Prediction of corrosion rates of pipeline steel in agricultural produce/hydrochloric acid corrosion system

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This preliminary investigation examines corrosion inhibition efficiencies of onion (Allium cepa) and its effects on pipeline steel in hydrochloric acid using gravimetric, gasometric and thermometric techniques. As a complimentary study, variously treated pipeline steel, exposed to natural environments were observed over several days of exposure. However, the corrosion rate of steel increased with increase in time of immersion in HCl whereas, it decreased as the concentration of the extract was increased in the corrosion system. In freely corroding state, the corrosion rates ranged from 2.15 mmpy to 1.08 mmpy in 10 M and 5 M hydrochloric acid respectively. At an inhibitor concentration of 20%, the corrosion rates decreased to 1.3x10^-2 mmpy and 2.5x10^-4 mmpy respectively corresponding to inhibition efficiencies of between 83% and 92%. The adsorption of active components in the extracts obeyed the Langmuir adsorption isotherm. Also, the predicted values of corrosion rates using a modified Milliams and De-Waards model agreed within a close approximation of experimental values. From examinations performed on painted steel specimens during natural exposure tests, the onion extracts dispersed in a white colored alkyd paint system preventing paint delamination over a period of 14 days.

Innovation at Henkel adhesives through strategic partnerships

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