

A STUDY ON THE BIODEGRADATION OF TAPIS A BLENDED  
CRUDE OIL BY AN OIL-DEGRADING BACTERIUM  
ISOLATED FROM MALACCA STRAITS

LOO SIEW KEAN

FACULTY OF APPLIED SCIENCE AND TECHNOLOGY  
UNIVERSITI PUTRA MALAYSIA TERENGGANU  
TERENGGANU

1999



**A STUDY ON THE BIODEGRADATION OF TAPIS A  
BLENDED CRUDE OIL BY AN OIL-DEGRADING  
BACTERIUM ISOLATED FROM MALACCA STRAITS**

**BY**

**LOO SIEW KEAN**

**This project report is submitted in partial fulfillment of  
the requirements for the Degree of  
Bachelor of Fisheries Science**

**Faculty of Applied Science and Technology  
UNIVERSITI PUTRA MALAYSIA TERENGGANU**

**1999**

**1100024146**

*Specially Dedicated to My Dearest*

**Father, Mother and Hubby**

*For your unconditional Love and Sacrifice.*

*I Love You all!*

## ACKNOWLEDGEMENT

I would like to express my sincere appreciation and gratitude to my supervisor, Prof. Dr. Law Ah Theem for his invaluable guidance, advice, comments, support, concern, time as well as encouragement to me during this project was carried on.

I am also grateful to En. Ismail Kassim and En. Mohd. Sharol Ali for their kindness in giving me technical assistance. My gratitude also goes out to Mr. Hii Yii Siang for his suggestions, comments and helps throughout this period of time. Besides, I would like to thank all of my course-mates, especially Mr. Haw Weng Cheong, Mr. Pang Chon Hau, Mr. Yong Hee Chow, Mr. Soon Chin Kai and Mr. Chua Yew Siang for their assistance in various aspects.

Special thanks also goes out to Ms. Der Foong Peng, Ms. Kuey Chew Yit, Mr. Wai Kien Tat, Ms. Choy Poh Ling, Mr. Jong Khiam Jan, Mr. Cheong Yee Kuan, Ms. Hing Lee Siang, and whoever have helped me in my experiments.

Last but not least, I would like to extend my deepest and also greatest gratitude to my father, mother, brothers, sisters and niece i.e. Phoebe and Sammy as well as to my beloved hubby Mr. Tan Ean Kok, for their endless love, concern, moral support as well as physical support to me for all these years.

## ABSTRACT

An oil-degrading bacterium, named Nap C, was isolated from sediment of the Straits of Malacca by using enrichment method. The cells that pre-exposed to 480ppm of crude oil were used to determine biodegradation rate and maximum specific growth rate on different concentrations of Petronas Tapis A crude oil.

Nap C was capable to degrade 25.01%, 25.21%, 49.11%, 35.33% and 49.00% of oil in 50ppm, 100ppm, 750ppm, 1000ppm and 1500ppm respectively after 12 days incubation under optimum growth condition. The biodegradation rate of these concentrations with an increasing order were  $7.283 \times 10^{-7} \mu\text{g/day/cell}$ ,  $1.456 \times 10^{-6} \mu\text{g/day/cell}$ ,  $2.128 \times 10^{-5} \mu\text{g/day/cell}$ ,  $2.033 \times 10^{-5} \mu\text{g/day/cell}$  and  $4.584 \times 10^{-5} \mu\text{g/day/cell}$ .

Meanwhile, the maximum specific growth rates of Nap C in 50ppm, 100ppm, 750ppm, 1000ppm and 1500ppm crude oil medium accordingly was  $0.009\text{hr}^{-1}$ ,  $0.020\text{hr}^{-1}$ ,  $0.115\text{hr}^{-1}$ ,  $0.292\text{hr}^{-1}$  and  $0.405\text{hr}^{-1}$ .

## ABSTRAK

Sejenis bakteria pengurai hidrokarbon, yang dinamakan sebagai Nap C, dipencilkan dari sedimen di Selat Melaka dengan menggunakan kaedah pengkayaan. Sel-sel bakteria yang telah didedahkan kepada kepekatan 480ppm minyak mentah digunakan untuk menentukan kadar degradasi dan kadar pertumbuhan spesifik bakteria dalam medium minyak mentah Petronas yang berlainan kepekatan.

Nap C berupaya mendegradasikan minyak sebanyak 25.01%, 25.21%, 49.11%, 35.33% dan 49.00% masing-masing dalam medium minyak yang berkepekatan 50ppm, 100ppm, 750ppm, 1000ppm dan 1500ppm selepas 12 hari eraman di bawah keadaan optimum. Kadar degradasi dalam medium minyak yang berkepekatan mengikut turutan secara meningkat adalah  $7.283 \times 10^{-7} \mu\text{g/day/cell}$ ,  $1.456 \times 10^{-6} \mu\text{g/day/cell}$ ,  $2.128 \times 10^{-5} \mu\text{g/day/cell}$ ,  $2.033 \times 10^{-5} \mu\text{g/day/cell}$  and  $4.584 \times 10^{-5} \mu\text{g/day/cell}$ .

Sementara itu, kadar pertumbuhan spesifik maksima Nap C ke atas medium minyak berkepekatan 50ppm, 100ppm, 750ppm, 1000ppm dan 1500ppm masing-masing ialah  $0.009\text{jam}^{-1}$ ,  $0.020\text{jam}^{-1}$ ,  $0.115\text{jam}^{-1}$ ,  $0.292\text{jam}^{-1}$  dan  $0.405\text{jam}^{-1}$ .