

OPTIMIZATION OF ENZYMATIC HYDROLYSIS FROM PATIN
(*Pangasius spp.*) FRAME WASTE

MUFIL - SIKWAN BINTI SUKOR

FACULTY OF BIOTECHNOLOGY AND FOOD SCIENCES
UNIVERSITI MALAYSIA TERENGGANU
2008

OPTIMIZATION OF ENZYMATIC HYDROLYSIS
FROM PATIN (*Pangasius spp.*) FRAME WASTE

By
Nurul Ashikin Binti Sukar

Research Report submitted in partial fulfillment of
The requirements for the degree of
Bachelor of Food Science (Food Service and Nutrition)

Department of Food Science
FACULTY OF AGROTECHNOLOGY AND FOOD SCIENCE
UNIVERSITI MALAYSIA TERENGGANU
2008

This project report should be cited as:

Nurul-Ashikin, S. 2008. Optimization of enzymatic hydrolysis from Patin (*Pangasius sp.*) frame waste. Undergraduate thesis. Bachelor of Food Science (Food Service and Nutrition). Faculty of Agrotechnology and Food Science. Universiti Malaysia Terengganu, Terengganu. 73p.

No part of this report may be reproduced by any mechanical, photographic or electronic process, or in the form of photographic recording, nor may it be stored in a retrieval system, transmitted or otherwise copied for public or private use, without written permission from the author and supervisor(s) of the project.

1100090112

LP
25
FASTO
2
2008



FAKULTI AGROTEKNOLOGI DAN SAINS MAKANAN
UNIVERSITI MALAYSIA TERENGGANU

PENGAKUAN DAN PENGESAHAN LAPORAN
PROJEK PENYELIDIKAN I DAN II

Adalah ini diakui dan disahkan bahawa laporan penyelidikan bertajuk:

*Optimization of enzymatic hydrolysis from patin (Pangasius spp.)
frame waste*

oleh *Nurul Ashikin bt. Sukar*, No.Matrik *UK11218*

telah diperiksa dan semua pembetulan yang disarankan telah dilakukan. Laporan ini
dikemukakan kepada Jabatan *Sains Makanan*

sebagai memenuhi sebahagian daripada keperluan memperoleh ijazah Sarjana Muda
Sains Makanan (Perkhidmatan Makanan & Pemakanan)

Fakulti Agroteknologi dan Sains Makanan, Universiti Malaysia Terengganu.

Disahkan oleh:

Penyelia Utama

Nama:

PROF. MADYA DR. AMIZA MAT AMIN
Timbalan Dekan (Hal Ehwal Pelajar & Alumni)
Fakulti Agroteknologi dan Sains Makanan
Universiti Malaysia Terengganu
21030 Kuala Terengganu.

Cop Rasmi:

Tarikh: *21/12/08*

Penyelia Kedua (jika ada)

Nama:

Cop Rasmi

Tarikh:

DECLARATION

I hereby declare that the work in this thesis is my own except
for quotations and summaries which have been duly
acknowledged.

Signature :

Name : Nurul Ashikin Binti Sukar

Matric No : UK 11218

Date :

ACKNOWLEDGEMENT

In the name of Allah, the most gracious and the most merciful. Have faith in god, the omnipotent, the eternal, the first and the last, who grants life and determines death. He bestows bounty and only he can restore crushed hope. Thanks to god because strengthened my spirit to continue this project regardless of the hardship.

I would like to thanks to my supervisor and also our head of department, Assoc. Prof. Dr. Amiza Mat Amin for her invaluable advice, continuous supervision and guidance, her kindness and her willingness to help throughout the course of this study. Thanks for her dynamic help, support and encouragement with golden advices throughout this study.

I also forward my special thanks to all lab assistants in the Food Science Laboratory (MSM), Chemical Analysis Laboratory (MAK) and Food Preparation Laboratory (MPM) for their invaluable help. Also to lab assistants in Post Harvest Laboratory because allowed me to use their freeze drier machine. Thanks for their commitment and assistance throughout the project.

