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This study aimed at investigating the corrosion inhibiting properties of 2,4,6-triamino-3-pentadecylphenyl acetate on mild steel in seawater. The study is divided into two parts; the synthesis of 2,4,6-triamino-3-pentadecylphenyl acetate as a corrosion inhibitor and its corrosion inhibition performance test. The corrosion inhibitor was synthesized through a series of chemical reactions as explained in the experimental part. The FT-IR results of the synthesized inhibitor show an absorption peak at 3459 cm−1 due to N-H stretching vibration and 1544 cm−1 due to N-H bending vibration, indicating the presence of amine groups in the structure of the synthesized inhibitor. The corrosion inhibition performance test of 2,4,6-triamino-3-pentadecylphenyl acetate was investigated on the mild steel electrodes in seawater at a stationary condition, at 30 °C and pH 8 by using two electrochemical techniques namely potentiodynamic polarization and electrochemical impedance spectroscopy. The results obtained show that the inhibition efficiency of 2,4,6-triamino-3-pentadecylphenyl acetate increases with increasing inhibitor concentration from 0 to 300 ppm. The maximum inhibition efficiency of 93% was found in the presence of 300 ppm of 2,4,6-triamino-3-pentadecylphenyl acetate for both potentiodynamic polarization and electrochemical impedance spectroscopy techniques. The potentiodynamic polarization curves show that 2,4,6-triamino-3-pentadecylphenyl acetate acts as an anodic inhibitor. The Nyquist plots revealed that the diameter or size of the semicircle increases as the concentration of the inhibitors increases due to formation of a protective film of inhibitor over the mild steel surface. However, the double layer capacitance (Cdl) and corrosion current density (icorr) decrease as the concentration of the inhibitor increases while the polarization resistance (Rp) increases. The results obtained from two electrochemical techniques are in good agreement. The adsorption of 2,4,6-triamino-3-pentadecylphenyl acetate on the mild steel surface obeyed Langmuir adsorption isotherm via chemical adsorption. The surface morphology analysis of the mild steel by Atomic Force Microscopy (AFM) revealed that the addition of optimum concentration of the inhibitor has significantly reduced the surface damage of the mild steel.