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Corrosion Resistance of Mild Steel Coated with Pyrazol Moiety Orgainc Material

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Editorial

The pyrazole moieties of Pyridine (P1) and Benzoic Acid (P2) derivatives were produced and tested as mild steel corrosion inhibitors in an acidic condition. Electrochemical Impedance Spectroscopy (EIS), potentiodynamic polarisation, and weight loss measurements were used to assess the results. SEM, UV-Vis, and X-Ray Photoelectron Spectroscopy (XPS) spectroscopies were used to evaluate the surface morphologies of the control and steel samples coated with the pyrazole derivatives P1 and P2. Minor modifications on steel surfaces were discovered before and after immersion in a 1M HCl solution. P1 and P2 both function as mixed-type inhibitors. The carboxyl group that is placed at the para position to the amino group in the Benzoic Acid derivative (P2) demonstrated a greater effectiveness than P1, which might be attributed to the carboxyl group that is located at the para position to the amino group. The amino and carboxyl groups have a direct electrical resonance as a result of this. As a result, the carboxyl group's electron density increased, and the carboxyl group's attachment to the metal surface became stronger. The bonding of both pyrazoles on mild steel surfaces follows the Langmuir adsorption isotherm, according to the results. The link between the molecular structures and inhibitory efficiency of P1 and P2 was theoretically defined using quantum chemical simulations. A powerful acid, such as hydrochloric acid or a mixture of hydrochloric acid and nitric acid, is used in the pickling process of steel. Corrosion is caused by residual acid on the steel surface after the pickling process. The use of an inhibitor is one technique to get around this severe problem. The majority of inhibitors used for this purpose are organic-based compounds with metal coordination sites. Multiple bonds and heteroatoms such as sulphur, oxygen, and nitrogen make up the coordination sites. These inhibitors prevent corrosion by complexing with the metal surface and producing a protective layer that blocks active corrosion sites.

Unfortunately, the majority of the inhibitors described are either hazardous or pose an environmental risk. As a result, an inhibitor that is free of these disadvantages will be particularly appealing. Pyrazine-based substance is one option. Pyrazole and pyrazole derivatives are well-known in the medical field because they contain functions that require a strong connection with the metal surface. Antimicrobials, antifungal agents, anti-inflammatory agents, anticancer agents, and antitubercular agents are all common uses for them. Pyridine-pyrazoles are more useful for this purpose than other pyrazole derivatives because they have several coordination sites, allowing them to attach to metal surfaces more strongly. The use of pyridine-pyrazole compounds as corrosion inhibitors was found to have a high anticorrosive performance in a study. The inclusion of a side chain on pyrazole increased the pyrazole's efficiency, with the longer the chain, the better the efficiency. The chemical structures of both compounds P1 and P2, as well as mild steel specimens coated with both materials and tested for

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anticorrosion capabilities in a 1M aqueous HCl solution. Electrochemical impedance spectroscopy, polarisation measurements, quantum chemical studies, Scanning Electron Microscopy (SEM), UV-Vis, and XPS (X-ray photoelectron spectroscopy) spectroscopies are among the spectroscopic and gravimetric techniques used.