# CORROSION INHIBITION OF ZINC IN TROPICAL SEAWATER

By
NORFAHANA BINTI MAZLAN HUZAIRI

A thesis submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Applied Science (Physics, Electronics & Instrumentation)

DEPARTMENT OF PHYSICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITI MALAYSIA TERENGGANU
2009

**JABATAN SAINS FIZIK**
**FAKULTI SAINS DAN TEKNOLOGI**
**UNIVERSITI MALAYSIA TERENGGANU**

## PENGAKUAN DAN PENGESAHAN LAPORAN PENYELIDIKAN SFZ 4399 a/b

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:..Corrosion Inhibition of zinc in Tropical Seawater.....

.....

.....

oleh...Norfahana binti Mazlan Huzairi.....,no. matrik: ...UK 13206.....
telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Fizik sebagai memenuhi sebahagian daripada keperluan memperolehi Ijazah Sarjana Muda Sains Gunaan (Fizik Elektronik & Instrumentasi), Fakulti Sains dan Teknologi, UMT.

Disahkan oleh:

.....
Penyelia Utama
Nama:
Cop Rasmi: DR. CHAN KOK SHENG
Pensyarah
Jabatan Sains Fizik
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: 29/4/2009

.....
Penyelia Bersama (jika ada)
Nama:
Cop Rasmi ENGKU ABD GHAPUR BIN ENGKU ALI
Pensyarah
Jabatan Sains Fizik
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: 29/4/2009

.....
Ketua Jabatan Sains Fizik
Nama:
Cop Rasmi: DR. MOHD IKMAR NIZAM BIN MOHAMAD ISA
Head
Department of Physical Sciences
Faculty of Science and Technology
University Malaysia Terengganu
21030 Kuala Terengganu

Tarikh: 29/4/09

## DECLARATION

I hereby declare that this thesis entitled Corrosion Inhibition of Zinc in Tropical Seawater is the result of my own research except as cited in the references.

Signature :.....
Name : Norfahana Binti Mazlan Huzairi
Matrix No. : UK 13206
Date :.....29/4/2009.....

## ACKNOWLEDGEMENTS

At the end of my thesis I would like to thank all those people who made this thesis possible and an enjoyable experience for me.

First of all I like to thanks to late Professor Dr. Senin Bin Hassan for his guidance and supervision while I complete my final year project. Although I only had a short chance to be under his supervision before he is gone, I am very grateful and thankful for this guidelines, concerns, advices and encouragements during the project.

Then, I would like to thank Dr Chan Kok Sheng for his patience and tolerance as the replacement supervisor for the final year project. Thank you for being very helpful and for the encouragements and supports for me to completing this thesis research.

Not to forget I like to thank YM Engku Abd Ghapur Bin Che Engku Ali as co-supervisor for this project and also as our coordinator for his patience and tolerance handling our final year project. Thank you for giving us enough time to complete the final year project.

Other than that, I like to thank all the lab assistants for the advice and help during my project.

Last but not least I would like to thank all my course mates, lecturers, tutors, friends and family for their encouragement and for giving me the support I need while finishing this project.

# CORROSION INHIBITION OF ZINC IN TROPIAL SEAWATER

## ABSTRACT

The growing environmental concerns have led to the formulation of corrosion inhibition in tropical seawater. The main objective of this study is to investigate the effect of the corrosion inhibition of zinc in seawater after adding sodium benzoate with different percentage. The samples were immersed in 100% seawater, 10% sodium benzoate, 20% sodium benzoate, 30% sodium benzoate, 40% sodium benzoate and 50% sodium benzoate. The samples were immersed for 30 days and the result were taken every 6 days intervals. The weight loss of the sample was recorded and using the formulae the result were calculated and graph were plotted. Using the weight loss measurements, the corrosion rates of zinc in solutions were determined. With the increment of the sodium benzoate, the weight loss of the zinc sample is decreased. The solution of seawater and 50% sodium benzoate will have the least weight loss and this proved that it will give the least corrosion rate. This will proved that the sodium benzoate inhibit the zinc from the corrosion. There for, the corrosion rate will be decreasing with the increasing of time. The sample morphology had been examined using Metallurgical Microscope to obtain microscopic image of the corrode sample. The sodium benzoate covered the surface of the zinc sample and this behavior then showed that the samples were slowing down the corrosion rate. The use of sodium benzoate is a useful technique for the corrosion inhibition of the zinc in tropical seawater.

## PERENCATAN KAKISAN ZINK DI DALAM AIR LAUT

## ABSTRAK

Pembangunan persekitaran yang banyak dititikberatkan telah menghasilkan formula penghalang pengaratan terhadap air laut. Objektif utama kajian ini dilakukan adalah untuk menyelidik kesan penghalang pengaratan zink di dalam air laut setelah ditambahkan beberapa peratusan garam benzoate. Sampel direndamkan di dalam 100% air laut, tambahan 10% garam benzoate, 20% garam benzoate, 30% garam benzoate, 40% garam benzoate dan 50% garam benzoate. Sampel direndamkan selama 30 hari dan sampel akan dikeluarkan setiap 6 hari untuk pengambilan data. Pengurangan berat sampel direkodkan dan dengan menggunakan formula yang dikaji, keputusan yang didapati dikira dan graf diplot. Dengan menggunakan pengiraan pengurangan berat sampel, kadar pengaratan zink diperoleh. Bagi setiap pertambahan peratusan sodium benzoate di dalam sampel air laut, jumlah pengurangan zinc akan berkurang. Tata bentuk zink dikaji dengan menggunakan Metallurgical Microscope untuk mendapatkan imej mikroskopik terhadap sampel yang telah terkakis. Garam benzoate akan menghasilkan lapisan nipis pada permukaan zink yang betindak sebagai perencat kepada kakisan. Sodium benzoate adalah salah satu teknik berkesan bagi perencatan kakisan oleh zinc di dalam air laut.