

Thesis Title A Study of the Effect of Compatibilisers on the Toughening
 of PVC with Vulcanised Rubber Scrap

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ABSTRACT

This thesis studied the effects of compatibilisers on the toughening of PVC with vulcanised rubber scrap. Three types of dust were used which are generated during sports shoe soles manufacture : midsole dust (scrap dust of vulcanised EVA foams) , outsole dust (scrap dust of vulcanised blend of NR , BR and SBR) , and laminate dust from the assembled sole (a laminate of the midsole and outsole). The compatibilisers which were used to promote adhesion between the phases of PVC and dust were classified into two groups : polar and non-polar compatibilisers.

The toughness of the PVC blends was evaluated using Charpy notched impact testing. The morphology of the PVC blends was studied using optical microscopy. The particle size distribution of the dusts were measured from photomicrographs. Dynamic mechanical thermal analysis (DMTA) was used to study the compatibility of the blend. The impact strength of the blends depended on the compatibility of the PVC , the dusts , and the compatibilisers. The good compatibilisers gave the blends high values of impact strength. The dust in these blends had small mean diameters and narrow ranges of dust particle size. The effect of types and loadings of dust and compatibiliser on the impact strength , the mean diameter and the range of dust particle sizes in the PVC blend were studied.

The good compatibilisers for midsole dust were ethylene acrylic elastomer , S-B-S , and EVA (containing 10%VA). For outsole dust , the good compatibiliser was EVA (containing 10%VA). For laminate dust , the good compatibiliser was ethylene acrylic acid ionomer 68% neutralised with Mg. The ratio of compatibiliser to dust that gave good impact properties was 2:10 weight percent.

The toughness was a 2 fold improvement in toughness for the PVC/midsole dust blend compatibilised with S-B-S (11.23 kJ/m²) compared to the uncompatibilised blend (5.36 kJ/m²).