Ekstrak Daun Syzygium Cumini Sebagai Green Inhibitor Korosi Pada Carbon Steel API 5L Dalam Larutan HCl 1M = Syzygium Cumini Leaf Extract as A Green Corrosion Inhibitor On Carbon Steel API 5L in HCl 1M Solution

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Abstrak

Ekstrak syzygium cumini (ESC) dievaluasi sebagai inhibitor korosi ramah lingkungan pada sampel carbon steel API 5L dalam larutan korosif HCl 1M dengan variasi komposisi 0, 100, 200, 300, 400 dan 500 ppm pada temperatur 303-323 K. Efisiensi penghambatan korosi diukur menggunakan metode elektokimia potensiodinamik polarisasi dan electrochemical impedance spectroscopy. Efisiensi inhibisi meningkat seiring peningkatan konsentrasi ESC namun berbanding terbalik dengan peningkatan temperatur. Berdasarkan hasil uji elektrokimia, efisiensi inhibisi tertinggi 90% diperoleh dengan penambahan 500 ppm ESC. Residence time meningkatkan efisiensi inhibisi hingga 97% pada waktu perendaman 60 menit. ESC diklasifikasikan kedalam tipe inhibitor campuran dan mengalami mekanisme inhibisi dengan cara adsorpsi monolayer secara physisorption, dengan mengikuti model isoterm adsorpsi Langmuir. Hasil spektrum FTIR membuktikan bahwa ESC mengandung gugus hidroksil fenol, karbonil dan aromatik yang berguna dalam aktifitas antioksidan. Selain itu, karakterisasi AFM menunjukan tingkat kekarasan rata-rata menurun dari 48.8 nm ke 7.2 nm, kehalusan permukaan menunjukan terbentuknya lapisan film pelindung pada permukaan carbon steel.

.....Syzygium cumini extract (ESC) was evaluated as an environmentally friendly corrosion inhibitor on API 5L carbon steel samples in 1M HCl corrosive solution with composition variations of 0, 100, 200, 300, 400 and 500 ppm at a temperature of 303 – 323 K. Corrosion inhibition efficiency was measured using Polarization potentiodynamic electrochemical methods and electrochemical impedance spectroscopy. The inhibition efficiency increased with increasing ESC concentration but inversely with increasing temperature. Based on the results of electrochemical tests, the highest inhibition efficiency of 90% was obtained with the addition of 500 ppm ESC. Residence time increases the inhibition efficiency up to 97% at a 60 minute immersion time. ESC is classified into mixed type inhibitor and undergoes an inhibition mechanism by physisorption monolayer adsorption, obey to Langmuir adsorption isotherm model. The results of the FTIR spectrum prove that ESC contains phenolic, carbonyl and aromatic hydroxyl groups which are useful in antioxidant activity. Furthemore, the AFM characterization showed that the average roughness decreased from 48.8 nm to 7.2 nm, the surface smoothness indicated the for mation of a protective film on the carbon steel surface.