**ABSTRACT**

The phytochemical constituents of *Delonixelata*, characterized by gas chromatography-mass spectroscopy (GCMS) and their inhibitive action on mild steel in 0.5 M H2SO4 medium, are discussed in the present study. The impedance and polarization techniques showed a similar trend as regards concentration and inhibition efficiency. The optimized concentration of *D. elata* (10 % v/v) resulted in high inhibition efficiency (85.96%). To confirm the adsorption of inhibitors on the mild steel surface, morphological studies of the latter were carried out by means of scanning electron microscopy (SEM), energy dispersive spectroscopy (EDX) and atomic force microscopy (AFM) techniques for both uninhibited and inhibited specimens. The electrochemical measurements and surface studies were well associated with each other.