CHAPTER I
INTRODUCTION

Poly(trimethylene terephthalate) (PTT) is a novel linear aromatic polyester, that was successfully synthesized by Whinfield and Dickson in 1941, but it was not commercial produced because of the lack of an economical source of 1,3-propanediol which is one of the raw materials used to produce PTT. Nevertheless, the synthesis of PTT is now commercially available and has been produced by Shell Chemicals company under the tradename Corterra, joining the rank of other linear aromatic polyesters, poly(ethylene terephthalate) (PET) and poly(buthylene terephthalate) (PBT). Compare to PET and PBT, PTT has some unusual outstanding properties such as elastic recovery and modulus, that either above or below those of PBT and PET. However, PTT also has some properties intermediately between those of PET and PBT with an unusual combination of the outstanding properties of PET and the processing characteristics of PBT. These made PTT highly suitable for uses as fibers, films and engineering thermoplastics.

The crystallization kinetics of semi-crystalline polymers have been of great interest for several decades and still is a fruitful area for research. In case of PTT, which is a new polymeric material, thus there is few research studied on crystallization kinetics of this polymer. For PET and PBT, there are many researches studied on the macrokinetic models that used to analyze the data obtained from both isothermal and nonisothermal crystallization. From the relatively similar chemical structure of PTT to those of PET and PBT, therefore it is a great interest to study the effect of the different number of methylene groups on the crystallization kinetics of these three polyesters using various macrokinetic models.

Polymer blending is an important field in polymer research and industrial interest. It is a physical mixing of two or more polymers that have different structures, which adhere together through the action of secondary bond forces with no covalent bonding between them. Most polymers are thermodynamically incompatible so the heterogeneous polymer blends are generally obtained with varied degrees of incompatibility. However in case of PET, PTT, and PBT, which have similar chemical structures, the blends obtained from any of these polymer should be

miscible with the final properties depending on properties of pure polymers, geometrical arrangement of the phases, their morphology, the extent of their interpenetration, and the nature of interface. In recent years, various researches have been carried out on blending of PET with other polyesters such as PBT, PETG, and PC in order to study crystallization behavior, miscibility, transesterification reaction, mechanical properties, rheological properties and other properties. But in case of PTT, that is one of aromatic polyesters, there is a few research studied on blending with other polymers. Therefore this work is aimed at studying the crystallization behavior of PET, PTT, PBT and their blends, including miscibility, mechanical, and rheological properties.