

Abstract:

The investigation of the corrosion inhibition of X60 steel and 2017A aluminium in 1 M hydrochloric acid medium by aqueous (EA) and ethanolic (EE) extracts of *Nigella Sativa* L. seeds, *Punica Granatum* fruit peel and *Pelargonium Graveolens* leaves, was performed using electrochemical techniques, High Performance Liquid Chromatography (HPLC), Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM).

The results of the study showed that the inhibition efficiency $E(\%)$ increases with increasing extract concentration and decreases with temperature rise. The study of the influence of temperature allowed us to understand the mechanism of action of these inhibitors on the corrosion of steel and aluminium. We found that the active molecules of the studied extracts adsorb on the metal surface by forming physical bonds following the Langmuir adsorption isotherm. These extracts behave as mixed type inhibitors, with a cathodic predominance in the case of aluminium in the presence of EA and EE extracts of *Nigella Sativa* L. seeds.

The ethanolic extract of *Nigella Sativa* L. seeds exhibit the best inhibition efficiency (96.7%) on steel with 4g/L, while *Punica Granatum* fruit peel provides maximum efficiency (78.9%) with aluminium for 7g/L of the ethanolic extract. The leaves of *Pelargonium Graveolens* are more efficient with aluminium and give an inhibition efficiency of 88.6% for 1g/L of ethanolic extract and 5g/L of aqueous extract.

Keywords : Corrosion, Inhibition, Acid, Steel, Aluminium, Plant extracts, *Nigella Sativa* L., *Punica Granatum* , *Pelargonium Graveolens*.