UNIVERSITI TEKNOLOGI MARA

THE EFFECT OF NBR LOADING ON THE MATURATION TIME AND MECHANICAL PROPERTIES OF NR/NBR BLENDS

NORZAHIDA BINTI M SALIH

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ABSTRACT

It is a common practice to blend two elastomers of different properties with a view to combine the best features in terms of technical and economic values. Nitrile rubber (NBR) is blended with natural rubber (NR) to meet the requirements for very good oil resistance as well as conferring high mechanical strength. The former is a polar rubber and provides very good oil resistance, while the latter is non-polar and provides excellent mechanical strengths. Numerous works on rubber blends that have been reported are based on dry rubber while the work on rubber blends based on latex receives less attention. This research describes the work on NR latex and NBR latex blends. The maturation time were determined to identify the optimum maturation time required for preparation of NR/NBR latex blends of various ratios. NR and NBR were blended at ratios of 90:10, 85:15, 80:20, 75:25 and 50:50 to study their effect on the mechanical properties of the blends, in particular tensile and tear strengths which are the two important properties in rubber gloves. In addition, the oil swelling resistance was also observed. The glass transition temperatures, T_g of the NR/NBR blends were determined and their morphologies were studied to identify the blending conditions and the compatibility of the blends. The result of optimum maturation time was obtained at 15 hours for NR and NBR separately and hence to use the 15 hours as the optimum maturation time for blending of NR/NBR. The blending results indicated that the tensile strength (TS) showed a good linear relationship with the blends composition. It was found that the presence of ACN segments in the rubber diluted the overall crosslink concentrations of NBR blank and NR/NBR blends which led to the observed lower crosslink concentrations of NBR blank and NR/NBR blends. Both elongations at break (EB) and tear energy are affected by the presence of NBR. They showed a non-linear relationship with blends composition. The swelling resistance of the latex film was assessed in terms of volume change where the latex film was immersed in ASTM IRM 903 oil and indicated that with the increase NBR content, the swelling resistance of the latex was improved towards oil.

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