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ORATHAI SROYSOM: A STUDY OF CHARACTERISATION AND HOMOGENISATION OF NATURAL RUBBER/NITRILE RUBBER BLEND. THESIS ADVISORS : KRISDA SUCHIVA, Ph.D., KALYANEE PREMPHET, Ph.D., CHAKRIT SIRISINHA, Ph.D. 134 p. ISBN 974-662-249-8

Rubber blends are commonly used in the rubber industry. Most rubber blends separate into two phases, with the major component usually forming the continuous phase and the minor component developing into the dispersed phase. Due to different chemical and physical natures of the rubbers in the two phases, solubilities of the rubber chemicals in the two rubbers or affinities of the two rubbers for chemicals and fillers are different, leading to differential distributions of rubber chemicals, in particular those of the curing agents and fillers, in different rubber phases of the blends. Variation in the crosslink density in different rubber phases influences properties of the blend. To understand and improve the properties of the blend, the crosslink density of each phase must be characterised. In the present study, two characterisation techniques, ^{1}H-NMR spectroscopy and dynamic mechanical analysis (DMA), were used to estimate the extent of crosslinking in the individual phases of natural rubber (NR)/nitrile rubber (NBR) blends. Besides, the effects of commercial homogenising agent (Struktol 60 NS) on the reduction in size of the dispersed phase and properties of the blends were studied.

It was found that NMR technique could be used to estimate the degree of crosslinking of each rubber in the blend. The extent of crosslink density in NR and NBR phases of (60/40) NR/NBR blend was 2.52×10^{3} mole/m^{3} and 3.29×10^{3} mole/m^{3} respectively. The results obtained showed that partitioning of the curatives in the two rubbers occurred and the curatives migrated to the more polar rubber (NBR).

DMA could be used to follow the cure behaviours of NR and NBR phases in NR/NBR blends by comparing tan δ peak height. However, several difficulties were experienced with the use of DMA, making this technique of limited utility.

For the blend systems in which NR (more viscous) was the major component, NBR was observed to be more difficult to disperse in NR and Struktol 60 NS did not appear to assist mixing of the two rubbers with respect to either the rate or the extent of mixing. However, for the systems in which NBR was the major component, the homogeniser used seemed to be quite effective in helping homogenise NR/NBR blends, for both the rate and the extent of mixing. In addition, it was found that the reduction in size of the dispersed phase did not have large effects on either the tensile properties or the oil-resistances of NR/NBR blends.