EFFECT OF ADDITIVES ON THE EXTRACT OF HENNA BY SHELLAC COATING FOR ALUMINIUM PROTECTION IN SEAWATER

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Effect of additives on the extract of henna by shellac coating for aluminium protection in seawater / Muhamad Fakhruddin Rusn

Lihat sebelah

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By

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Research report submitted in partial fulfilment of the requirement for the degree of Bachelor of Applied Science (Maritime Technology)

Department of Maritime Technology
Faculty of Maritime Studies and Marine Science
UNIVERSITI MALAYSIA TERENGGANU
2012

DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled: **Effect of Additives on the Extract of Henna by Shellac Coating for Aluminium Protection in Seawater** by **Muhamad Fakhruddin B. Rusni,** Matric No. **UK 17712** have been examined and all errors identified have been corrected. This report is submitted to the Department of Maritime Technology as partial fulfillment towards obtaining the **Bachelor Degree of Applied Science (Maritime Technology)**, Faculty of Maritime Studies and Marine Science, Unitversiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this thesis entitled **EFFECT OF ADDITIVES ON THE EXTRACT OF HENNA BY SHELLAC COATING FOR ALUMINIUM PROTECTION IN SEAWATER** is the result of my own research except as cited in the references.

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EFFECT OF ADDITIVES ON THE EXTRACT OF HENNA BY SHELLAC COATING FOR ALUMINIUM PROTECTION IN SEAWATER

ABSTRACT

The effect of additives on corrosion behavior of Aluminium Alloy 5083 (AA5083) by using henna extract with shellac coating has been investigate with modified henna by using 1,3-propanediamine and glycerol at 5%, 10% and 15% of henna extract by using salt-spray test for 30 days. Start from surface preparation, produce the coating, coating process, laboratory work, weighing and collect data lastly the laboratory analysis. AA5083 was cut into 25mm x 25mm x 3mm and was polished manually using 600, 800 and 1200 grit of emery papers. Henna was extracted with ethanol as a solvent by using rotary evaporator (Rotavap). To investigate the content of extraction, a Fourier Transform Infrared Spectroscopy (FTIR) device was used. Six type of coating was produce which is coating with 5%, 10% and 15% of native henna and modified henna. The specimens were coated by immerse into each coating for 10 second and was dried. Specimen was coating by 5% of native henna was set for experiment control. The corrosion behavior was investigated using several methods which were weight loss measurement, potentiodynamic polarization measurement, Electrochemical Impedance Spectroscopy (EIS) and Scanning Electron Microscope (SEM). Calculations of inhibition efficiency for weight loss shows that the results indicates that the henna extract using ethanol solvent have good inhibition efficiency, *IE(%)*. The value for charge transfer resistance, (R_{ct}) increase as a result increase the degree of protection of AA5083 in test solution and double layer capacitance, (C_{dl}) decrease indicates that a layer was form indicating the formation of a surface film. This reflects the inhibitor does retard the corrosion rate. Image from SEM show when percentage of modified henna was increase, the corrosion was decrease because the particle of henna extract where acts as anti-oxidant was protecting the AA5083 surface. Extract Lawsone which is the main constituent of henna able to protect AA5083 for this experiment.

KESAN ADITIF TERHADAP EKSTRAK INAI DENGAN SALUTAN SYELEK UNTUK PERLINDUNGAN ALUMINIUM DALAM AIR LAUT

ABSTRAK

Kesan aditif ke atas kakisan yang berlaku tehadap Aluminium Aloi 5083 (AA5083) dengan menggunakan ekstrak inai dengan salutan syelek telah disiasat dengan inai diubahsuai dengan menggunakan 1,3-propanediamine dan glycerol pada 5%, 10% dan 15% daripada ekstrak inai dengan menggunakan ujian semburan garam selama 30 hari. Bermula daripada penyediaan permukaan sampel, menghasilkan salutan, proses menyalut, kerja-kerja makmal, menimbang dan mengumpul data akhir sekali analisis makmal. AA5083 telah dipotong kepada 25mm x 25mm x 3mm dan telah digilap secara manual menggunakan 600, 800 dan 1200 grit kertas pasir. Inai diekstrak dengan etanol sebagai pelarut dengan menggunakan Rotary Evaporator (Rotavap). Untuk menyiasat kandungan pengekstrakan, alat Fourier Transform Infrared Spectroscopy (FTIR) telah digunakan. Enam jenis salutan dihasilkan iaitu salutan dengan 5%, 10% dan 15% daripada inai asli dan inai diubahsuai. Spesimen telah disalut dengan merendamkan ke dalam salutan selama 10 saat pada setiap spesimen dan dikeringkan. Spesimen yang disalut dengan 5% inai asli ditetapkan sebagai kawalan eksperimen. Kakisan berlaku telah dikaji dengan menggunakan beberapa kaedah iaitu menyukat kehilangan berat, potendiodynamic polarization, Electrochemical Spectroscopy (EIS) dan Scanning Electron Microscope (SEM). Pengiraan kecekapan menghalang untuk kaedah penyukatan kehilangan berat, keputusan menunjukkan bahawa bahawa ekstrak inai dengan menggunakan pelarut etanol mempunyai kecekapan perencatan baik, *IE (%)*. Nilai bagi rintangan pemindahan caj, (R_{ct}) meningkat sebagaimana peningkatan tahap perlindungan AA5083 dalam ujian larutan dan kemuatan lapisan berganda, (C_{dl}) menurun menunjukkan bahawa lapisan tersebut terbentuk menunjukkan pembentukan filem permukaan. Ini mencerminkan perencat merencatkan kadar kakisan. Imej dari SEM telah menunjukkan apabila peratusan inai diubahsuai meningkat, kakisan menurun kerana zarah ekstrak inai yang besifat anti-oksida mampu untuk melindungi permukaan AA5083. Ekstrak Lawsone yang merupakan juzuk utama inai mampu untuk melindungi AA5083 untuk eksperimen ini.