

Studi pengaruh ekstrak temulawak (*curcuma xanthorrhiza*) sebagai green inhibitor pada baja api 5l grade x42 dalam lingkungan hcl 1m =
Study of curcuma xanthorrhizza extract as green inhibitor for api 5l grade x42 steel in hcl 1m solution

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Abstrak

Efek penghambatan dari ekstrak *Curcuma xanthorrhizza* pada korosi baja API 5L Grade X42 dalam larutan HCl 1M diselidiki dengan menggunakan metode kehilangan berat, polarisasi tafel, dan metode electrochemical impedance spectroscopy EIS. Uji FTIR digunakan untuk menyelidiki senyawa antioksidan yang berperan penting dalam menghambat korosi. Dalam penelitian ini konsentrasi ekstrak temulawak yang digunakan adalah 0 ppm, 100 ppm, 250 ppm, 500 ppm, dan 1000 ppm.

Hasilnya menunjukkan bahwa temulawak dapat menghambat korosi pada baja dan bertindak sebagai penghambat tipe campuran. Laju korosi menurun seiring dengan meningkatnya konsentrasi inhibitor. Sedangkan efisiensi inhibisi meningkat dengan meningkatnya konsentrasi inhibitor. Adsorpsi ekstrak pada permukaan baja mengikuti Langmuir isotherm. Nilai energi bebas ΔG_{ads} menunjukkan bahwa adsorpsi molekul inhibitor secara fisika. Dapat disimpulkan bahwa ekstrak *Curcuma xanthorrhizza* dapat digunakan sebagai penghambat alternatif dan ramah lingkungan untuk baja API 5L Grade X42 di lingkungan asam.

.....The inhibitory effect of the extract of *Curcuma xanthorrhizza* on the corrosion of API 5L Grade X42 steel in HCl 1M solution was investigated by using weight loss, tafel polarization, and electrochemical impedance spectroscopy methods. FTIR test was used to investigate the antioxidant compound that plays an important role to inhibit corrosion. In this study the concentration of *Curcuma xanthorrhizza* extract used was 0 ppm, 100 ppm, 250 ppm, 500 ppm, and 1000 ppm.

The results show that *Curcuma xanthorrhizza* inhibit the steel corrosion and act as mixed type inhibitors. The corrosion rate decreases with the increasing of inhibitors concentrations. At the same time, inhibition efficiency increases with the increase of inhibitors concentrations. The adsorption of extract on the steel surface was found to obey Langmuir's adsorption isotherm. The free energy value ΔG_{ads} indicated that the adsorption of inhibitor molecules was typical of physisorption. It can be concluded that *Curcuma xanthorrhizza* extract could be used as an alternative and environmental friendly inhibitor for API 5L Grade X42 steel in acidic environment.