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Green and sustainable local biomaterials for oilfield chemicals: *Griffonia simplicifolia* extract as steel corrosion inhibitor in hydrochloric acid

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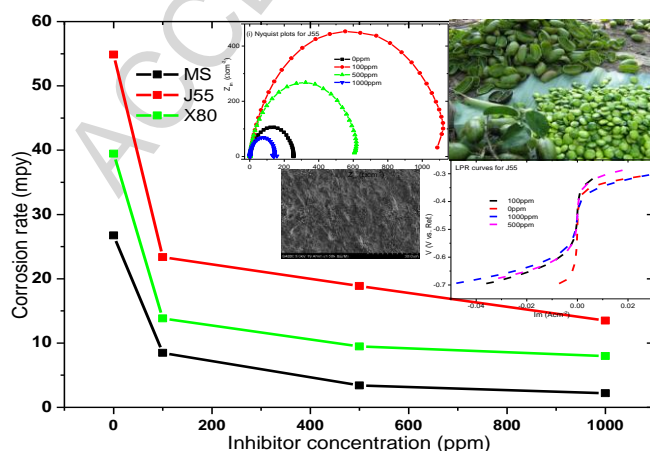
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Abstract

Mild steel (MS), X80 and J55 steel are commonly used in construction of oilfield line pipes, casings, tubing and storage facilities. Their corrosion behaviour was investigated in 1 M HCl solution in absence and presence of seed extracts of *Griffonia simplicifolia* (SEGS) at 303K. Corrosion rates obtained using weight loss technique at 303K followed the trend J55>X80>MS. Inhibition efficiency up to 91.73 %, 79.78 % and 75.41 % for MS, X80 and J55 respectively at 1000 ppm SEGS. SEGS was spontaneously physisorbed on the steel surfaces as best described by Temkin adsorption isotherm. Electrochemical measurements also conducted in the absence and presence of SEGS yielded comparable results. Charge transfer resistance increased as double layer capacitance decreased due to increase in thickness of SEGS protective film formed. SEGS acted as mixed type inhibitor with anodic predominance. Scanning Electron Microscopy (SEM) micrographs of the corroded surfaces reveal efficient protection of all the metal surfaces by addition of SEGS. SEGS could find application as anticorrosive oilfield chemical additive for acidizing, enhanced oil recovery and well treatment fluids.

Graphical Abstract



Keywords: Oilfield chemical; corrosion inhibitor; EIS; Polarization; *Griffonia simplicifolia*.

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