Electrochemical Studies of Bitter Gourd (*Momordica charantia*) fruits as Ecofriendly Corrosion Inhibitor for Mild Steel in 1 M HCl Solution

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Fruits extract of *Momordica charantia* (MCFE) was characterized using gas chromatography (GC), and mass spectrometry (MS) methods. The influence of MCFE on corrosion of mild steel in 1M HCl solution was evaluated using static electrochemical methods. Electrochemical Impedance Spectroscopy (EIS) and polarization studies were performed to derive the kinetic mechanism taking place at the electrodes. Micro-electrochemical tests were performed using scanning electrochemical microscopy (SECM) technique. The surface was further examined by scanning electron microscope (SEM). The EIS results suggested that the increase in the concentration of MCFE increased the inhibition efficiency. Polarization statistics pointed towards the changes in the anodic and cathodic kinetics, but overall shift of $-E_{\text{corr}}$ was less than 85 mV suggesting the MCFE inhibitor belongs to mixed type category. SEM studies revealed that the surface of the mild steel was quite unaffected with MCFE film on it in 1M HCl solution.

Keywords: Mild steel; *Momordica charantia*; Corrosion; EIS; SECM; GC-MS

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