My deepest gratitude and appreciation to both of my lovely parent, Ayahanda Sukar bin Musidi and Bonda Rosnani binti Kadar for their continuous support since my primary education, and for my brothers, Saiful Shahza and Mohamad Shafiq, thank you so much for your support, understanding and encouragement throughout my study.

Finally, special thanks are also extended to all my members in Food Science Courses and all members in Universiti Malaysia Terengganu for their support and advice in strengthen my spirit to I finished my project research.

ABSTRACT

The objective of this study is to study the combined effects of hydrolysis time, temperature, pH and ratio of enzyme to substrate on the degree of hydrolysis of Patin frames using Response Surface Methodology (RSM). Besides that, the proximate composition of patin frame and patin hydrolysate powder was determined as well. The effects of independent factors were described using a three-level factors Face Centered Central Composite design. A model equation was proposed with regard to effects of temperature, time (min), enzyme to substrate ratio (E/S) and pH on degree of hydrolysis of Patin hydrolysis. Proximate analyses revealed that Patin frames consisted of 63.20% moisture, 10.67% protein, 17.94% fat and 4.04% fat. The freeze dried Patin frame hydrolysate powder contained 5.20% moisture, 64.31% protein, 25.9% fat and 0.64% ash. The enzymatic hydrolysis had increased the protein content and reduced the fat and ash content significantly. The protein recovery in Patin frames hydrolysate was as high as 71.60%. The optimum value for temperature, hydrolysis time, E/S and pH were found to be 55°C, 163 minutes, 1.99% and 9.45, respectively. Regression of coefficients indicates that all linear forms, namely temperature, time, E/S ratio and pH plus one quadratic form, namely temperature² were significant ($P < 0.05$). The model showed a good fit in experimental data because 94.98% of the variability within the range of values studied could be explained by it.

ABSTRAK

Objektif kajian ini adalah untuk menggabungkan kesan daripada masa hidrolisis, suhu, pH dan nisbah enzim terhadap substrat pada darjah hidrolisis terhadap tulang patin menggunakan *Response Surface Methodology* (RSM). Selain itu, komposisi proksimat daripada tulang ikan patin dan serbuk hidrolisat tulang ikan patin juga ditentukan. Kesan kesemua pembolehubah tidak bersandar ini digambarkan dengan menggunakan reka bentuk faktor tiga peringkat, *Face Centered Central Composite*. Satu model persamaan telah dicadangkan bergantung kepada kesan daripada masa hidrolisis, suhu, pH dan nisbah enzim terhadap substrat pada darjah hidrolisis terhadap tulang patin. Analisis proksimat telah menunjukkan tulang ikan patin mengandungi 63.20% lembapan, 10.67% protein, 17.94% lemak and 4.04% kandungan abu. Manakala serbuk hidrolisat tulang ikan patin mengandungi 5.20% lembapan, 64.31% protein, 25.9% lemak dan 0.64% kandungan abu. Hidrolisis berenzim telah meningkatkan kandungan protein dan megurangkan lemak dan kandungan abu. Protein dalam hidrolisat tulang ikan patin telah diperoleh semula sebanyak 71.60%. Nilai yang optimum bagi masa hidrolisis, suhu, pH dan nisbah enzim terhadap substrat masing-masing adalah 55°C, 163 minit, 1.99% and 9.45. Pekali regrasi menunjukkan semua bentuk linear iaitu masa hidrolisis, suhu, pH dan nisbah enzim terhadap substrat, dan satu bentuk kuadratik suhu² adalah merupakan nilai yang beerti. ($P < 0.05$). Ia telah menunjukkan data yang digunakan dalam eksperimen adalah suatu model yang bagus kerana 94.98% daripada pembolehubahnya boleh diterjemahkan dalam bentuk model yang dihasilkan.