

**ANTIBACTERIAL PROPERTIES OF EIGHT SYNTHETIC THIOUREA
DERIVATIVE COMPOUNDS**

By

NURUL FAKRIAH BINTI CHE HASHIM

**A PITA report submitted in partial fulfillment of
the requirements for the award of the degree of
Bachelor of Science (Biological Sciences)**

**DEPARTMENT OF BIOLOGICAL SCIENCES
FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITI MALAYSIA TERENGGANU
2012**



JABATAN SAINS BIOLOGI
FAKULTI SAINS DAN TEKNOLOGI
UNIVERSITI MALAYSIA TERENGGAU

BIO 4999

PENGAKUAN DAN PENGESAHAN LAPORAN PITA

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk: ANTIBACTERIAL PROPERTIES OF EIGHT SYNTHETIC THIOUREA DERIVATIVE COMPOUNDS oleh NURUL FAKRIAH BINTI CHE HASHIM, no matrik: UK19342 telah diperiksa dan semua pembedaan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahagian daripada keperluan memperoleh Ijazah SARJANA MUDA SAINS (SAINS BIOLOGI), Fakulti Sains dan Teknologi, Universiti Malaysia Terengganu

Disahkan Oleh:

.....

Penyelia Utama

Nama:

Cop Rasmi:

Tarikh :.....

Ketua Jabatan Sains Biologi

Nama: **DR. FARIDAH BT MOHAMAD**
Ketua Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Universiti Malaysia Terengganu
21030 Kuala Terengganu

Cop Rasmi:

Tarikh: **2 JULAI 2012**.....

DECLARATION

I hereby declare that this PITA research report entitled Antibacterial Properties of Eight Thiourea Derivative Compounds is the result of my own research except as cited in the references.

Signature :.....*Fakriah*.....
Name : Nurul Fakriah Binti Che Hashim
Matric No. :UK19342
Date :8th July 2012

ACKNOWLEDGEMENTS

Thank to almighty Allah for the ease and fluency throughout this study. I would like to thank all those people who made this thesis possible and enjoyable experience for me. First of all, I would like to express my sincere gratitude to my dedicated supervisor, Prof. Dr. Nakisah Binti Mat Amin for her guidance, advice and suggestions given to me throughout this project. I also would like to thank Science Officer and Laboratory Assistant of Biological Science Department, Faculty of Science and Technology, University Malaysia Terengganu, Miss Nor Azlina and Madam Rohidawati for their attention and support.

I also would like to give appreciation to Science Officer and Laboratory Assistant of Scanning Electron Microscope Laboratory, Oceanography Institute (INOS), University Malaysia Terengganu, Mr. Mohamad Nasir and Madam Norita for the guidance throughout this project. To Miss Nuraini Nawati, I would like to thank her for assistance and knowledge.

I am grateful to my friends for their encouragement and help especially to Nurul Jannah Amirul, Sharifah Siti Maryam Syd. Abd. Rahman, Firasysafra Din, Wan Nur Famieza Wan Rahimi and Nur Faizah Hanafi for help me throughout my final year project.

Finally, I would like to express my deepest gratitude for a constant support, emotional understanding and love receive from my family especially Madam Kamsiah Mahmud and Mr. Che Hashim Che Soh. Thank you very much to all of you.



ANTIBACTERIAL PROPERTIES OF EIGHT SYNTHETIC THIOUREA DERIVATIVE COMPOUNDS

ABSTRACT

The importance of antibacterial to human health and hygiene has led intense research in biological activities of thiourea derivatives at large scale. Thiourea derivative compounds are synthetic elements. Their molecular structures are similar as urea except the oxygen is replaced by sulfur. Previous study showed that these compounds exhibit a wide spectrum of biological activities such as anti-amoeba, antifungi, antibacterial and anticancer. Thus, this study was conducted to explore the antibacterial properties of eight thiourea derivative compounds against four common pathogenic bacteria. Each compound with five different concentrations; 200 $\mu\text{g/ml}$, 100 $\mu\text{g/ml}$, 50 $\mu\text{g/ml}$, 25 $\mu\text{g/ml}$ and 12.5 $\mu\text{g/ml}$ were tested on three gram-negative bacteria; *Pseudomonas aeruginosa*, *Escheria coli*, *Proteus* sp. and one gram-positive bacteria; *Staphylococcus aureus*. All eight synthetic thiourea derivative compounds showed antibacterial activity towards *Staphylococcus aureus* at MIC value of 12.5 $\mu\text{g/ml}$ while other gram-negative bacteria were not affected by the compounds. The morphology of affected bacteria, when observed under Scanning Electron Microscopy showed several abnormal appearances of the cell morphology including ruptured of cell wall of *Staphylococcus aureus*. This study suggests that synthetic thiourea derivative compounds had different effect towards gram-positive and gram-negative bacteria due to their different in the cell wall structure and outer membrane and also the properties of the synthetic thiourea derivative compound itself.

SIFAT –SIFAT ANTIBAKTERIA LAPAN SEBATIAN HURAIAN THIOUREA SINTETIK

ABSTRAK

Kepentingan agen antibakteria kepada kesihatan dan kebersihan manusia telah mengarah kepada penekanan penyelidikan aktiviti biologi oleh sebatian thiourea pada skala yang besar. Sebatian thiourea merupakan elemen sintetik. Struktur molekularnya adalah sama seperti urea kecuali sebatian oksigen digantikan dengan sebatian sulfur. Kajian sebelum ini telah menunjukkan sebatian ini mempamerkan satu spektrum aktivi biologi yang luas seperti anti-amoeba, anti-kulat, antibakteria dan antiparasit. Oleh itu, kajian ini telah dijalankan untuk menerokai sifat-sifat antibakteria oleh lapan sebatian thiourea melawan empat jenis bakteria patogen. Setiap sebatian dengan lima kepekatan yang berbeza: 200µg/ml, 100µg/ml, 50µg/ml, 25µg/ml dan 12.5µg/ml telah diuji ke atas tiga jenis bakteria Gram-negatif: *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus* sp. dan sejenis bakteria Gram-positif: *Staphylococcus aureus*. Kesemua lapan sebatian thiourea sintetik menunjukkan sifat-sifat antibakterial terhadap *Staphylococcus aureus* pada nilai Kepekatan Minimum Perencatan (MIC) 12.5µg/ml manakala bakteria Gram-negatif yang lain tidak terkesan oleh sebatian ini. Perubahan morfologi bagi bakteria yang terkesan di perhatikan di bawah Mikroskopi Elektron Saringan (SEM) telah menunjukkan beberapa penampilan bentuk kokus yang tidak normal termasuk kehancuran dinding sel *Staphylococcus aureus*. Kajian ini menyarankan bahawa sebatian thiourea sintetik telah memberi kesan yang berbeza kepada bakteria gram-positif dan gram-negatif berdasarkan kepada perbezaan struktur dinding sel dan membran paling luar bakteria serta sifat-sifat sebatian thiourea sintetik itu sendiri.

TABLE OF CONTENTS

TITLE PAGE	i	
RESEARCH REPORT VERIFICATION FORM	ii	
DECLARATION	iii	
ACKNOWLEDGEMENTS	iv	
ABSTRACT	v	
ABSTRAK	vi	
LIST OF TABLES	x	
LIST OF FIGURES	xi	
LIST OF ABBREVIATIONS	xv	
CHAPTER 1	INTRODUCTION	
1.1	Study background	1
1.2	Significance of study	2
1.3	Objectives of study	2