

Thesis Title A Study of the Properties of Calcium Carbonate Filled
 Plasticised PVC.

Name Jatuporn Ratanapaka

Degree Master of Science (Polymer Science)

Thesis Supervisory Committee Frederick Henry Axtell, Ph.D.
 Krisda Suchiva, Ph.D.
 Pranee Phinyocheep, Docteur de l'Universite' du Maine

Date of Graduation 3 August B.E. 2535 (1992)

ABSTRACT

The present work involved studies of the effects of the characteristics of calcium carbonate filler in plasticised PVC and the degree of PVC fusion on the mechanical properties.

The calcium carbonate is a filler, which deteriorates the performance of the compounds. The effects of the characteristics of the filler that were studied included the differences in structure of the commercial grades of calcium carbonate. The particle size distribution of fillers were studied after various grinding times, and a wide particle size distribution range was found to give better tear and tensile properties.

The filler and plasticiser loadings cause deterioration of mechanical properties of PVC due to stress concentration effect. The stress concentration has been described by the first and two-third power laws, the S and S' parameters decreased from unity when the filler loading increased. The equations have been modified to account for the plasticiser influence on the stress concentration effect. The slope of plots of the power laws show that at low plasticiser and filler content, the first power law should be used while at higher filler content the two-third power law gave a better fit. At higher

plasticiser content (70 phr. of DOP) the first power law could be used up to a filler loading of 50 phr.

Surface treatment of the filler by silane coupling agent showed an improvement in the tear properties while titanate coupling agents lower improve the properties significantly.

The degree of fusion of PVC was assessed by the endothermic energy from DSC thermograms. The PVC fusion level affected flex cracking properties. Filled compounds showed good flex properties at complete fusion, while unfilled compounds showed it at low fusion level.