

## CHAPTER I

### INTRODUCTION

#### 1.1 General

Most materials, including plastic ones, are utilized because they have desirable mechanical properties at economic cost. For this reason, the mechanical properties are considered the most important of all physical properties for most applications. However, in the present economical and environmental climate, it is often more advantageous to blend existing materials rather than to synthesize new ones to develop materials with unique or desirable properties.

Blending of polymers is a widely used technique to improve rheological, mechanical, and degradative properties in polymer. Moreover, it affords the fabricator the opportunity to custom formulate a material to the predetermined desirable properties. Finally, a polymer is often more economical than one of the homopolymers. For these reasons, the mixing of polymers is gaining increasing importance in academic and industrial communities. [1]

Predictions of mechanical properties of multicomponent materials are very valuable because unnecessary experiments can be avoided, or at least their number can be reduced. Scientists and engineers constantly need to know the properties of the mixtures. It would be desirable to be able to predict easily the properties of the mixture from the corresponding properties of the components and their concentrations. Hundreds of equations(both theoretical and empirical) can be found in the literature to predict the properties of blends. [2]

Simplex equation is one of most interesting equation because its formula is not so much complex to understand and it containing only one parameter. Only interaction parameter is added to enable it to be widely used with much more systems of blends than the simplest mixture rules that are not capable of accurately predicting the mechanical properties of polymer blends. The most important thing about this equation is that the equation base upon a statistical method.

### 1.2 Objective of this research

The objective of this research work is to study the use of Simplex equation for predicting mechanical properties of several kinds of polymer blends. In addition, polymer blend of polypropylene(PP) with four different molecular weights of high-density polyethylene(HDPE) will be prepared to study how the interaction parameter in Simplex equation depends on the molecular weight of HDPE in the blends.