CHAPTER I

INTRODUCTION

1.1 General Introduction

Plastics 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. As a result, the growth of their applications is so rapidly. Plastic packaging can be divided into 2 groups which are Rigid Packaging and Flexible Packaging. In this research, we will focus more on Flexible Packaging.

More than 50 percents of polyethylene or PE is used in a packaging industry, mostly 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 produced by blown process are Linear Low Density Polyethylene (LLDPE), Low Density Polyethylene (LDPE), High Density Polyethylene (HDPE). They are mostly consumed in film applications, almost 90 percents of all LLDPE and LDPE is consumed in film applications [1].

LLDPE from the blown film process mostly produced is flexible film packaging because having easy process ability and advantage mechanical properties more than LDPE and HDPE. Generally it has good tensile, impact and tear resistance. It is also suitable for many types of film packaging for example: milk film, bread bag, frozen bag and etc., including its advantage in heavy duty for example: rice bag and resin bag and etc. LLDPE is usually blended with LDPE about 5–30 percents. Their blends are widely of used in film applications. The reason of that is to improve the processing and the clarity of LLDPE itself. However, this blended decrease little mechanical strength of

LLDPE, comparing to pure LLDPE film, because LDPE has low tensile strength and modulus, medium impact and tear resistance. In the mean while, HDPE is the most crystalline polyethylene, since its chains are linear and contain very little branching. It shows high modulus, medium tensile properties, poor impact and tear resistance [2].

Significant differences in physical properties have been observed in LLDPE, LDPE and HDPE blown films. Structural parameters, such as density/crystallinity, molecular weight and its distribution, short chain branching/ long chain branching length and amount and crystalline morphology are the key factors that control the properties [3].

Nowadays, automatic packing industrial is replaced manual packing for rapidly of packing and cost saving. Though, LLDPE/LDPE blown film has good tensile, impact and tear resistance, sometimes it has less stiffness which is not suitable for automatic packing. How to cover the weak point is to add HDPE to LLDPE/LDPE blown film to increase the blown film stiffness to the desired level. Although, strength and clarity of the film are the perfect combination of an important property.

1.2 Objective

This research is aimed to investigate the blown film of LLDPE/LDPE/HDPE by comparing two grades of HDPE with different melt flow index and two types of LLDPE manufactured by using Ziegler-Natta catalyst and metallocene catalyst with different melt flow index too. Also, to study the effect of HDPE to the blown film of LLDPE/LDPE in order to have more stiffness, while their accepted clarity and mechanical properties.

1.3 Scope of Research

This research will focus on the LLDPE/LDPE/HDPE blown films on topics as the following.

1.3.1 Investigating ratio of HDPE on increasing stiffness and acceptable clarity and mechanical properties on the LLDPE/LDPE/HDPE blown films.

1.3.2 Comparing the effect of different melt flow index of HDPE on mechanical and physical properties of the LLDPE/LDPE/HDPE blown films.

1.3.3 Comparing the effect of zn-LLDPE and m-LLDPE on mechanical and physical properties of the LLDPE/LDPE/HDPE blown films.