Chapter 1

Introduction

Originally, fillers were introduced to extend the polymer and to decrease the price of the compound. However, polymer filled with particulate inorganic filler represents a growth sector in the engineering application because it possesses numerous advantages over its unfilled one. Among other, fillers increase stiffness and heat deflection temperature, decrease shrinkage and improve the appearance of the composites. Fillers are very often introduced into the polymer because of some new functional properties, the flame retardancy or conductivity (Patel, 1992), not possessed by the polymer matrix at all. There are many different particulate fillers are added to thermoplastics. Murphy (1996) noted that the calcium carbonate takes on overwhelming proportion of the filler market in plastics because of its low cost. Polyolefins, polyvinyl chloride, phenolics, polyesters, and epoxies are all resins with which calcium carbonate can be compounded.

For particulate composite system, The volume fraction of filler is very important factor for producing a change in mechanical properties. Moreover, the adhesion between polymer and filler is another factor affecting the strength of a particulate composite (Dolakova and Svehlova, 1982).

In this study, the influence of filler concentration on the mechanical properties of calcium carbonate filled high density polyethylene composite was examined. The validity of the available theoretical models for particulate fillers was checked against the experimental data for predictive purposes. The mechanical properties of the composite measured from different testing modes, tension, flexural and compressive, were also investigated. Density measurement and thermogravimatric analysis were used to determined the filler content in the composites. The dispersion of filler and the adhesion at the interface between filler and polymer matrix are investigated by SEM micrographs.

Another aspect of this study was the investigation of the effect of annealing treatment on the thermal and mechanical properties of the composite. Differential scanning calorimetry measurement used to examine the morphological changes within polymer matrix after annealing. The effect of annealing treatment on the mechanical properties of the composite was illustrated in term of the Young's modulus, tensile strength and strain at yield.