

## CHAPTER I

### INTRODUCTION

As the need for new and more advanced polymeric materials growing continuously, the blending of two or more homopolymers is frequently used. Most polymers are incompatible, therefore, the major problem in polymer blending is the lack of compatibility between the polymers to be blended, which giving poor interfacial adhesion and dispersion and poor mechanical properties of the polymer blend. However, the incompatible blend can be solved by the addition of a third component that is called a compatibilizer. In some cases the compatibilizer might actually produce complete thermodynamic miscibility. In most cases, it simply acts as a surfactant to reduce the domain size of the dispersed phase, or acts as an interfacial adhesion between the two phases.

Polyamide (Nylon) is the most widely used engineering plastic, which contains amide group in the main chain. Polyamide 6 has various properties such as good melt flow, easy to process, water sensitive, high rigidity, weather and thermally resistant and good barrier properties. However, polyamide 6 has limitation in its end use, this is because of PA6 has low impact strength (particularly below its glass transition temperature), poor dimensional stability due to high moisture absorption, and difficulty in processing. High-density polyethylene (HDPE) is a polyolefin widely employed in the packaging and the injection-molding industries. It has good moisture barrier and processes very good tensile and impact strength. A blend of these two materials could offer a very attractive balance of mechanical and barrier properties; nevertheless, PA6 and HDPE are immiscible blend due to the presence of polar groups in the nylon and the non-polar ones of HDPE. To overcome the incompatibility of this blend, the compatibilizer will be required. A compatibilizer is usually a polymer made up of chemical distinct sections, some of which are miscible with one component and some with the other.

This work will study the use of maleic anhydride grafting on high-density polyethylene (HDPE) as a compatibilizer for blends of HDPE and polyamide 6. DuPont markets this compatibilizer under the trademark Fusabond<sup>®</sup>. This compatibilized blend of HDPE/polyamide will be studied in terms of the

morphology, mechanical properties, rheological properties, thermal behavior, and specific interaction over a range of compositions.