

Synthesis, structural, density functional theory, and x-ray diffraction study of zn(II) n-isopropylbenzylthiocarbamate: anti-corrosion screening in acid media

ABSTRACT

Corrosion of metal is a serious issue across many industries and is considered costly. Acids used during the cleaning process in industries may contribute to metal erosion. Dithiocarbamate is a ligand that can act as a corrosion inhibitor due to the presence of sulfur and nitrogen as electronegative atoms. Zn(II) N-isopropylbenzylthiocarbamate (Zn[N-isopbenzdtc]₂) complex was synthesized through direct synthetic method of < 4 °C and characterized using Fourier Transform Infrared-Attenuated Total Reflectance (FTIR-ATR), Ultraviolet-Visible (UV-Vis), Nuclear Magnetic Resonance (NMR), X-ray crystallography study, molar conductivity, melting point, and gravimetric analysis. Corrosion inhibition of mild steel was studied for different corrosive media (1 M HCl and 1 M H₂SO₄). The synthesized inhibitor was studied at different concentrations of 1, 2, 3, 4, and 5 mM at 40 °C. As a conclusion, as the inhibitor concentration decreased, the efficiency of the corrosion inhibitor also decreased at a constant temperature. In this study, it showed that the corrosion activity of mild steel in 1 M H₂SO₄ was higher compared to 1 M HCl due to the higher concentration of H⁺, which makes H₂SO₄ more corrosive than HCl.

Keyword: Dithiocarbamate; Corrosion inhibitor; Mild steel; Acid