

EFFECT OF PARTICLE SIZE AND CONCENTRATION OF MICA ON PROPERTIES OF POLYESTER THERMOPLASTIC ELASTOMER COMPOSITES

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ABSTRACT

Composites of Polyester Thermoplastic elastomer (Hytrel) with varying concentration of mica were prepared by twin screw extruder. Two different particle sizes of mica were used in the preparation of composites. The mica was added in equal proportion of 5 to 40% by weight to hytrel. Test specimens were prepared on microprocessor based injection moulding machine. The specimens were tested for Melt flow index, Tensile strength, Flexural strength and modulus, optical properties and electrical properties.

Keywords: TPE (Thermoplastic Elastomers), Mica.

INTRODUCTION

The present work deals with the effect of particle size and concentration of mica on properties of polyester thermoplastic elastomers.

EXPERIMENTAL PROCESSING

The mica was added in proportions of 5%, 10%, 15%, 20%, 30%, and 40% by wt to TPE.

The compounding of polymer and mica was done in a counter rotating twin-

screw extruder. The granules of the extrudate were pre-dried in air-circulated oven at 85-90°C for 3-4 hours and then injection moulded to form specimens for different tests. The temperature profile was 170, 220 and 230°C.

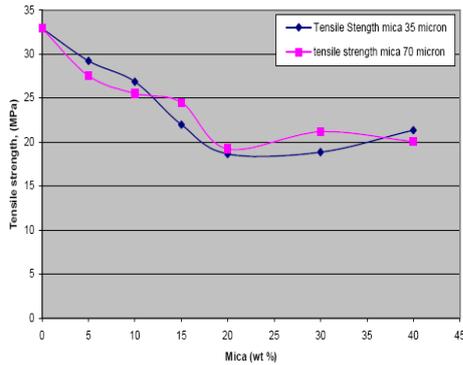
CHARACTERIZATION

The dumbbell shape tensile strength specimens were injection moulded as per ASTM standards. The tensile strength and elongation at break of the samples were evaluated according to the ASTM D638 M-91, using Universal Tensile Tester LR 50K. The flexural strength and flexural modulus were measured; as per ASTM D790 M-92. The impact strength was determined as per ASTM D 256. The morphological studies were carried out by using scanning electron microscope. The melt flow index was determined according to ASTM D1258. The electrical property was determined by ASTM D149. The optical properties were determined as per ASTM-D1925.

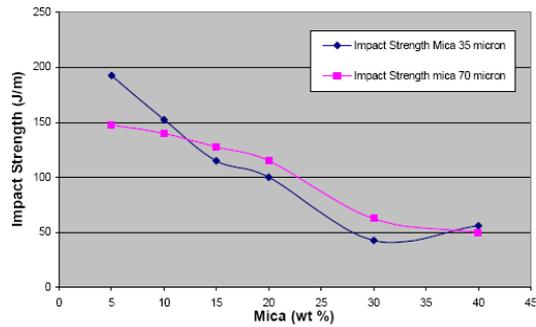
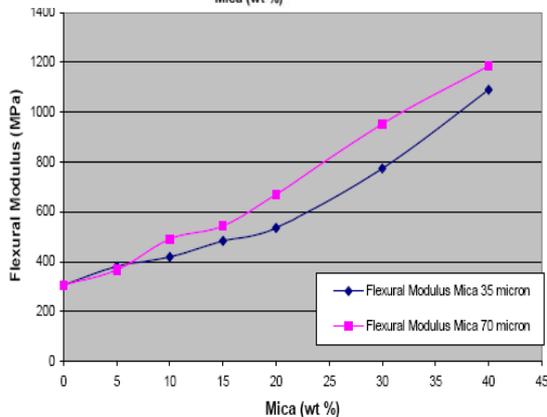
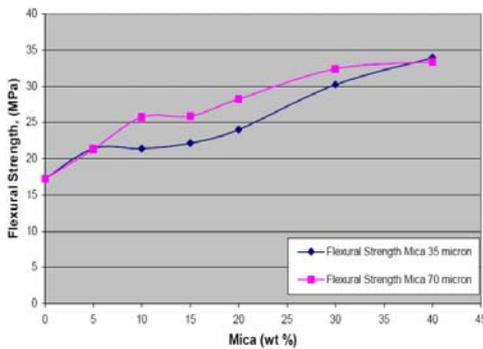
RESULTS AND DISCUSSION MECHANICAL PROPERTIES

The tensile strength of hytrel decreases with increase in the loading of mica. This can be attributed to the fact that

there is a decreased stress transfer as the bond between filler and polymer is weak. At higher volume fraction, filler-filler interaction is more predominant which is responsible for the development of cracks and thus decrease in tensile strength.



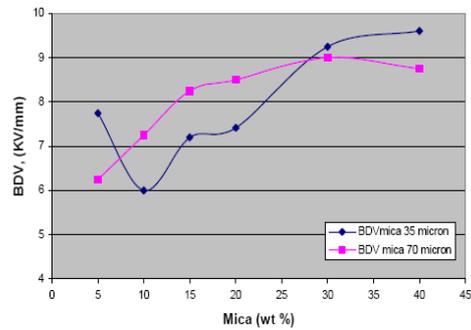
The flexural strength increases with increase in filler loading. The flexural modulus increases with increase in filler loading. higher particle size leading to more wetting of the filler with the same quantity of polymer.



There is drastic decrease in the impact strength of hytrl with increase in filler loading.

DIELECTRIC STRENGTH

The dielectric strength increases on addition of filler.



OPTICAL PROPERTIES

The whiteness index decreases with increase in filler loading. The yellowness index increases on filler loading.

CONCLUSION

Following conclusions were drawn

- When mica used as fillers for thermoplastic polyester elastomers, there is a reduction in the tensile and impact strength of the resultant composite.
- There is an increase in the flexural strength and modulus of Hytrl due to addition of mica.
- Mica increases the dielectric strength of Hytrl.
- Mica increases the yellowness index of Hytrl but decreases the whiteness index.