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Synthesis and anticorrosion studies of 4-[(2-nitroacetophenonylidene)-amino]-antipyrine on SAE 1012 carbon steel in 15 wt.% HCl solution

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Abstract

A novel corrosion inhibitor, ((E)-1,5-dimethyl-4-((1-(3-nitrophenyl)ethylidene)amino)-2-phenyl-1,2-dihydro-3H-pyrazol-3-one) (DNPP) was synthesized in high yield by the condensation reaction of 4-aminoantipyrine with 2-nitroacetophenone derived from acetophenone as a starting material and characterized by FT-IR, ¹H, and ¹³C NMR techniques. DNPP was tested against the corrosion of SAE 1012 carbon steel in 15 wt.% HCl solution using electrochemical and surface characterization techniques. Results obtained show that DNPP is effective in retarding the corrosion of SAE 1012 carbon steel. With 4 mM of DNPP, the charge transfer resistance of SAE 1012 in 15 wt.% HCl solution is raised from 17.42 to 140.50 Ω cm² and the substrate surface is protected by 87%. The inhibition is through adsorption mechanism (mixed-adsorption type) and has been confirmed by SEM and EDAX results. Potentiodynamic polarization results reveal that DNPP acted as a mixed-type corrosion inhibitor. DNPP is a promising candidate for the formulation of an inhibitor cocktail for the strong acid environment.

Keywords:

- [4-aminoantipyrine](#)
- [Schiff base](#)
- [Carbon steel](#)
- [Corrosion](#)
- [Corrosion inhibition](#)

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Disclosure statement

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Additional information

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