

THE EARLY CORROSION OF MILD STEEL IN FISH FARMING
WATER INHIBITED BY SEA CUCUMBER
CONCENTRATED SOLUTION

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BY:

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**A Thesis in partial fulfillment of
the requirement for the award of the degree of
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**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE
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**DEPARTMENT OF MARITIME TECHNOLOGY
FACULTY OF MARITIME STUDIES AND MARINE SCIENCE**

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

It is hereby declared and verified that this research report entitled:
THE EARLY CORROSION OF MILD STEEL IN FISH FARMING WATER INHIBITED BY SEA CUCUMBER CONCENTRATED SOLUTION By **AHMAD KHAIRUL AZHAR BIN AHMAD AGIN**, Matric No. **UK 17452** 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, Universiti Malaysia Terengganu.

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DECLARATION

I hereby declare that this thesis entitled **THE EARLY CORROSION OF MILD STEEL IN FISH FARMING WATER INHIBITED BY SEA CUCUMBER CONCENTRATED SOLUTION** is the result of my own research except as cited in the references.

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ABSTRACT

Today, fish farming activities are actively in the running as there is an increase in protein and to reduce reliance on the fishes obtained from the sea. However, this activity is costly especially in term of operating costs. At the same time, the equipments are easily exposed to corrosion phenomenon when reacting with water. Thereby, this study was important to see the rate of corrosion that will occur on these equipments to help breeders to cut the spending on maintenance. In this experiment, mild steel was tested using samples of water obtained from the fish farm of Universiti Malaysia Terengganu. In addition, sea cucumber solution was also used in the experiment aimed to test whether it can be used as a inhibition to prevent corrosion, in which in the sea cucumber there exists two antioxidants which are dimutase superoxide (SOD) and catalase (CAT) that can be used to reduce the production of reactive oxygen species (ROS). The concentrations used in this research are 0 ppm, 300 ppm, 600 ppm, and 900 ppm. The experiments were run for 28 days. Results of samples were taken starting from the first day and up to day seven. The weights of the samples were taken. On day 28, the last samples were taken to measure its final weight. There are several methods that has been used to measure the rate of corrosion from the data collection, the loss weight method, polarization scan and electrochemical impedance spectroscopy. In order to obtain more accurate data, twelve samples were taken on each day. The corrosion rate and inhibition efficiency were calculated in order to find the best solution to be inhibitor.

PENGARATAN AWAL KELULI LEMBUT DI DALAM AIR TERNAKAN IKAN YANG DI RENCATKAN DENGAN MENGGUNAKAN KEPEKATAN LARUTAN GAMAT

ABSTRAK

Hari ini, aktiviti ternakan ikan begitu aktif dijalankan kerana terdapat peningkatan permintaan sumber protein dan bagi mengurangkan kebergantungan pada hasil tangkapan di laut. Walau bagaimanapun, aktiviti ini mendatangkan kos yang mahal terutamanya bagi kos operasi. Pada masa yang sama, peralatan mudah terdedah kepada fenomena hakisan apabila bertindak balas dengan air. Dengan demikian, kajian ini adalah penting untuk melihat kadar hakisan yang akan berlaku pada peralatan ini untuk membantu penternak untuk mengurangkan perbelanjaan penyelenggaraan. Dalam eksperimen ini, keluli lembut diuji dengan menggunakan sampel air yang diperolehi daripada ladang ikan Universiti Malaysia Terengganu. Di samping itu, larutan timun laut juga digunakan dalam eksperimen ini yang bertujuan untuk menguji sama ada ia boleh digunakan sebagai penghalang semula jadi untuk mencegah kakisan, di mana di dalam timun laut wujud dua antioksidan iaitu dimutase dismutase (SOD) dan catalase (CAT) yang boleh digunakan untuk mengurangkan pengeluaran spesies oksigen reaktif (ROS). Kepekatan yang digunakan dalam penyelidikan ini ialah 0 ppm, 300 ppm, 600 ppm, dan 900 ppm. Eksperimen telah dijalankan untuk 28 hari. Keputusan sampel telah diambil bermula dari hari pertama dan sehingga tujuh hari. Berat sampel telah diambil. Pada hari 28, sampel terakhir diambil untuk mengukur berat badan yang muktamad. Terdapat beberapa kaedah yang telah digunakan untuk mengukur kadar kakisan daripada pengumpulan data, kaedah penurunan berat badan, polarisasi imbasan dan spektroskopi impedans elektrokimia. Dalam usaha untuk mendapatkan data yang lebih tepat, dua belas sampel telah diambil pada setiap hari untuk di analisis. Kadar kakisan dan kecekapan perencatan telah di kira untuk mencari larutan yang terbaik yang boleh di jadikan sebagai perencat.