OPTIMIZATION OF A THERMOSTABLE LIPASE FOR INDUSTRIAL APPLICATIONS

SUPACHOK SINCHAIKUL

A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN BIOTECHNOLOGY

GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
AUGUST 2001

OPTIMIZATION OF A THERMOSTABLE LIPASE FOR INDUSTRIAL APPLICATIONS

SUPACHOK SINCHAIKUL

THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN BIOTECHNOLOGY

EXAMINING COMMITTEE

Sance Fentoalil CHAIRMAN
Assoc. Prof. Dr. Suree Phutrakul
Shu'-te clem MEMBER
Prof. Dr. Shui-Tein Chen
ON MEMBER
Assoc. Prof. Dr. Kanit Krisnangkura
al der Miss MEMBER
Asst. Prof. Dr. Sirirat Sarawek
Daran St Timple no MEMBER
Lect Dr. Dararat Tongkao

9 August 2001

© Copyright by the Graduate School, Chiang Mai University

ACKNOWLEDGEMENT

I express my sincere appreciation to Assoc. Prof. Dr. Suree Phutrakul, Prof. Dr. Shui-Tein Chen, Dr. Linda Gilmore, Prof. Dr. Malcolm Walkskinshaw and Dr. Fu-Ming Pan for their kind advise, encouragement and support throughtout my research.

I am very grateful to the members Assoc. Prof. Dr. Kanit Krisnangkura, Asst. Prof. Dr. Sirirat Sarawek and Dr. Dararat Tongkao for their many useful suggestions.

Thanks Dr. Boonyaras Sookkheo for her enthusiastic helpful through this research and deeply gratitude to my friends, Mr. Bundit Boonsinthai, Mrs. Hui-Ming Yu, Ms. Yae-Er Yu, Dr. Chi-Yue Wu, Dr. Ying-Ta Wu and Dr. Joel Tyndall for their available helpful and introduction. I could not have gone through all of the graduate work smoothly, if with out them.

Thanks the Thailand Research Fund (TRF), Thailand for the scholarship of the Royal Golden Jubilee Ph.D. program support to the graduate student and for research funds in Thailand and Edinburgh, UK.

I am grateful to the Institute of Biological Chemistry, Academia Sinica, Taipei, Taiwan for supporting research in part at Taiwan.

Finally, I would like to thank my family for their tender love and constant support.

S. Sinchaikul