

ABSTRAK

Korosi merupakan salah satu penyebab utama kerusakan material logam yang berdampak pada penurunan kinerja serta umur pakai peralatan industri. Upaya pengendalian korosi melalui penggunaan inhibitor berbasis bahan alam terus dikembangkan sebagai alternatif yang lebih ramah lingkungan. Daun beluntas (*Pluchea indica L.*) berpotensi dimanfaatkan sebagai sumber *green inhibitor*, namun informasi mengenai kandungan senyawa minyak atsiri hasil ekstraksi *Solvent-Free Microwave Extraction* (SFME) serta efektivitasnya dalam menghambat korosi pada baja ST-37 masih terbatas. Penelitian ini mengevaluasi potensi minyak atsiri daun beluntas (*Pluchea indica L.*) sebagai *green inhibitor* korosi pada baja ST-37 dalam media korosif H_2SO_4 1 M dan NaCl 3,5%. Ekstraksi dilakukan menggunakan metode *Solvent-Free Microwave Extraction* (SFME) pada daya 700 W, yang kemudian dikarakterisasi menggunakan GC-MS. Analisis menunjukkan dominasi senyawa golongan terpenoid dan aromatik yang berperan penting dalam pembentukan lapisan pelindung pada permukaan logam. Pengujian laju korosi dilakukan dengan metode *weight loss* menggunakan variasi konsentrasi 0, 30, 50, dan 70 ppm. Hasil penelitian mengindikasikan bahwa laju korosi menurun secara signifikan seiring bertambahnya konsentrasi *inhibitor*, dengan efektivitas terbaik dicapai pada konsentrasi 70 ppm. Meskipun media asam (H_2SO_4) bersifat lebih agresif dibandingkan media lain (NaCl), minyak atsiri daun beluntas menunjukkan kinerja inhibisi yang efektif melalui mekanisme adsorpsi molekul pada permukaan baja. Dengan demikian, minyak atsiri ini berpotensi besar sebagai alternatif perlindungan logam yang efisien dan ramah lingkungan.

Kata Kunci: *Green inhibitor*, korosi, baja ST-37, *Pluchea indica L.*, SFME, Adsorpsi, *Weight loss*

ABSTRACT

*Corrosion is one of the main causes of damage to metal materials that has an impact on the decline in performance and service life of industrial equipment. Corrosion control efforts through the use of natural material-based inhibitors continue to be developed as a more environmentally friendly alternative. Beluntas leaves (*Pluchea indica* L.) have the potential to be used as a source of green inhibitors, but information on the content of essential oil compounds from Solvent-Free Microwave Extraction (SFME) and its effectiveness in inhibiting corrosion in ST-37 steel is still limited. This study evaluated the potential of beluntas leaf essential oil (*Pluchea indica* L.) as a green corrosion inhibitor in ST-37 steel in the corrosive medium H_2SO_4 1 M and NaCl 3.5%. Extraction was carried out using the Solvent-Free Microwave Extraction (SFME) method at 700 W power, which was then characterized using GC-MS. The analysis showed the dominance of terpenoid and aromatic compounds that play an important role in the formation of a protective layer on the metal surface. Corrosion rate testing was carried out using the weight loss method using concentration variations of 0, 30, 50, and 70 ppm. The results indicated that the corrosion rate decreased significantly as the inhibitor concentration increased, with the best effectiveness achieved at a concentration of 70 ppm. Although the acidic medium (H_2SO_4) is more aggressive than other media (NaCl), the essential oil of beluntas leaves shows effective inhibition performance through the adsorption mechanism of molecules on the surface of steel. Thus, this essential oil has great potential as an efficient and environmentally friendly alternative to metal protection.*

*Keywords: Green inhibitor, corrosion, ST-37 steel, *Pluchea indica* L., SFME, Adsorption, Weight loss.*