Inhibition of Under-Deposit Corrosion of Carbon Steel by Bupropion Drug in CO₂ Saturated Brine Solutions

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Inhibition effects of bupropion drug on the under-deposit corrosion of carbon steel in 3.5% NaCl solution saturated with CO₂ have been investigated by the techniques of potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). The sand-covered electrode was prepared by covering the carbon steel electrode with a layer of the silica sand. The increase of the drug concentration up to 600 ppm led to increasing the inhibition efficiency of carbon steel against under-deposit corrosion in the brine solution. Further increasing of the bupropion concentration caused the lowering of the inhibition efficiency. The Langmuir isotherm can describe the adsorption behavior of bupropion on the surface of carbon steel. Measurements of potentiodynamic polarization indicated that bupropion is an anodic inhibitor. The effects of temperature on the under-deposit corrosion behavior of carbon steel were studied both in the absence and presence of 600 ppm bupropion drug. The enthalpy of the drug adsorption was obtained from the temperature dependence of the corrosion inhibition process. A reasonable agreement was observed between the IE values resulted from the potentiodynamic polarization and the EIS techniques.

Keywords: Bupropion drug; Under-deposit corrosion (UDC); Corrosion of oil pipelines; Electrochemical impedance spectroscopy; Potentiodynamic polarization.

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