

EFFECT OF HENNA AT HIGH CONCENTRATION IN METHANOL
FOR THE INHIBITION OF ALUMINIUM IN SEAWATER

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2013

**EFFECT OF HENNA AT HIGH CONCENTRATION IN METHANOL FOR THE
INHIBITION OF ALUMINIUM IN SEAWATER**

By

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


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2013**



**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled: **Effect Of Henna At High Concentration In Methanol For The Inhibition Of Aluminium In Seawater** by **Norhaiqal binti Mansor**, Matric No. **UK 20434** 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 HENNA AT HIGH CONCENTRATION IN METHANOL FOR THE INHIBITION OF ALUMINIUM IN SEAWATER** is the result of my own research except as cited in the references.

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ACKNOWLEDGEMENTS

First and foremost I offer my sincerest gratitude to my supervisor, Prof. Dr. Wan Mohd. Norsani bin Wan Nik, who has supported, guided and monitored me throughout my thesis. The blessing, help and guidance given by him time to time shall carry me a long way in the journey of life on which I am about to embark. Also thanks to Dr. Sulaiman Oladukun, my second supervisor for giving me tips and advices during the documentation process.

I also take this opportunity to express a deep sense of gratitude to Mr. Fakhratul Ridwan Zulkifli, for his cordial support, valuable information and guidance, which helped me in completing this task through various stages.

My endless thank and deep respect to my dear father, mother, brothers, sisters and relatives for their not limited love, encouragement, patience and support which push me toward successes.

Last but not least, I would like to thank my friends especially Noraliza binti Abu, who helped me during laboratory and thesis writing process. Thank you because she willing to share her ideas and knowledge with me. Also, thanks to all my friends who did their final year project under Dr. Wan Mohd. Norsani supervision, because they were willing being together with me facing the difficulties during the execution of this project.

I wish to offer all the thanks and respect for everybody that helped me directly or indirectly throughout this study.

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ABSTRACT

Aluminium Alloy 5083 or known as AA5083 has been a well known material in shipbuilding for a couple of decades because it owes its outstanding corrosion resistance. But nowadays corrosion is an obscure or untraceable threat to all industries that related to metal, in marine industry, corrosion effect the hull, piping system, equipments and other material related to metal. Hence, to overcome this using inhibitors are one of the most practical methods for protection against corrosion. In this experiment, henna extract was used. Hence it is classified as natural inhibitor. Henna also known as *Lawsonia inermis*. Henna leaves were immersed in methanol for a week before it was filtered and extracted using rotovap. The henna extract was observed using fourier transform infrared spectroscopy (FTIR). The concentration used were high concentration, they were 600ppm, 700ppm, 800ppm, 900ppm and 1000ppm. The duration for the immersion period was 60 days. The coupons were tested for loss weight experiment, electrochemical test (potentiodynamic polarization (PP) scan, electrochemical impedance spectroscopy (EIS)) and one time for scanning electron microscope (SEM). From FTIR observation shown the abundant element content in henna extract was Lawsonsone. The values of inhibition efficiency percentage, IE (%) were obtained from weight loss, corrosion current density, I_{corr} , polarization resistance, R_p , and corrosion rate, C_R , parameter. The IE% results shown as the concentration of henna was increased, the IE% was increased. The corrosion rate, C_R results analysis show, the corrosion rate increases again immersion period .

Keywords: Aluminium Alloy 5083, corrosion inhibitor, henna, seawater

KESAN INAI PADA KEPEKATAN TINGGI DALAM METANOL UNTUK PERENCATAN ALUMINIUM DALAM AIR LAUT

ABSTRAK

Aloi aluminium 5083 juga dikenali sebagai AA5083 amat terkenal sebagai bahan di dalam bidang pembuatan kapal untuk kesekian dekat kerana ia mempunyai kebolehan tersendiri untuk menghalang kakisan. Tetapi, pada masa kini, kakisan sangat sukar dijangka dan sukar dikesan membuatkan ia menjadi satu ancaman kepada industri yang berkaitan dengan bahan besi. Jadi, untuk mengatasi masalah ini, penggunaan perencat adalah langkah yang paling praktikal untuk menghalang kakisan. Dalam ujikaji ini, ekstrak inai digunakan sebagai perencat semula jadi. Inai juga dikenali sebagai *Lawsonia inermis*. Daun inai direndam bersama metanol selama seminggu sebelum ia ditapis dan diekstrak menggunakan mesin penyejuelupan (*rotovap*). Ekstrak inai telah diuji dan dilihat menggunakan fourier Spektroskopi inframerah transformasi (FTIR). Dalam kajian ini kepekatan yang digunakan ialah tinggi iaitu 600ppm, 700ppm, 800ppm, 900ppm and 1000ppm. Jangka masa bagi masa rendaman ialah 60 hari. Kupon-kupon aluminium telah diuji untuk ujian kehilangan berat, ujian elektrokimia (pengutuban potentiodynamik (PP), spektroskopi impedans elektrokimia(EIS)) dan mikroskop imbasan elektron (SEM), didapati bahawa unsur yang banyak terdapat didalam inai ialah Lawsonsone. Nilai peratusan kecekapan perencatan, IE% telah di dapati dari kehilangan berat, ketumpatan arus kakisan, I_{corr} , rintangan pengutuban, R_p , dan kadar kakisan, C_R . Keputusan IE% menunjukkan semakin tinggi penggunaan ekstrak inai, semakin tinggi IE%. Bagi kadar kakisan, C_R , analisa menunjukkan kadar kakisan meninggan apabila jangka masa rendaman meningkat.

Kata kunci: Aloi aluminium 5083, perencat kakisan, inai, air laut