THE EFFECT OF LIPASE ENZYME ON TRANSESTERIFICATION OF OLIVE OIL WITH SOD LYE

[redacted]

[redacted]

[redacted]

2005

/2059

The effect of lipase specificity of transesterification of olive oil with cod liver / Noorkhamsida Ideris.

Lihat sebelah

THE EFFECT OF LIPASE SPECIFICITY ON TRANSESTERIFICATION OF OLIVE OIL WITH COD LIVER

By

Noorkhamsyida binti Ideris

Research report submitted in partial fulfillment of
the requirements for the degree of
Bachelor of Science (Biological Sciences)

Department of Biological Sciences
Faculty of Science and Technology
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
2005

This project should be cited as:

NOORKHAMSYIDA, I. Effect of lipase specificity on transesterification of olive oil with cod liver oil. Undergraduate thesis, Bachelor of Science in Biological Sciences, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia, Terengganu. 40p.

JABATAN SAINS BIOLOGI
FAKULTI SAINS DAN TEKNOLOGI
KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA

PENGAKUAN DAN PEMGESAHAN LAPORAN PROJEK PENYELIDIKAN 1 DAN 11

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk Effect of Lipase Specificity on Transesterification of Olive Oil with Cod Liver Oil oleh Noorkhamsyida binti Ideris, no matrik UK 7563 telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini dikemukakan kepada Jabatan Sains Biologi sebagai memenuhi sebahahagian daripada keperluan memperolehi Ijazah Sarjana Muda Sains (Sains Biologi), Fakulti Sains dan Teknologi, Kolej Universiti Sains dan Teknologi Malaysia.

Disahkan oleh:

.....
Penyelia utama
Nama
Cop Rasmi

HAZLINA AHAMAD ZAKERI
Pensyarah
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia (KUSTEM)
Mengabang Telipot
21030 Kuala Terengganu, Terengganu Darul Iman.

Tarikh 13/4/2005

.....
Penyelia kedua
Nama
Cop Rasmi

Tarikh

.....
Ketua Jabatan Sains Biologi
Nama
Cop Rasmi

PROF. MADYA DR. NAKISAH BT. MAT AMIN
Ketua
Jabatan Sains Biologi
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
(KUSTEM)
21030 Kuala Terengganu.

Tarikh

ACKNOWLEDGEMENTS

Special thanks to my supervisor, Cik Hazlina binti Ahamad Zakeri from the Department of Biological Sciences, Faculty of Science and Technology. A heartiest gratitude for her help and cooperation in guiding me through this project.

A lot of thanks dedicated to the biochemical lab officers, Cik Norazlina and Cik Ku Naiza for their assistance in coping with the technical problems of HPLC. Their help and assistance gave me a lot of courage and confidence to complete this project.

Special appreciation to all my fellow labmates for their help in using HPLC and for all the information provided.

Lastly, my gratitude goes to my beloved parents as well for their encouragement and support to finish my thesis successfully. May the Lord bring all of you His blessings.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ALA	Alpha-linolenic acid
AOM	Active oxygen method
CLO	Cod liver oil
DAD	Diode array detector
DHA	Docosahexanoic acid
DoH	Degree of hydrolysis
DoT	Degree of transesterification
EPA	Eicosapentanoic acid
FFA	Free fatty acid
GRAS	Generally Recognized as Safe
HPLC	High Performance Liquid Chromatography
MAG	Monoacylglycerol
n-6	Omega 6
n-3	Omega 3
NaOH	Sodium hydroxide
OO	Olive oil
PUFA	Polyunsaturated fatty acid
$revmin^{-1}$	Revolution per minutes
TG	Triglyceride

w/v	Weight per volume

KESAN SPESIFISITI ENZIM TERHADAP TRANSESTERIFIKASI MINYAK ZAITUN DENGAN MINYAK IKAN KOD

ABSTRAK

Kesan spesifisiti enzim terhadap transesterifikasi minyak zaitun dengan minyak ikan kod telah dikaji. Enzim yang telah digunakan adalah seperti *Rhizomucor miehei, Pseudomonas fluorescens, Aspergillus niger,* Amano lipase PS-C1 dan wheat germ. Tindak balas dilakukan pada suhu 60^0C dan 200 rpm selama 6 jam. Penentuan luas bagi puncak tiap-tiap graf dilakukan dengan menggunakan HPLC. Daripada keputusan yang didapati, profil bagi luas puncak tiap- tiap graf adalah tinggi apabila minyak ikan kod dan minyak zaitun ditransesterifikasikan dan ini berbeza dengan minyak zaitun dan minyak ikan kod yang tidak dicampur bersama dan tidak dijalankan proses transesterifikasi. Keputusan yang didapati daripada proses transesterifikasi tersebut, campuran minyak zaiton dengan minyak ikan kod dengan menggunakan enzim Amano lipase PS-C1 menghasilkan lapan puncak, *Pseudomonas florescens* dengan lima puncak, *Aspergillus niger* menghasilkan tujuh puncak, campuran minyak zaitun dan minyak ikan kod dengan menggunakan enzim *Rhizomucor miehei* menghasilkan enam puncak dan enzim wheat germ menghasilkan tujuh puncak. Nilai DoT dan DoH dikira bagi setiap enzim. Nilai DoH tertinggi telah dikira didalam *Rhizomucor miehei* dengan 2.72% diikuti dengan Amano lipase PS-C1 dengan 1.64%; *Pseudomonas flourescens* 0.16% , *Aspergillus niger* dengan 0.14% serta wheat germ 0.02%.

Manakala nilai DoT yang tertinggi adalah *Rhizomucor miehei* dengan 63.74%, diikuti oleh wheat germ dengan 42.45%; *Pseudomonas flourescens* lipase 20.34%; Amano lipase PS-C1 19.45% dan *Aspergillus niger* dengan 3.29%. Enzim yang palaing berkesan dalam proses transesterikasi ini adalah enzim *Rhizomucor miehei*.

ABSTRACT

The effect of lipase specificity on the transesterification of olive oil with cod liver oil was studied. The lipases were from *Rhizomucor miehei, Pseudomonas flourescens,* Amano lipase PS-C1, *Aspergillus niger* and wheat germ. Transesterification reaction was carried out at 60^0C and 200 rpm for 6 hours. Analyses of peak concentrations were carried out using Reversed- Phase High Performance Liquid Chromatography (RP-HPLC). The degree of hydrolysis (DoH) and degree of transesterification (DoT) for each lipases were also calculated. From the results, the profile of peak concentration was high when cod liver oil and olive oil blend were transesterified compared to non- transesterified of unblended olive oil and cod liver oil. *Pseudomonas flourescens* show five peaks, Amano lipase show eight peaks, *Aspergillus niger* show seveb peaks, *Rhizomucor miehei* show six peak and wheat germ show seven peaks. DoH and DoT was calculated for each lipase. The highest DoH was calculated in *Rhizomucor miehei* lipase with 2.72% followed by Amano lipase lipase with 1.64%; *Pseudomonas flourescens* with 0.16%, *Aspergillus niger* 0.14% and wheat germ lipase with 0.02%.The highest DoT was also calculated in *Rhizomucor miehei* lipase with 63.74%, followed by wheat germ lipase with 42.45%; *Pseudomonas flourescens* 20.34%, Amano lipase PS-C1 with 19.45% and *Aspergillus niger* lipase with 3.29%. The most suitable lipase that catalyzed the transesterification was *Rhizomucor miehei*.