CHAPTER 1

INTRODUCTION

1.1 Package cushioning system

Nowadays, rigid foam is still necessary to use as package cushioning because it can prevent internal damage for example in electronic equipment or computer mechanical assembly. The main advantages of polyurethane foam are light weight, high efficient for cushioning, good mould resistance, good resilience, low dusting and low corrosive . However, most of foams are used only once and they take a long time for degradation. Synthetic polymer, which contain natural polymer or their main components such as saccharide residues, are considered to be biodegradable. Accordingly natural polymers having more than two hydroxyl groups per molecule can be used for polyurethane synthesis. Polyurethane which containing plant components has another advantages on decreasing cost of raw material because of low cost of plant component such as molasses which easily obtainable in local area.

The Polymerization of urethane linkage is called addition polymerization. Polyurethane is formed by the reaction between alcohol with two or more reactive groups per molecule (diol or polyols) and isocyanates that have more than one reactive isocyanate group per molecule (diisocyanate or polyisocynate). All polyurethane is based on exothermic reaction of diisocyanate or polyisocyanates with polyols molecules. Therefore natural polymer such as saccharide residues which have more than two hydroxyl groups per molecule can be used as polyols for polyurethane preparation. Molasses is a by-product of the sugar industry, it is the liquor remaining after crystallization and removal of sucrose from the juices of sugar cane and is used in a variety of food and non-food applications. Molasses contains of about 50% total

sugar so that it can be used as low cost raw material to prepare polyurethane foam. Another way to reduce cost of polyurethane foam is adding local cheap filler waste material such as husk and sawdust . The polyurethane foam from natural not only has a low cost, but also can be biodegradable.

1.2 Statement of the problem

Due to high cost of polyols and isocyanate, polyurethane material is expensive, and foam used for packaging takes a long time to degrade. This problem can be solved by development of polyurethane material which use low cost and biodegradable starting material such as molasses, and low cost fillers.

1.3 Objective of this work

The principle of this study was to develop a low-cost and biodegradable package cushioning material. In detail, studying would include the following study.

1. Determine a suitable composition for polyurethane.

2. Determine the steps of producing packaging foam and the operating conditions.

3. Determine the mechanical property of polyurethane foam which composes molasses.

4. Determine type and the quantity of the fillers to be used in filled-polyurethane foam.

1.4 Scope of this work

The investigated raw materials will be of local-manufactured low cost. Namely molasses, husk, and sawdust.