L-CYSTEINE AS GREEN CORROSION INHIBITOR ON CARBON STEEL IN ENVIRONMENTAL APPROPRIATE FOR THE OIL WELL CONDITION

Yayan Sunarya
Department of Chemistry Education, Indonesia University of Education (UPI Bandung)
e-mail: yayan_sunarya@upi.edu

Abstracts

The inhibition effect of cysteine on the corrosion behaviour of carbon steel in CO_2-saturated NaCl solution at pH level and temperature appropriate for the oil mining conditions was studied by means of potentiodynamic curves (Tafel) and electrochemical impedance spectroscopy (EIS). The effects of temperature and pH controlled by acetic buffer on the corrosion behaviour of carbon steel in media was studied in the temperature range from 300 to 360K and in the pH range from 3.0 to 5.0. Results obtained reveal that cysteine is very good inhibitors. The inhibition efficiency increases with the increase of inhibitor concentration and reached 89% at 0.25 mM for the cysteine studied. Potentiodynamic polarization studies clearly reveal that cysteine acts essentially as anodic inhibitor at low temperature and as chatodic inhibitor at higher temperature. The experimental impedance data were analyzed according to a proposed equivalent circuit model for the electrode/electrolyte interface, its show that the mechanism of cysteine inhibition through the formation of protective film was physically adsorpted on the carbon steel surface, which is in line with Langmuir adsorption isotherm.

Keywords: 3-mercaptopropanoic acid, corrosion inhibitor, electrochemical methods, Tafel plot, EIS, oil-well corrosion.