

## Studi pengaruh penambahan teh rosela terhadap inhibitor teh daun sirsak pada pipa api 5l dalam lingkungan nacl 3 5 = The addition effect of roselle tea against soursop leaf inhibitors on pipeline materials api 5l in nacl 3 5 environment

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### Abstrak

Sebagai salah satu material pipa baja berkarbon yang paling sering digunakan, pipa API-5L memiliki kekurangan sebagaimana material baja karbon lainnya yaitu korosi. Korosi ini merupakan fenomena degradasi material tanpa henti yang menjadi penyebab utama kegagalan pada aplikasi baja karbon di berbagai industri. Korosi ini dapat dihambat dengan berbagai metode dan salah satunya adalah dengan menggunakan inhibitor. Inhibitor alami dipilih menjadi salah satu alternatif proteksi korosi yang ramah lingkungan, mudah didapat dan relatif murah.

Penelitian ini dilakukan untuk mempelajari kinerja inhibitor campuran antara teh daun sirsak dan teh rosela ketika keduanya digabungkan dalam lingkungan NaCl 3.5% yang bersifat korosif. Kedua inhibitor ini dipilih karena kemampuan inhibisinya yang cukup efektif apabila digunakan secara individual karena tingginya senyawa aktif antioksidan berbeda yang terdapat pada kedua jenis teh ini. Untuk mencapai tujuan ini dilakukan pengujian elektrokimia seperti EIS untuk mengamati tahanan permukaan logam terhadap terjadinya korosi, FTIR untuk mengetahui gugus fungsi senyawa aktif yang terdapat dipermukaan logam dan polarisasi dinamik untuk menghitung laju korosi logam pada konsentrasi tertentu serta dilakukan juga uji perendaman untuk mensimulasi pengujian in situ.

Hasil penelitian menunjukkan inhibitor teh daun sirsak dan teh rosela cukup efektif untuk API-5L di lingkungan NaCl 3.5% ketika digunakan secara individu. Berdasarkan uji perendaman, teh daun sirsak mampu mencapai efisiensi 84.6% pada volume inhibitor 5 ml dimana konsentrasi inhibitor 1 %, sedangkan teh rosela mencapai efisiensi optimal pada volume inhibitor 3 ml dimana konsentrasi inhibitor 0.6% sebesar 71.6%. Ketika inhibitor dicampurkan maka timbul interaksi antisinergisme antara kedua inhibitor. Hal ini ditunjukkan dengan menurunnya efisiensi kedua inhibitor ketika dicampurkan, terlebih lagi ketika penggunaan inhibitor campuran ini menyebabkan laju korosi meningkat lebih tinggi dari logam API-5L tanpa menggunakan inhibitor.

*As one of the most commonly used carbon steel pipeline material, API-5L has disadvantages as well as other carbon steel materials which is corrosion. This corrosion is a relentless degradation phenomenon of materials that become the main cause of failure in the application of carbon steel in various industry. This corrosion can be prevented by various methods and one of them is by using inhibitors. Natural inhibitor were selected to be one of the corrosion protection alternatives that are environmentally friendly, easily available and relatively inexpensive.*

This research was conducted to study the performance of inhibitors mixture between soursop leaf and rosele tea when both of them were mixed in a corrosive NaCl 3.5% environment. Both of these inhibitors were

chosen due to their effective individual inhibition performance because of their high different active compounds composition. To achieve such a goal, some electrochemical testing methods were conducted such as EIS(Electrochemical Impedance Spectroscopy) to analyze the surface resistance of metals, FTIR (Fourier Transform Infrared Spectroscopy) to identify functional groups of active compounds within the surface of metals, dynamic polarization to measure corrosion rate of metals in at a certain concentration, and also weight loss methods as a field simulation testing.

The result of the research shows that soursop leaf and roselle tea were effective as an inhibitors for API-5L in NaCl 3.5% solution when they were applied individually. Based on weight loss methods, soursop leaf was able to achieve efficiency up to 84.6% on 5 ml inhibitors volume where inhibitors concentration was 1 %, while roselle tea was able to achieve optimal efficiency of 71.6% in 3 ml inhibitor volume where inhibitors concentration was 0.6%. When both of these inhibitors were mixtured, an antisinergistic interaction appear between these inhibitors. This was indicated by the reduction of the efficiency when these inhibitors were mixtured, moreover when these inhibitor were mixtured the corrosion rate rise above the plain API-5L metals without inhibitors.</i>