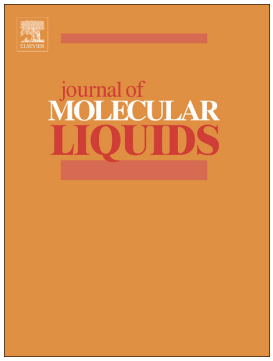


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# Correlated Experimental and Theoretical Study on Inhibition Behavior of Novel Quinoline Derivatives for the Corrosion of Mild Steel in Hydrochloric Acid Solution

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## ABSTRACT

The corrosion inhibition properties of three quinoline derivatives namely, 2,6-dichloroquinoline-3-carbaldehyde (QA-1), 2-chloro-6-nitroquinoline-3-carbaldehyde (QA-2) and 2,6-dichloro-8-nitroquinoline-3-carbaldehyde (QA-3) for mild steel (MS) in 1.0 M HCl at 303 K were studied by using electrochemical techniques, the density functional theory and molecular dynamic simulations. Experimentally obtained results showed that the quinoline derivatives are excellent inhibitors and that their adsorption on metal surface was found to follow that of the Langmuir adsorption model. Electrochemical findings revealed that quinoline derivatives behave as mixed-type inhibitors. These inhibitors increased the polarization resistance and simultaneously lowered the double layer capacitance, thereby confirming their high potentialities to protect metal against dissolution. Surface morphology of the MS surface in both the absence and presence of quinoline derivatives was examined using Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM). The mechanism of inhibition action of the studied quinolines was discussed in the light of the DFT and