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## Some Hydrazine Derivatives as Corrosion Inhibitors for Mild Steel in 1.0 M HCl: Weight loss, Electrochemical, SEM and Theoretical Studies

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### Abstract

The inhibition of mild steel corrosion in 1.0 M HCl by some hydrazine derivatives namely: (1*E*,2*E*)-1,2-bis(thiophen-2-ylmethylene)hydrazine (**PP2**) and (1*E*,2*E*)-1,2-bis(1*H*-pyrrol-2-ylmethylene)hydrazine (**PP3**) has been investigated using weight loss, electrochemical studies, SEM and quantum chemical calculations. The results showed that PP3 is the best corrosion inhibitor among the three compounds studied and the inhibition efficiency increases with increase in concentration for all the inhibitors. The adsorption of inhibitor molecules on mild steel surface was found to be spontaneous and obeyed the Langmuir adsorption isotherm. Potentiodynamic polarization investigations indicated that the studied inhibitors were mixed type inhibitors. Electrochemical Impedance Spectroscopic measurements show that the inhibitors form an adsorptive layer on the metallic surface. Some of the inhibitors' quantum chemical parameters are calculated with the DFT method at the B3LYP/6-31G(d,p) level of theory. Among the calculated parameters, the LUMO energy, energy gap between the

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