

EFFECT OF HENNA IN ETHANOL FOR THE INHIBITION OF
ALUMINIUM IN SEAWATER AT LOW
CONCENTRATION

SITI NUR ANIS BINTI IBRAHIM

FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

2012

CPA 8288

1100087362



bpd

LP 40 FMSM 2 2012



1100087362

Effect of henna in ethanol for the inhibition of aluminium in seawater at low concentration / Siti Nur Anis Ibrahim.

PERPUSTAKAAN SULTANAH NUR ZAHIRAH
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

1100087362

1100087362		

Lihat sebelah

HAK MILIK
PERPUSTAKAAN SULTANAH NUR ZAHIRAH UMT

**EFFECT OF HENNA IN ETHANOL FOR THE INHIBITION OF ALUMINIUM IN
SEA WATER AT LOW CONCENTRATION**

By

Siti Nur Anis binti Ibrahim

**Research Report submitted in partial fulfillment 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 Henna in Ethanol for The Inhibition of Aluminium in Seawater at Low Concentration** by **Siti Nur Anis binti Ibrahim**, Matric No. **UK 17470** 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.

Verified by:


.....

First Supervisor

Name: **Assoc. Prof. Dr. Wan Mohd.**

Norsani bin Wan Nik

Official Stamp: 

Date: 11/7/12


.....

Second Supervisor

Name: **Ir. Ferry Manuhutu**

FERRY MANUHUTU
JABATAN TEKNOLOGI MARITIM
FAKULTI PENGAJIAN MARITIM DAN SAINS MARIN
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

Official Stamp:

Date: 21/6/2012


.....

Head of Department of Maritime Technology

Name: **Assoc. Prof. Dr. Mohammad Fadhli bin Ahmad**

Official Stamp:

ASSOC. PROF. DR. MOHAMMAD FADHLI AHMAD
HEAD
DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
UNIVERSITI MALAYSIA TERENGGANU (UMT)
21030 KUALA TERENGGANU

Date: 1/7/2012

DECLARATION

I hereby declare that this thesis entitled **EFFECT OF HENNA IN ETHANOL FOR THE INHIBITION OF ALUMINIUM IN SEAWATER AT LOW CONCENTRATION** is the result of my own research except as cited in the references.

Signature : 

Name : SITINUR ANIS BT IBRAHIM

Matric No. : UK17470

Date : 4 JULY 2012

EFFECT OF HENNA IN ETHANOL FOR THE INHIBITION OF ALUMINIUM IN SEAWATER AT LOW CONCENTRATION

ABSTRACT

Aluminium alloy type 5083 or AA5083 is known for exceptional performance in extreme environments. AA5083 shows an excellent corrosion resistance mostly in seawater and industrial chemical environment. Nowadays, corrosion is entrenched in maritime industry where the ship plate undergoes corrosion and it depends on the different environment. As a remedy, natural inhibitor was used to overcome this problem. This study used plant extract which is henna (*Lawsonia Inermis*). Henna was extracted with ethanol as solvent by using rotary evaporator (Rotavap). Low concentration of henna which is 100, 200, 300, 400 and 500ppm was used. The characterization of the corrosion was performed by using potentiodynamic polarization (PP), weight loss, electrochemical impedance spectroscopy (EIS), fourier transform infrared spectroscopy (FTIR) and scanning electron microscope (SEM). The percentage of inhibition efficiency (IE %) was calculated by using equation and this study showed the corrosion rate increase by decreasing concentration of the henna extract. This extract is believed to form a surface layer as it protects AA5083 from reacting to the environment.

ACKNOWLEDGEMENTS

At the end of my thesis, I would like to thank people that help and support me with new knowledge and good information to produce this good thesis. I would like to thank my first supervisor, Prof. Madya Dr. Wan Mohd. Norsani bin Wan Nik that help me a lot during this project. The ideas and knowledge given really help me to improve my thesis. Also thanks to Mr. Ir. Ferry Manuhutu as my second supervisor for giving me tips and advices during experiment held.

A lot of appreciate to Mr. Fakhratul Ridwan Zulkifli that guided me from the beginning of my thesis. The suggestions given really help me and my thesis works smoothly. The information and experience while conducting his final year project was shared with me and improves me better. He helps me a lot by explained the steps of the procedures during handling my thesis.

Not to forget also, I would like to thank my friends especially Muhamad Fakhruddin that help me a lot accompany me for laboratory measurement. Thanks also to my friends that conducting the same corrosion experiment and shared the knowledge together. New enjoyable experience was shared together while monitoring this laboratory measurement. Last but not least, my beloved family is really supportive and understanding that always motivates me to finish my thesis. They always be my side and pray for my successful.

KESAN INAI DALAM ETANOL UNTUK PERENCATAN ALUMINIUM DALAM AIR LAUT PADA KEPEKATAN RENDAH

ABSTRAK

Aluminium aloi jenis 5083 atau AA5083 dikenali untuk kebolehan luar biasa dalam persekitaran melampau. AA5083 menunjukkan rintangan pengaratan yang baik biasanya dalam air laut dan persekitaran bahan kimia. Kini, pengaratan sebatu dalam industri maritime di mana plat kapal mengalami pengaratan dan ia bergantung kepada persekitaran yang berbeza. Sebagai pemulihan, perencat semulajadi telah digunakan untuk mengatasi masalah ini. Kajian ini menggunakan ekstrak tumbuhan iaitu inai (*Lawsonia Inermis*). Inai telah diekstrak dengan etanol sebagai pelarut dengan menggunakan penyajat berputar (Rotavap). Kepekatan rendah inai iaitu 100, 200,300,400 dan 500ppm telah digunakan. Pencirian kakisan diuji dengan menggunakan pengutuban potentidinamik (PP), kehilangan berat, spektroskopi impedans elektrokimia (EIS), alat Fourier Transform Infrared Spectroscopy (FTIR), dan alat spectroscopy impedance microscope (SEM). Peratusan kecekapan perencatan (IE%) telah dikira dengan menggunakan persamaan dan kajian ini menunjukkan kadar pengaratan meningkat dengan pengurangan kepekatan ekstrak inai. Ekstrak ini dipercayai untuk membentuk satu lapisan permukaan yang melindungi AA5083 daripada bertindakbalas dengan persekitaran.