

IMPROVEMENT OF CORROSION PROTECTION OF MILD  
STEEL BY HONEY

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Design and modeling of wave energy converter / Nor Hasnaa'  
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PERPUSTAKAAN SULTANAH NUR ZAHIRAH UMT

**IMPROVEMENT OF CORROSION PROTECTION OF MILD STEEL BY HONEY**

**BY  
NOR HASNAA' KAMILAH MOHD DALIM**

**A Thesis in partial fulfillment of  
the requirement for the award of the degree of  
Bachelor of Applied Science (Maritime Technology)**

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

**2013**



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

It is hereby declared and verified that this research report entitled: **Improvement of Corrosion Protection of Mild Steel by Honey by Nor Hasnaa' Kamilah Mohd Dalim**, Matric No. **UK 21683** 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 **IMPROVEMENT OF CORROSION PROTECTION OF MILD STEEL BY HONEY** is the result of my own research except as cited in the references.

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## ABSTRACT

The corrosion inhibition of mild steel is the subject of tremendous technological importance due to the increased industrial applications of these materials, mainly in marine environment. Mild steel is still the materials mostly used for pipes in the industry. In this case, marine environment is a very corrosive environment since with presence of sodium chloride in seawater. Corrosion is death, there is no cure. Extension of their lives is possible by selection of appropriate corrosion preventive methods. Hence, the inhibitive action of honey on the corrosion of mild steel in seawater has been investigated by weight loss, potentiodynamic polarization (PP) and electrochemical impedance spectroscopic (EIS) methods. The functional group of honey has been determined by using Fourier Transform Infrared Spectroscopy (FTIR). Moreover, in this study, honey exhibits a very good performance as inhibitor because it contains a mixture of organic and inorganic compounds. In addition, it is not expensive and also environmental friendly. The inhibition efficiency increases with an increase in honey concentration. After some time, the inhibition efficiency decreased due to the growth of fungi in the medium. The adsorption of natural honey on the mild steel was found to follow the Langmuir adsorption isotherm.

**KEY WORDS:** Mild Steel, Honey, Weight Loss (WL), Potentiodynamic Polarization (PP), Electrochemical Impedance Spectroscopic (EIS), Frequency Response Analysis (FRA), Fourier Transform InfraRed Spectroscopy (FTIR).

## ABSTRAK

Isu perencatan kakisan terhadap keluli lembut merupakan cabaran teknologi yang serius seiring dengan peningkatan penggunaan bahan-bahan industri tersebut, terutamanya dalam persekitaran marin. Keluli lembut kebanyakannya digunakan untuk paip dalam industri. Dalam kes ini, persekitaran marin adalah persekitaran yang sangat mengakis oleh kerana kewujudan Natrium Klorida dalam air laut. Kakisan terus mereput, ianya tiada penawar. Oleh itu, pencegahan kakisan adalah penyelesaiannya. Proses lanjutan jangka hayat besi daripada pemilihan kaedah pencegahan kakisan yang sesuai. Oleh itu, tindakan perencatan bagi madu di kakisan keluli lembut dalam air laut akan dikaji dengan megaplikasikan kaedah penurunan berat, pengimbasan pengutuban (PP) dan kaedah spektroskopi elektrokimia (EIS). Sehubungan dengan itu, kajian sifat-sifat dan kepelbagaian kimia yang terkandung dalam madu akan dijalankan dengan menggunakan inframerah transformasi Fourier Spektroskopi atau Penuh Spektrum Scan (FTIR). Namun begitu, dalam penyelidikan sebelum ini, madu menunjukkan impak yang sangat baik sebagai penghalang kakisan kerana ia mengandungi campuran sebatian organik dan bukan organik. Di samping itu, ia juga tidak mahal dan mesra alam. Kecekapan perencatan meningkat apabila kepekatan madu meningkat. Selepas beberapa lama, kecekapan perencatan menurun disebabkan oleh pertumbuhan kulat di dalam medium. Keputusan perbandingan dengan menggunakan perencat dan tanpa perencat akan diperolehi. Penjerapan madu asli pada keluli carbon telah didapati ianya mengikut Langmuir isoterma penjerapan.

**KATA KUNCI:** keluli lembut, Madu, kehilangan berat (WL), Pengimbasan Pengutuban (PP), Elektrokimia Spektroskopi (EIS), Spektroskopi inframerah transformasi Fourier atau Penuh Spektrum Scan (FTIR).