



(3) Macromolecular:

1095 - Relaxation analyses of rubbers with carbon black and with aging

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Abstract Body: We present two topics. One is an analysis of ^1H T_2 relaxation decays of the cross-linked and the un-cross-linked *cis*-1,4-polyisoprene rubbers (PI) filled with carbon black (CB), another is those analyses of acrylonitrile-butadiene rubbers (NBR) after long aging. The 25 MHz ^1H T_2 relaxation decays of the PI/CB materials were measured by both solid and Hahn echo methods and analyzed by the conventional fitting procedure, namely using the Gaussian, Weibullian and exponential functions. Furthermore, we employed the inverse Laplace transform to visualize the T_2 distribution of the molecular motion. We also evaluated the obtained T_2 distributions by the principal component analysis to investigate the relationship between the bound rubber and CB concentration with or without cross-linking reaction. For the NBR samples with aging, we investigated the relationship between the T_2 short component of NBR and the restriction of molecular motion under compression for long period up to 33,000 h at various temperatures. The aging made the cross-link density increase and the estimated T_2 short component had a good correlation with the density and decrease of dynamics of NBR chains.

