

ISOLATION OF POLYHYDROXYALKANOATE PRODUCING BACTERIA
FROM BRACKISH WATER IN UNIVERSITI MALAYSIA
TERENGGANU CANAL

JONG TSE KIUN

SCHOOL OF MARINE AND ENVIRONMENTAL SCIENCES
UNIVERSITI MALAYSIA TERENGGANU

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**ISOLATION OF POLYHYDROXYALKANOATE PRODUCING BACTERIA
FROM BRACKISH WATER IN UNIVERSITI MALAYSIA TERENGGANU
CANAL**

**By
Jong Tse Kiun**

**Project report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Science (Marine Science)**

**School of Marine and Environmental Sciences
UNIVERSITI MALAYSIA TERENGGANU**

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A5: Declaration and Verification Report



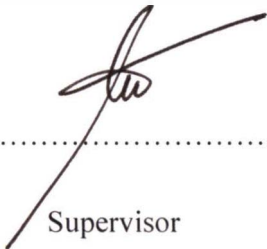
**SCHOOL OF MARINE AND ENVIRONMENTAL SCIENCES
UNIVERSITI MALAYSIA TERENGGANU**

DECLARATION AND VERIFICATION REPORT

FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled *Isolation of polyhydroxyalkanoate producing bacteria from brackish water in Universiti Malaysia Terengganu* by Jong Tse Kiun, Matric No. UK 28221 has been examined and all errors identified have been corrected. This report is submitted to the School of Marine and Environmental Sciences as partial fulfilment towards obtaining the degree of Bachelor of Science (Marine Science), School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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LIST OF ABBREVIATIONS

KH_2PO_4	:	Potassium dihydrogen phosphate
Na_2HPO_4	:	Disodium hydrogen phosphate
NH_4Cl	:	Ammonium chloride
$\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$:	Magnesium sulphate heptahydrate
HCl	:	Hydrochloric acid
$\text{CoCl}_2 \cdot \text{H}_2\text{O}$:	Cobalt (II) chloride hydrate
FeCl_3	:	Iron (III) chloride
CaCl_2	:	Calcium (II) chloride
$\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$:	Nickel (II) chloride hexahydrate
$\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$:	Chromium (III) chloride hexahydrate
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$:	Copper (II) sulfate pentahydrate
μL	:	Microliter
N	:	Normality
mL/L	:	Milliliter per liter
g/L	:	Gram per liter
% (w/v)	:	Percentage of weight per volume
v/v	:	Volume per volume
kPa	:	Kilopascal
mL/min	:	Microliter per minutes
mg	:	Milligram
pmol	:	Picomolar

h : **Hours**

bp : **Base pair**

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ABSTRACT

Polyhydroxyalkanoate (PHA) is a type of biodegradable plastic which can be synthesized by bacteria under limited nutrient and excess carbon source. Approximately 11 strains isolated from brackish water in University Malaysia Terengganu canal were screened to determine potential PHA production using Nile red dye. Results showed three strains, *Massilia haematophila*, *Mangrovibacter plantisponsor*, and *Novosphingobium panipatense*, were produced poly(3-hydroxybutyrate), P(3HB), a common PHA. These strains were tested for the production of P(3HB) using three renewable carbon sources, which are glucose, sweetwater and glycerol. *Massilia haematophila* produced 33.75 ± 4.49 wt% and 9.83 ± 1.60 wt% P(3HB) from glucose and glycerol respectively. *Massilia plantisponsor* produced 12.14 ± 3.52 wt% from glucose, and *N. panipatense* produced 10.53 ± 3.2 wt% P(3HB) when supplemented with sweetwater. P(3HB) polymer in *M. haematophila* and *M. plantisponsor* freeze-dried cell pellets were extracted using solvent extraction method. All strains showed ability in converting industrial waste or by-products to valuable biodegradable material as a more beneficial approach in waste management.

Pengasingan Bakteria yang Menghasilkan Polyhydroxyalkanoate dari Air Payau di Universiti Malaysia Terengganu.

ABSTRAK

Polyhydroxyalkanoate (PHA) adalah sejenis plastik yang boleh dihapuskan dalam alam sekitar dan boleh dihasilkan oleh bakteria apabila dalam keadaan mengehadkan nutrien dan juga melebihi sumber karbon. Sebelas bakteria yang diasingkan dari air payau di Universiti Malaysia Terengganu canal diskriminasi oleh pewarna Nile Red untuk menentukan potensi bakteria yang boleh menghasilkan PHA. Keputusan yang didapati dari skrin proses menunjukkan hanya *Massilia haematophila*, *Mangrovibacter plantisponsor* dan *Novosphingobium panipatense* terdapat potensi untuk menghasilkan sejenis PHA yang biasa dijumpai iaitu poly(3-hydroxybutyrate), P(3HB). Ketiga-tiga bakteria ini menggunakan sumber karbon yang boleh diperbaharui contohnya glukosa, gliserol dan juga *sweetwater* untuk menghasilkan P(3HB). *Massilia haematophila* mampu menghasilkan sebanyak 33.75 ± 4.49 wt% and 9.83 ± 1.60 wt% P(3HB) daripada glukosa dan gliserol. *Massilia plantisponsor* mampu menghasilkan sebanyak 12.14 ± 3.52 wt% P(3HB) daripada glukosa dan *N. panipatense* hanya menghasilkan 10.53 ± 3.2 wt% P(3HB) daripada *sweetwater*. Di samping itu, polimer P(3HB) boleh diekstrakan oleh pelarut kloroform daripada *M. haematophila* dan *M. plantisponsor* dalam pelet sel yang telah dikerinkangkan. Ketiga-tiga bakteria ini menunjukkan keupayaan untuk menukarkan sisa-sisa industri kepada produk yang lebih berharga oleh itu PHA berfaedah dalam pengurusan sisa-sisa.