method and surface analysis at 303 K-333K. The inhibition efficiency was found to increase with increasing concentration of the inhibitors but decreased with increase in temperature, which is attributed to physisorption. The adsorption of the inhibitors on the mild steel surface obeyed the Langmuir adsorption isotherm. Various kinetic and thermodynamic parameters reveal a weak interaction between inhibitor and mild steel surface. Further, scanning electron microscope (SEM) and atomic force microscope (AFM) analyses supported the inhibitive action of the inhibitors by the formation of protective layer over the mild steel surface. Quantum chemical method was employed for theoretical calculations and the obtained results were found to be consistent with experimental findings.