CHAPTER I

INTRODUCTION

1.1 Background

Indonesia is one of the maritime countries that has considerable potential as producers of fish and other marine animals such as shrimp. Currently shrimp farming has grown so rapidly that shrimp become a reliable non-oil exports commodity and is a marine biota of high economic value. Shrimps are generally used as food ingredients that have high nutritional value. Shrimp in Indonesia are generally exported abroad after disposal of head, tail, and skin. Actually, this waste can be of high economic value because the main constituent of shrimp shell is chitin, a natural polysaccharide which has many uses, such as chelating agent, emulsifier and adsorbent (No, 2000).

Non-toxic and easily degradable chitin properties encourage the modification of chitin with the aim of optimizing the usefulness as well as expanding the field of chitin application. One of the derivatives of chitin which is widely developed due to its wide application is chitosan (No, 2000).

D-glucosamine ($C_6H_{13}NO_5$) or 2-amino-2-deoxy-D-glucose is an amino sugar (hexosamine) with a molecular weight of 179.17, naturally present in human body and shrimp shells. It is a precursor of biochemical synthesis of the GAGs (glycosaminoglycans) found in cartilage. Premature loss of cartilage is part of the clinical syndrome recognized as OA (osteoarthritis). Glucosamine in the form of glucosamine sulphate, glucosamine hydrochloride, or N-acetyl-glucosamine is

extensively used as a dietary supplement in the treatment for osteoarthritis, knee pain, and back pain, and a critical evaluation indicated that glucosamine is safe under current conditions of use and does not affect glucose metabolism (Shantosh, *et al*., 2007).

Chitin hydrolysis using chemical method will produce acidic wastes which are not environment friendly and enzymatic degradation of chitin requires high cost, so the alternative method is to use chitinolytic bacteria to ferment the chitin into glucosamine. Due to its high cost to extract and produce its crude enzyme, fermentation process by using its own bacteria rather than using the enzyme has to be developed and there are still a few researches regarding the fermentation process and its factor to produce glucosamine. In addition, previous research from Saima, *et al.*, (2013) has shown that isolated *Aeromonas hydrophila* from soil has higher chitinolytic activity. Therefore, production of glucosamine through fermentation of floured *Panaeus monodon* Fabricius shrimp shell using *Aeromonas hydrophila* was done.

1.2 Research Problem

Waste of tiger shrimp processing in the form of shell continues to increase along with the increase of tiger shrimp production in Indonesia. Waste of shrimp shells must be processed and utilized properly so as to reduce environmental pollution. Some researchers have developed fermentation process of glucosamine production using the crude enzyme of the designated bacteria which is chitinolytic bacteria.

The enzyme is able to degrade the chitin and convert it into glucosamine with the help of the enzyme (Lamine, *et al*., 2012).

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1.3 Objectives

The objectives of this research were divided into two parts, which were general objective and specific objectives.

1.3.1 General Objective

The aim of this research was to produce glucosamine from chitin of Tiger shrimp shell *(Penaeus monodon* Fabricius*)* by fermentation using *Aeromonas hydrophila*.

1.3.2 Specific Objectives

The specific objectives of this research were:

1. To determine the optimum temperature for *Aeromonas hydrophila* in the production of N-glucosamine.
2. To determine the optimum pH and fermentation period of *Aeromonas hydrophila* in the production of N-glucosamine.