

ABSTRAK

Korosi merupakan masalah umum yang sering terjadi di berbagai bidang seperti industri dan maritim yang menggunakan Baja ST 37. Penggunaan inhibitor sintetis kimia yang banyak digunakan saat ini dianggap kurang ramah lingkungan. Oleh karena itu diperlukan bahan alternatif yang berasal dari bahan alami. Penelitian ini bertujuan menganalisis pengaruh variasi tiga inhibitor organik ekstrak daun kelor, daun sembuk, dan daun kapuk dalam menghambat laju korosi Baja ST 37. Metode yang digunakan adalah eksperimen laboratorium dengan inhibitor direndam pada plat baja masing-masing dengan durasi berbeda selama 1, 3, dan 5 hari, dilanjutkan dengan perendaman air laut selama 30 hari. Laju korosi diukur dengan metode weight loss, sementara efektivitas inhibitor dianalisis dengan membandingkannya terhadap sampel kontrol tanpa inhibitor, dan uji mikroskop bertujuan untuk melihat permukaan morfologi permukaan baja. Hasil eksperimen membuktikan bahwa ketiga ekstrak daun berhasil menekan laju korosi. Ekstrak daun kelor mencatat kinerja optimal perendaman inhibitor 5 hari dengan laju korosi terendah dengan 0,09 *mmpy* dan efisiensi 89,8%, diikuti dengan daun kapuk laju korosi 0,16 *mmpy* dan efisiensi 81,38%, daun sembuk menunjukkan laju korosi paling tinggi dengan nilai 0,18 *mmpy* dan efisiensi 80,00%. Uji mikroskop digital menunjukkan bahwa kualitas lapisan pelindung yang terbentuk di permukaan logam meningkat seiring dengan penambahan durasi perendaman. Pada kondisi tanpa inhibitor korosi sumuran seluas 50,5%. Pengaplikasian inhibitor organik berhasil mengurangi luas korosi secara bertahap di mana ekstrak daun kelor mengalami penurunan pada perendaman 5 hari luas korosi turun menjadi menjadi 3,83%. Ekstrak daun kapuk juga mengalami penurunan secara bertahap dari perendaman 5 hari luas korosi jadi 8,75%, sementara daun sembuk memberikan hasil terendah dengan perendaman 5 hari mengalami penurunan sangat tinggi yaitu 12,17%. Hasil ini menunjukkan bahwa periode perendaman yang lebih lama meningkatkan efektivitas proteksi. Temuan ini menguatkan potensi inhibitor organik sebagai bahan alternatif untuk mitigasi korosi di industri.

Kata kunci: Ekstrak Daun Kelor, Ekstrak Daun Sembukan, Ekstrak Daun kapuk, Korosi Plat Baja ST 37, Etanol 70%.

ABSTRACT

Corrosion is a common problem that frequently occurs in various sectors such as industrial and maritime applications that utilize ST 37 steel. The synthetic chemical inhibitors widely used today are considered less environmentally friendly; therefore, alternative materials derived from natural sources are needed. This study aims to analyze the effect of variations of three organic inhibitors moringa leaf extract, sembukan leaf extract, and kapok leaf extract in inhibiting the corrosion rate of ST 37 steel. The method employed was a laboratory experiment in which steel plates were immersed in each inhibitor for different durations of 1, 3, and 5 days, followed by immersion in seawater for 30 days. The corrosion rate was measured using the weight loss method, while inhibitor efficiency was analyzed by comparing the results with a control sample without inhibitor. Digital microscopic testing was conducted to observe the surface morphology of the steel. The experimental results demonstrated that all three leaf extracts were effective in reducing the corrosion rate. Moringa leaf extract showed the optimal performance with a 5-day inhibitor immersion, yielding the lowest corrosion rate of 0.09 mmpy and an efficiency of 89.8%. This was followed by kapok leaf extract with a corrosion rate of 0.16 mmpy and an efficiency of 81.38%. Sembukan leaf extract exhibited the highest corrosion rate among the inhibitors at 0.18 mmpy with an efficiency of 80.00%. Digital microscopy revealed that the quality of the protective layer formed on the metal surface improved with increasing inhibitor immersion time. In the absence of inhibitors, pitting corrosion covered an area of 50.5%. The application of organic inhibitors successfully reduced the corrosion area gradually; with moringa leaf extract, a 5-day immersion reduced the corroded area to 3.83%. Kapok leaf extract also showed a gradual reduction, with the corroded area decreasing to 8.75% after 5 days, while sembukan leaf extract produced the least reduction, with the corroded area reaching 12.17% after a 5-day immersion. These results indicate that longer immersion periods enhance the effectiveness of corrosion protection. The findings further strengthen the potential of organic inhibitors as alternative materials for corrosion mitigation in industrial applications.

Keywords: Moringa Leaf Extract, Sembukan Leaf Extract, Kapok Leaf Extract, ST 37 Steel Plate Corrosion, Etanol 70%.