CHAPTER I
INTRODUCTION

1.1 General Introduction

Plastic Packaging has noticeably been used in several ways. They have become commercially attractive material because of their advantages on physical properties such as durable, flexible, toughness, and long-live, light weight as compared with glass, metal or other material and less in cost. Plastic packaging can be divided into 2 groups which are rigid packaging and flexible packaging. As a result, the growth of their applications is so rapidly [1]. Plastics have been an environmental trepidation because of the lack of degradation. Plastics make up about 20% by volume waste per year [2]. Plastics are extremely important to the job market as well as packaging throughout the world. Since plastics are vital to people's everyday lives, production of biodegradable plastics to make plastics more compatible with environment is necessary. More than 50 percents of polyethylene or PE is used in a packaging industry, mostly are produced in the form of plastic film. PE can be produced from the blown or injection process, depending on their usage objectives. Most of PE which are produced by low density polyethylene (LDPE), High Density Polyethylene(HDPE) and linear low-density polyethylene(LLDPE). They are mostly consumed in film applications, almost 90% percents of all LLDPE are consumed in film applications [1].

Biodegradable plastics began being sparking interest during the oil crisis in the 1970's. As oil prices increased, so did the planning and crating of biodegradable materials. Green materials (or plant-based) have become increasingly more popular. Biodegradable materials are beginning to be accepted in many countries. These materials are thought to help the environment by reducing waste plastics. The two main reasons for using biodegradable materials are: One is "the growing problem of waste resulting in the shortage of landfill availability and the second is need for the environmentally responsible use of resources". As the government and many organizations are working to save the environment, there is a definite advantage to making biodegradable plastics more of a reality. Conventional plastics have widespread use in the packaging industry because biodegradable plastics are cost prohibitive. The key, bringing the costs down, is to have numerous companies to buy

a large sum of biodegradable materials. Laws of supply and demand state that increasing demand will drive costs down. Like conventional plastics, biodegradable plastics must have the same structural and functional qualities, in addition to reacting the same as conventional plastics when they are used by the consumer. The biodegradable plastics also must be inclined to, "microbial and environmental degradation upon disposal, without any adverse environmental impact" [2]. When traditional plastics are burned, they created toxic fumes which can be damaging to peoples' health and the environment. If any biodegradable films are burned, there is little, if any, toxic chemicals or fume released into the air. Biodegradable plastics have been proved to improve soil quality. This process is performed by microorganisms and bacteria in the soil to decompose the material, and it actually makes the ground more fertile [2].

The blending of polymers provides an efficiency way to developing new materials with tailored properties, which is often a faster means of achieving a desired set of properties than synthesizing new polymers. The polymer blends are mainly due to their ability to combine the properties of their phases in a unique product. The final properties of polymer blend are directly related to the quality of their morphology, which in turn depends on rheological properties of the phases of the blend, on the composition of the blend, and on compatibility between the polymers forming the blend. Immiscible polymer blends are preferable over miscible blends since in immiscible blends an average of the individual properties is obtained [3]. However, most of polymer blends are immiscible or incompatible at the molecular level, because the combinatorial entropy of mixing of two polymers is drastically smaller than that of low molecular weight mixtures, whereas the enthalpy of mixing is often positive or near zero. The incompatibility of polymeric blends is responsible for poor mechanical properties because of a lack of physical and chemical interactions across the phase boundaries and poor interfacial adhesion. Therefore, compatibilization is demanded to obtain a blend with desired properties. A common way to improve the compatibility and interfacial adhesion of polymer blends is to add compatibilizers or interfacial agents [4].

The addition of biodegradable plastics to LDPE has been promoted as a technique to achieve biodegradability together with support material cost. As micro-organisms consume, hydrolyze and react on the degradable material, the LDPE will lose its structural integrity enhancing other degradation mechanisms and eventually

deteriorating mechanical properties. However biodegradable polyester is incompatible with polyolefin [5], their blending system needs to improve compatibilization. LDPE has several kinds of molecular chain and their of different molecular weight effects for blending system were studied.

1.2 Objective

This research aims to study effect of molecular weight difference of LDPE to LDPE/PLA by comparing 2 grades of LDPE with different molecular weights. Morphology, impact strength, degradation, thermal and rheological properties and the resulting LDPE/PLA blends were investigated.

1.3 Scope of research

This reaches will focus on the LDPE/PLA blends on the following topics.

1.3.1 Present study involved blending of different molecular weights of LDPE with various ratios of PLA.

1.3.2 Study the ratios of PLA to LDPE/PLA blends on tensile strength, impact strength, morphological and degradation properties.

1.3.3 Study the ratio of compatibilized LDPE/PLA blends on tensile strength, impact strength, morphological and degradation properties.

1.3.4 Comparing the effect of different molecular weights of LDPE to LDPE/PLA blends on tensile strength, impact strength, morphological and degradation properties.