CHAPTER I
INTRODUCTION

1.1 Background

Bones are a part of human body that has an important role in human life. They function to move, support, and protect the various organs of the body, produce red and white blood cells and store minerals. Therefore bone damage can affect the activity of human. However, case of bone damage increases recently. Anyone can fracture a bone. Those with low bone density (osteoporosis), bone tumors, certain cancers, or a brittle bone disease called osteogenesis imperfecta are at higher risk for bone fractures. A fracture is most often caused by some type of trauma to a bone. This trauma might occur as a result of a fall, physical abuse, motor vehicle accident, or disease.

Bone damage such as fracture of disease or accident requires material to replace. In various clinical cases it remains surgery and grafting conducted by autograft, allograft, xenograft, or synthetic biomaterial. Material which is obtained from the person involved called autograft, from the other human bone called allograft and from animal called xenograft. The major advantages of using synthetic biomaterial are the prevention of additional surgery to take autograft bone, prevention of the transfer of disease from an allograft, and prevention of immunological reactions to the allograft.

An ideal biomaterial for implantation should be bioactive, biodegradable, non-toxic, and biocompatible with human body. Hydroxyapatite (HA) and tricalcium phosphate (TCP) are the most commonly used bioceramics due to their biocompatibility and bioactivity/resorbability. HA and TCP although have similar chemical composition, they differ in their biological resorbing capacity. The density of HA ceramics when used as bone implant is almost non resorbable and bioinert. While the porous TCP containing ceramics displays affinity for high speed biological degradation, they are bioactive and bioresorbable materials. Therefore, they were combined as biphasic calcium phosphate (BCP) which has ability to form a strong direct bone with the host bone resulting in a strong
BCP can be prepared by various methods such as dry method, wet method, and hydrothermal method. The hydrothermal approach has several advantages, it does not need expensive equipment, the cost of production is relatively low, and the method can be used to synthesize many kinds of ceramic particles.

1.2 Purpose of Research

1. To synthesize biphasic calcium phosphate (BCP) by hydrothermal method using natural and synthetic raw materials.

2. To get information about the difference between natural raw materials and synthetic raw materials in the forming of BCP.

1.3 Scope of Research

This research includes several activities regarding the synthesis of biphasic calcium phosphate by hydrothermal method. The raw material which was used was natural and synthetic raw material. Natural raw material was obtained from hen's eggshell, while synthetic raw material was obtained from Ca(OH)\textsubscript{2}. Sample was characterized by XRD, FTIR, and SEM.