# UNIVERSITI TEKNOLOGI MARA

# OPTIMIZATION OF ENZYME CONCENTRATION FOR FOOD PROTEIN HYDROLYSATE FROM FOOD WASTE.

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### ABSTRACT

In this era, the food waste disposal from animals and vegetables is increasing due to increase of food industries across the world. However, most of them the waste form the industries like okara and fish are not properly utilized and may cause environmental pollution. The utilization of the increasing food waste across the year must be improved for human consumption as it contained a lot of benefits to human health such as antioxidant, antihypertensive, immunomodulatory, antioxidant, anti-inflammatory properties and anticancer. Enzymatic hydrolysis is the most efficient method not only to extract the bioactive peptides from the food waste, but also can improve its functional and biological properties. The effect of enzyme concentration on the enzymatic hydrolysis of fish, okara and shrimp waste was studied to get optimum hydrolysis conditions. Fish, okara and shrimp waste were hydrolysed using alcalase at different enzyme concentration which were 1, 1.5, 2 and 2.5% (v/v) at constant temperature, 60°C, and pH, 7.5 for 4 hours. Alcalase enzyme was chosen for the hydrolysis due to its endopeptidase properties which can produce various type of peptides. The results showed that the enzyme concentration of 2.0 % was the highest degree of hydrolysis for fish waste and shrimp waste while for okara was 1.5%. FTIR results showed that the functional groups for each protein hydrolysate of fish waste, okara and shrimp waste were almost the same which were presence of hydroxyl groups and alkene groups. The results from UV-Vis Spectrophotometer shows that the highest absorbance among the protein hydrolysate in the form of supernatant was okara, 0.6963 due to the highest degree of hydrolysis which was 58.09 at the optimum condition of hydrolysis. From this study, it can be concluded that the degree of hydrolysis increases as the enzyme concentration increases until it reached maximum conversion of protein into peptides.

## CHAPTER 1

### INTRODUCTION

### 1.1 Research Background

Today, most of the food waste is not properly utilized either at home, restaurants or industries. People simply discard them where they are mostly end up in landfills and several industries use them as animal feeding and fertilizers [1]. As a result, this may lead to economy, environmental and social implications problems. Actually, the food waste such as fish bone, spoiled vegetable or egg shell may have proteins which are very useful and can be beneficial in many aspects such as human health. Therefore, the nutrient in the waste such as protein can be extracted and applied in our food or supplements to promote health to the public.

Peptides is a specific protein fragments with 2 to 20 amino acids which have various nutritional values to body functions and to human health [2][3]. The function of the peptides are based on the sequence of amino acids [4]. The source of nutrition and health-promoting functions in bioactive peptides include antihypertensive, immunomodulatory, antioxidant, anticancer, anti-inflammatory properties and opioid-like, [5]. Therefore, the bioactive compounds that are benefits to human health, no toxic to human body and not bring negative impact to the environment has greatly increased in market demand.

Peptides can be obtained from animal or plant proteins [6]. Wide range of peptides are encrypted in both organism structures. They are naturally present in plants' and animals' defence systems [3]. Amino acids that are synthesized from the organism are categorize as endogenous [7]. From the recent researches, there are numerous derived- protein from the organism has been studied in order to extract the peptides effectively. The example of food waste utilization that has been studied were the enzymatic hydrolysis of *Salmo salar* (Atlantic Salmon) skin [8] and *Actinopyga lecanora* (sea cucumber) [9]. Fish, shrimp and okara are