

Pengaruh Temperatur Terhadap Stabilitas Ekstrak Kayu Secang (Caesalpinia Sappan L.) sebagai Inhibitor Organik pada Korosi Baja (API 5L Grade X60) Dalam Lingkungan HCl 1M = Influence of Temperatur on Thermal Stability of Caesalpinia Sappan L. As Green Inhibitor Corrosion for API 5L Grade X60 in HCl 1M Environment

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Abstrak

80% kegagalan material baja pada fasilitas produksi industri minyak dan gas bumi disebabkan oleh proses korosi. Salah satu pengendalian proses korosi material baja API 5L Grade X60 dengan menggunakan inhibitor ramah lingkungan. Pada penelitian ini, ekstrak kayu secang (Caesalpinia Sappan L.) dievaluasi sebagai inhibitor ramah lingkungan untuk baja API 5L X60 di lingkungan HCl 1M dengan variasi volume ekstrak 0,5 ml, 1 ml, 1,5 ml, 2 ml, 3ml dan variasi temperatur 302K, 312K, 322K, dan 332K menggunakan metode polarisasi tafel, Electrochemical Impedance Spectroscopy (EIS), Fourier Transform Infra-red Spectroscopy (FTIR), dan Simultaneous Thermal Analysis (STA). Hasil dari pengujian polarisasi tafel dan EIS menunjukkan ekstrak kayu secang bertindak sebagai inhibitor campuran (Mixed Inhibitor). Efisiensi optimal dihasilkan dari penambahan volume ekstrak sebesar 1,5 ml dalam 400 ml HCl 1M. sebesar 91 % polarisasi tafel, dan sebesar 94% EIS. Rapat arus korosi material pada volume 1,5 ml ekstrak kayu secang sebesar $57 \mu\text{A}/\text{cm}^2$ dan nilai resistivitas larutan $841 \Omega \cdot \text{cm}^2$. Kenaikan temperatur lingkungan sebesar 332 K menaikkan rapat arus korosi material menjadi $139 \mu\text{A}/\text{cm}^2$ dan menurunkan nilai resistivitas larutan sampai $121 \Omega \cdot \text{cm}^2$, sehingga nilai efisiensi inhibitor turun sampai 50%. Gugus fungsi keton ($\text{C}=\text{O}$) muncul dari hasil karakterisasi pengujian FTIR yang menandakan keberadaan senyawa brazilein dan sappanchalcone.

.....80 % failure of carbon steel at oil and gas production facility was caused by corrosion. One of corrosion mitigation of carbon steel was used green inhibitor. In this study, Caesalpinia Sappan L. extract has been evaluated as green inhibitor corrosion for API 5L X60 in HCl 1M environment with variation of volume extract 0,5 ml, 1ml, 1,5 ml, 2ml, 3ml and variation of temperature 302K, 312K, 322K, and 332K using Tafel polarization and Electrochemical Impedance Spectroscopy (EIS), Fourier Transform Infra-red Spectroscopy (FTIR), dan Simultaneous Thermal Analysis (STA). The Result show the tafel polarization and EIS show caesalpinia sappan extract acts for inhibit corrosion process in the system with mixed type inhibitor. Optimal inhibition efficiency occurs at volume 1.5 ml extract caesalpinia sappan/400 ml HCl 1M, 91% for tafel polarization and 94% for EIS. Current density at volume extract 1,5 ml was $57 \mu\text{A}/\text{cm}^2$ and resistivity of solution $841 \Omega \cdot \text{cm}^2$. Increasing temperatur of environment will increase current density to $139 \mu\text{A}/\text{cm}^2$ and decrease resistivity to $121 \Omega \cdot \text{cm}^2$. So, the inhibition efficiency decrease to 50%. Keton functional group was found showed existence of showed that brazilein dan sappanchalcone