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OPTIMIZATION OF HYDROLYSIS TIME FOR FOOD PROTEIN HYDROLYSATE FROM FOOD WASTE (FISH, SHRIMP & OKARA)

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ABSTRACT

Every year, a huge amount of food waste such as fish, shrimp and soybean waste are generated by their food processing industries. Fish, shrimp and soybean (okara) waste such as skin, head, tail fins, and shell are being discarded or simply dumped without further processing. The aim of this study was to optimize the hydrolysis time for food waste from fish, shrimp and okara by varying time between 2 until 5 hours with 1 hour interval for each sample and to characterize the hydrolysed protein by using the Fourier Transform Infrared (FTIR) and UV-Vis Spectroscopy. Enzymatic hydrolysis of proteins was carried out using alcalase enzyme at 2 % (w of enzyme/ w of substrate), 60 ℃ and four hydrolysis times (2, 3, 4, and 5 h).The food waste (fish, shrimp and okara) was blended with Mastar blender for 15 minutes to get the slurry mixture. In this experiment, the blended materials were used. In order to determine the nitrogen content in food waste, the blended food sample were undergo a Kjeldahl method. The protein determination and analysis were determined by using several laboratory equipments such as UV-Vis Spectroscopy, and Fourier Transform Infrared (FTIR) Spectroscopy. In conclusion, the highest degree of hydrolysis (DH) for fish, shrimp and okara is at 2% of the alcalase enzyme concentration, 60 ℃ after 4 h of hydrolysis. From overall analysis of FTIR, it shows that different types of food sample (fish, shrimp, okara) exhibit a different functional group in a specific range of wavelength. Moreover, analysis of UV-Vis resulting that the absorbance value is decreased as the number of filtration for supernatant is increased. Thus, it shows that the optimum concentration of protein content is at a sample directly before undergo any filtration process.

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TABLE OF CONTENTS

Contents	Pages
AUTHOR'S DECLARATION	**I**
SUPERVISOR'S CERTIFICATION	**II**
COORDINATOR'S CERFTIFICATION	**III**
ABSTRACT	**IV**
ACKNOWLEDGEMENT	**V**
TABLE OF CONTENTS	**VI**
LIST OF TABLES	**IX**
LIST OF FIGURES	**IX**
LIST OF SYMBOLS	**XI**
LIST OF ABBREVIATIONS	**XI**

CHAPTER 1: INTRODUCTION

1.1 Research Background……..1-2

1.2 Objectives……2

1.3 Problem Statement……...3

1.4 Scope of Research……3-4

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction……..5

2.2 Low and High End Product of Fish, Shrimp and Soybean (Okara) Waste.....5-7

2.3 Animal and Vegetables Source of Protein Hydrolysate……...7

2.3.1 Aquatic Organism-Based Protein Hydrolysate…….....7-9

2.3.2 Meat-Based Protein Pydrolysate…….…9-10

2.3.3 Fibrous Vegetables-Based Protein Hydrolysate…….....10-11

2.4 Hydrolysis Limitation……..….11

2.4.1 Enzymatic Hydrolysis…….....11-12

CHAPTER 1

INTRODUCTION

1.1 Research Background

Every year, a huge amount of food waste such as fish, shrimp and soybean waste are generated by their food processing industries. Fish waste such as skin, head, tail and fins are being discarded or simply dumped without further processing. Same goes to the shrimp and soybean processing industries. The shrimp waste and soybean waste like shrimp shell and okara which is the residue from the soybean are being discarded from their processing industries without being utilized for other purposes. These food waste has been increasing over the past decades due to increasing consumer demand. The accumulation of these food waste may lead to environmental issue and become an economic concern for food processing industries.

According to Food and Agriculture Organization of the United Nations(FAO), there are 1.3 billion tons per year of food waste get wasted for human consumption in the world. In Europe and North America, 280-300 kg per capita per year of food waste has been wasted (Garrone, Melacini, & Perego, 2014). Meanwhile, in Southeast Asia, the food waste estimated about 33% in the region(Yang et al., 2016). In China, about 2.8 million tonnes of okara are produced annually during tofu processing(Li, Qiao, & Lu, 2011). There are several ways that have been developing to use these food waste such as low-value product and high-value product. These food waste has been underutilized to produce a low-value product such as animal meal, fish oil and fertilizer(Sheriff, Sundaram, Ramamoorthy, & Ponnusamy, 2014).

Shrimp head was mainly used to produce fertilizers, feeds for poultry and livestock (Bechtel, 2007). In addition, fish industries' wastes are mainly exploited as low-cost fertilizers and were developed as an alternative to conventional ingredients for feeding aquaculture fishes (Nisticò, 2017) (Bacenetti et al., 2018). Okara from soybean processing also been used as an alternative to enrich vegetable paste to increases the nutritional value