Studi penggunaan campuran ekstrak daun sirsak dan ubi ungu sebagai inhibitor korosi organik untuk material baja api 5L pada lingkungan larutan 3,5% NaCl = Study of the use of mixture of annona muricata leaves and purple sweet potato extracts as an organic corrosion inhibitor for api 5L steel in 3,5% NaCl solution

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Abstrak

ABSTRAK
Korosi merupakan suatu proses degradasi material akibat interaksi dengan lingkungannya. Inhibitor korosi merupakan suatu zat yang dapat menghambat proses korosi. Bahan organik dipilih sebagai alternatif karena bersifat aman, mudah didapatkan, bersifat biodegradable, biaya murah, dan ramah lingkungan. Penelitian ini merupakan studi tentang inhibitor korosi menggunakan senyawa organik yang dilakukan pada material baja API 5L di lingkungan larutan NaCl 3,5%. Penelitian ini dilakukan untuk mempelajari efek penggunaan campuran ekstrak daun sirsak dan ubi ungu sebagai inhibitor korosi dengan variasi konsentrasi. Ekstrak daun sirsak dan ubi ungu dipilih sebagai inhibitor korosi karena mengandung senyawa antioksidan yang dapat menghambat laju korosi. Pengukuran laju korosi dilakukan dengan menggunakan metode kehilangan berat dan polarisasi. Mekanisme terjadinya korosi diuji dengan menggunakan Electrochemical Impedance Spectroscopy (EIS) sementara karakterisasi dari material inhibitor organik dilakukan dengan menggunakan metode Fourier Transform Infra-Red (FTIR). Tipe ikatan kimia yang terbentuk di lapisan permukaan baja dianalisa dengan metode FTIR yang mengindikasikan adanya gugus fungsi karbonil (C=O) dan hidroksil (O-H) yang berkombinasi membentuk suatu lapisan. Di dalam larutan 100 mL NaCl 3,5%, penambahan ekstrak daun sirsak sebanyak 1 mL menghasilkan efisiensi inhibitor sekitar 73,38% (melalui pengujian polarisasi) dan di dalam larutan 520 mL NaCl 3,5%, penambahan ekstrak daun sirsak sebanyak 1 mL menghasilkan efisiensi inhibitor sekitar 50% (melalui pengujian kehilangan berat). Kemudian, penambahan ekstrak ubi ungu sebanyak 1-5 mL menyebabkan terjadinya penurunan efisiensi inhibitor. Ekstrak daun sirsak dan ubi ungu bekerja dengan membentuk suatu lapisan tipis yang mengendap (adsorpsi) pada permukaan logam sebagai lapisan pelindung yang dapat menghambat reaksi logam tersebut dengan lingkungannya. Mekanisme ini juga didukung dengan meningkatnya nilai tahanan polarisasi dari permukaan baja setelah ditambahkan inhibitor.
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ABSTRACT
Corrosion is a degradation of the material due to its interaction with the

environment. Corrosion inhibitor is a substance that can inhibit the corrosion process. The use of organic corrosion inhibitor become a new alternative to achieve that goal, it happen because the organic corrosion inhibitor is safe, cheap, biodegradable, and environmentally friendly. This research is the study of corrosion inhibitor using organic compounds for API 5L steel in 3.5% NaCl solution. This research was conducted to study the use of mixture of annona muricata leaves and purple sweet potato extracts as corrosion inhibitor with variable concentration. Annona muricata leaves and purple sweet potato extracts are selected as corrosion inhibitor because they contain antioxidant compounds that can inhibit the corrosion rate. Corrosion rate measurement method was conducted by using the weight loss and polarization methods. Corrosion mechanism was examined by Electrochemical Impedance Spectroscopy (EIS) while the characterization of organic inhibitor material was carried out using the method of Fourier Transform Infra-Red (FTIR). The type of chemical bonds on the steel surface layer was analyzed by FTIR method which indicated the presence of functional groups carbonyl (C=O) and hydroxyl (O-H) which combined as film forming. In a solution containing 100 mL 3.5% NaCl, the addition of 1 mL annona muricata leaves extract resulted in approximately 73.38% inhibitor efficiency (using the polarization method) and in a solution containing 520 mL 3.5% NaCl, the addition of 1 mL annona muricata leaves extract resulted in approximately 50% inhibitor efficiency (using the weight loss method). Then, the addition of 1-5 mL purple sweet potato extract resulted the decreasing of inhibitor efficiency. Annona muricata leaves and purple sweet potato extracts work by forming a thin layer which settles (adsorption) to metal surfaces as a protective layer that can inhibit the reaction of the metal with its environment. This mechanism is also supported by the increased value of the polarization resistance of the steel surface after addition of inhibitor.