

Effect of Avogadro natural oil on the corrosion inhibition of mild steel in hydrochloric acid solution

Abstract

The inhibition action of Avogadro natural oil on corrosion of mild steel in one molar hydrochloric acid solution was investigated by gravimetric and potentiodynamic polarization techniques. The surface morphology of as-corroded samples was assessed with high resolution scanning transmission electron microscopy equipped with energy dispersive spectroscopy (HR-STEM/EDS). From the results, the presence of Avogadro natural oil in the metal–acidic interface decreased the corrosion rate with all the exposure times. The inhibition efficiency (%IE) increases with the concentration of the inhibitor considered. Results obtained from gravimetric measurements indicate that the natural oil exhibited higher efficiencies of 93.26 % after 384 h of exposure time and 98.26 % recorded in the potentiodynamic polarization method, both at 4.5 g/v inhibitor addition. Equally, results from the linear polarization indicated higher potential value with an increase in the polarization resistance (R_p) and lower current density for the inhibited samples than the uninhibited mild steel sample. The inhibitive effect of this oil was explained in view of adsorption on the metal surface. The adsorption process follows the Langmuir adsorption isotherm.

Keywords

Avogadro natural oil SEM–EDS Inhibition efficiency Adsorption Interface