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2009

**FORMULATION OF ARTIFICIAL ROCK FOR REMOVAL OF INORGANIC
NITROGEN IN ORNAMENTAL AQUARIA**

**By
Mohamad Nazri Bin Pusa**

**Research Report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Agrotechnology Science (Aquaculture)**

**Department of Fisheries Science and Aquaculture
FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
2009**

1100076177

This project report should be cited as:

Nazri, M. P., 2009. Formulation of artificial rock for removal of inorganic nitrogen in ornamental aquaria. Undergraduate thesis, Bachelor of Agrotechnology Science (Aquaculture), Faculty of Agrotechnology and Food Science, Universiti Malaysia Terengganu, Terengganu. 26p.

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**FAKULTI AGROTEKNOLOGI DAN SAINS MAKANAN
UNIVERSITI MALAYSIA TERENGGANU**

**PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK ILMIAH I DAN II**

Adalah ini diakui dan disahkan bahawa laporan ilmiah bertajuk:

Formulasi Batu Buatan bagi Menyingkir Nitrogen Tak Organik dalam Akuarium Ikan Hiasan

(Formulation of Artificial Rock for Removal of Inorganic Nitrogen in Ornamental Aquaria)

oleh..... Mohamad Nazri bin Puasa....., No.Matrik UK 13390 telah
diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan
kepada Jabatan Sains Perikanan dan Akuakultur sebagai memenuhi sebahagian
daripada keperluan memperoleh Ijazah Sarjana Muda
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DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledge.

Signature



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Date : 17 March 2009

ACKNOWLEDGEMENTS

First of all, grateful to God because of my successful work in this research project. I also would like to take this precious opportunity to express my sincere appreciation to my supervisor, Dr. Hii Yii Siang for his continuous comments, patience thought and guidance that enable this project to run smoothly and successful. Appreciation and lot of love to my mother Pn. Jainon and my father En. Puasa and also all family member for their support and living encouragement as well as the tower of strength in my hour of needs. Besides, I would like to express my sincere thanks to the members of examination board for their patience in reviewing my thesis. I would also like to extend my gratitude to the laboratory assistances Mr. Shahrol Ali, Mrs. Faridah Musa and Mr. Shahrol Idham for their kindly assistance and help. Appreciation is also extended to my friends especially Sajiddin and Haleem for their support and encouraged. Last but not least, my appreciation goes to those who have contributed direct or indirect to this project.

ABSTRACT

This study aims to remove inorganic nitrogen using artificial rock by mixture of different percentage clay with zeolite and clay with activated carbon. Efficiency in ammonia absorption rate and perfect rock forming was shown by formulation 30 % zeolite and clay that is $0.005 \text{ mg}(\text{g}^{-1}\text{d}^{-1})$ ammonia absorb. Clay with activated carbon mixture was eliminated because low average ammonia absorption rate then mixture clay with zeolite that is $0.002 \text{ mg}(\text{g}^{-1}\text{d}^{-1})$ and $0.004 \text{ mg}(\text{g}^{-1}\text{d}^{-1})$. Fixed formulation was recreated with addition of different water ratio during forming process to create different surface area (pore) during firing process. Experiments show higher water content in mixture of clay and zeolite tends to create large surface area by formulation with 37.5 % water create $3.714 \text{ cm}^2\text{g}^{-1}$ while formulation with 25 % water create $0.428 \text{ cm}^2\text{g}^{-1}$. Result on ammonia absorption rate by all formulation with different water ratio show large surface area does not influence the ammonia absorption. Artificial rock with small surface area ($0.428 \text{ cm}^2\text{g}^{-1}$) absorb high volume of ammonia then artificial rock with large surface area ($3.714 \text{ cm}^2\text{g}^{-1}$) by $3.987 \text{ g}(\text{cm}^{-2}\text{d}^{-1})$ and $0.407 \text{ g}(\text{cm}^{-2}\text{d}^{-1})$ of ammonia. The average of removal ammonia by formulated artificial rock was significantly greater than control with average ammonia removed in formulated artificial rock was 26.137 mgL^{-1} compare to 11.617 mgL^{-1} in control.

ABSTRAK

Kajian ini bertujuan untuk menyingkirkan nitrogen bukan organik dengan menggunakan batu buatan daripada formulasi campuran tanah liat dengan zeolite dan tanah liat dengan karbon aktif. Kecekapan kadar penyerapan ammonia dan pembentukan batu yang sempurna ditunjukkan oleh formulasi 30 % zeolite dengan tanah liat dimana 0.005 mgL^{-1} ammonia diserap. Formulasi campuran tanah liat dan karbon aktif ditolak kerana purata kadar penyerapan ammonia yang rendah berbanding campuran tanah liat dengan zeolite iaitu $0.002 \text{ mg}(\text{g}^{-1}\text{t}^{-1})$ berbanding $0.004 \text{ mg}(\text{g}^{-1}\text{t}^{-1})$. Formulasi yang tetap dihasilkan semula dengan penambahan air pada nisbah yang berbeza bagi menghasilkan luas permukaan (liang) yang berlainan semasa proses pembakaran. Kajian menunjukkan kandungan air yang tinggi dalam campuran tanah liat dan zeolite menghasilkan luas permukaan (liang) yang lebih besar iaitu formulasi dengan 37.5 % air menghasilkan luas permukaan $3.714 \text{ cm}^2\text{g}^{-1}$ manakala formulasi dengan 25 % air menghasilkan $0.428 \text{ cm}^2\text{g}^{-1}$. Keputusan yang diperoleh daripada semua rawatan menunjukkan kadar penyerapan ammonia tidak dipengaruhi oleh luas permukaan. Batu buatan dengan luas permukaan yang kecil ($0.428 \text{ cm}^2\text{g}^{-1}$) menyerap lebih banyak ammonia daripada batu buatan yang mempunyai luas permukaan yang besar ($3.714 \text{ cm}^2\text{g}^{-1}$) iaitu $3.987 \text{ g}(\text{cm}^{-2}\text{t}^{-1})$ berbanding $0.407 \text{ g}(\text{cm}^{-2}\text{t}^{-1})$ ammonia. Penyingkiran ammonia oleh formulasi batu buatan adalah nyata lebih besar berbanding kawalan. Purata penyingkiran ammonia oleh batu buatan adalah 26.137 mgL^{-1} manakala penyingkiran ammonia oleh kawalan adalah 11.617 mgL^{-1} .