

Studi inhibitor korosi berbahan dasar imidazoline dengan menggunakan metode model adsorpsi = Study of imidazoline based corrosion inhibitor using adsorption model

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Abstrak

Mekanisme inhibisi korosi dari inhibitor berbahan dasar imidazoline pada baja API 5L Grade B di lingkungan NaCl 3,5% diinvestigasi dengan menggunakan metode model adsorpsi yang didapat dari hasil pengujian Tafel Polarisasi, Linier Polarisasi dan Electrochemical Impedance Spectroscopy (EIS) dengan menggunakan variasi konsentrasi 0 ppm, 50 ppm, 100 ppm, 150 ppm, 200 ppm dan 250 ppm. Senyawa imidazoline yang teradsorpsi pada permukaan logam diinvestigasi dengan menggunakan pengujian Fourier Transform InfraRed (FTIR). Hasilnya didapatkan bahwa proses adsorpsi inhibitor imidazoline terjadi secara spontan mengikuti mode adsorpsi Langmuir isotherm. Berdasarkan nilai Goads antara -16,2 kJ/mol sampai -17,5 kJ/mol menunjukkan bahwa inhibitor imidazoline menginhibisi korosi dengan cara adsorpsi fisika (interaksi elektrostatis antara muatan negatif molekul inhibitor dengan muatan positif permukaan logam) membentuk lapisan tunggal di permukaan logam sehingga dapat menghambat proses korosi. Besarnya efisiensi inhibisi inhibitor berbahan dasar imidazoline bergantung pada konsentrasi inhibitor. Efisiensi inhibisi tertinggi diperoleh pada konsentrasi imidazoline 250 ppm sebesar 72,69% berdasarkan hasil pengujian Linier polarisasi.

.....Corrosion inhibition mechanism of imidazoline-based corrosion inhibitor on API 5L Grade B steel in 3.5% NaCl environment was investigated by using adsorption method from the results of tafel polarization, linier polarization resistance (LPR), and Electrochemical Impedance Spectroscopy (EIS) tests with 0 ppm, 50 ppm, 100 ppm, 150 ppm, 200 ppm and 150 ppm concentration variation. Imidazoline compounds which adsorbed on metal surface was also investigated by Fourier Transform InfraRed (FTIR) test. It was found that adsorption process of imidazoline-based inhibitor occurs spontaneously and follow the Langmuir adsorption isotherm. From the calculation of Goads (around -16,2 kJ/mol to -17,5 kJ/mol), it indicates that the inhibitor inhibited corrosion by physisorption (involving electrostatic attraction between the negative charged of inhibitor molecules and the positive charged of metal surface) to form a monolayer on the metal surface so that corrosion will be obstructed. Inhibition efficiency of imidazoline-based inhibitor was concentration dependent. The optimum inhibition efficiency is 72,69% in 250 ppm concentration of imidazoline as a result of LPR test.