CHAPTER I
INTRODUCTION

Polymer blending has been a well-established route for the development of new polymeric materials,which combine the excellent properties of more than one existing polymer. This strategy isusually relative easyand cost-effective than the development of creating an entirely new polymeric materials. However, most polymers are thermodynamically immiscible and theirimmiscible blendproduce poorinterfaces and properties due to their unfavorable interaction and highmolecular weight. The final properties of the blend are stronglyinfluenced by the interface and the size scale of the minor phasethat is determined by the relationship between the processingconditions and morphology development (JoungSookHonget al.,2006).

Polybutylene terephthalate (PBT), a strong and highly crystalline synthetic resin, it is similar in structure to polyethylene terephthalate (PET). The mechanical properties of the two materials are also similar. However, PBT has a lower melting point (223 °C) than PET (255 °C), so it can be processed at lower temperatures. In addition, PBT possessesthe advantages of thermoplastic polyesters,such as their dimensional stability, excellent electrical properties, solvent resistance,and abrasion resistance.So it is used in numerous applications, for example, electrical components, automotive body components, and many metalreplacements.

HDPE has excellent low temperature flexibility, low cost, ease of processing and good resistance to moisture permeation. In case of PET blend with HDPE, generally they are incompatible polymers, their blends show poor properties. (T.L.Dimitrovaetal.,1999).The morphology and the properties of the immiscible blends can be enhanced by adding a third component, an interfacially active polymer, called a compatibilizer, which promotes physical and/or chemical interactions between the components.

Ionomers are polymeric species carrying a relatively low number of pendant ionic groups per molecule. These materials aresold commercially with either hydrogen or a metal cation as the neutralizing agent for the acid group, typically the amount ofacid groups neutralized with a metal cation is less than stoichiometric. One common commercial type of ionomer is a copolymer of ethylene and methacrylic acid marketed by DuPont under the trademark Surlyn®. The two most common neutralizing cations are zinc (Zn^{2+}) or sodium(Na^{+}). The properties of zinc-neutralized and sodium-neutralized carboxylate ionomers are very different, such as sodium ionomers absorb significantly more water and tend to have higher fractional crystallinities than zinc ionomers (Atchara Lahoret al., 2004).

When the Na-EMAA ionomer reacts with a polymer, such as poly(butylene terephthalate) (PBT), which containing －OH, －COOH groups on the chain end, these groups may interact with the ionic groups via hydrogen bonding, ion-dipole interactions or/and metal-ion coordination during melt blending. The introduction of such specific interactions can improve compatibility and may promote miscibility of PBT and polyethylene blend.Further, compatibility of PBT and HDPE blends have also been attributed to esterification reaction occurring between the hydroxyl end groups of PBT and the carboxylic acid groups of Na-EMAA.

The purpose of this work is to study compatibilization effect of sodium neutralized poly(ethylene-*co*-methacrylic acid) ionomer (Na-EMAA) on the blends of PBT and HDPE. As ionomer is a high effective compatilizer, we will carry out different blend ratios ofPBT/HDPE by varying different mount of Na-EMAAat the same time, in order to investigate the compatibility of these blends. Characterization ofmechanical properties, rheological properties and morphology of obtained polymer blends will also be carried out.