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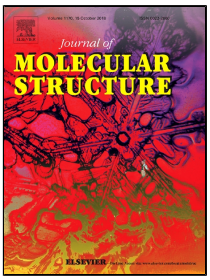

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Synthesis, spectral properties and corrosion inhibition efficiency of new ethyl hydrogen [(methoxyphenyl) (methylamino) methyl] phosphonate derivatives: Experimental and theoretical investigation

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Abstract

Tow new α-aminophosphonic acids, Ethyl hydrogen [(2-methoxyphenyl)(methylamino) methyl]phosphonate (**2-EHMAP**) and Ethyl hydrogen [(3-methoxyphenyl)(methylamino) methyl]phosphonate (**3-EHMAP**) were synthesized by the reaction between Methylamine, 2- or 3-Methoxybenzaldehyde and Diethylphosphite in THF solution with $FeCl_3$. The structures of the title compounds were determined by UV-Vis, FT-IR, ^{1}H, ^{13}C, ^{31}P NMR and MS spectra and confirmed by centesimal analysis. Their inhibition efficiency on the corrosion of mild steel in 1M HCl and 0.5M H_2SO_4 solutions was studied by weight loss, polarization curves and electrochemical impedance spectroscopy (EIS). The surface morphology of XC38 simple was studied by scanning electron microscopy (SEM) and Atomic Force Microscopy (AFM). The experimental results show that both molecules are mixed inhibitors and that their adsorptions on the surface of mild steel obey the Langmuir isotherm and that the **2-EHMAP** exhibit better inhibition efficiency. Quantum chemical calculations were performed by using DFT to study the influence of molecular structure on the inhibition efficiency; theoretical findings are in good accord with the experimental observations.

Keywords: Synthesis; α-aminophosphonates; mild steel; corrosion; inhibition efficiency; DFT.

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