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FTIR investigation into Degradation of Natural Rubber RYAN RICH, T. WALDEK ZERDA, Texas Christian University — The aging of tires is of the highest concerns to the automotive industry, due to its implications in fuel economy and automobile safety. Previously, the high absorption rate of carbon black filled polymers has hindered the use of Fourier Transform Infrared Spectroscopy (FTIR) in studying this occurrence. However, recent developments in attenuated total reflection (ATR) techniques have provided a means for spectroscopically monitoring the composition changes induced in rubber blends by heat, exposure to ultraviolet radiation, and mechanical strain. The ATR apparatus, employing a germanium crystal, collected high quality infrared spectra at a reduced penetration depth of less than one micron. This research analyzed natural polymer blends with varied aggregate size and concentration of carbon black. The samples were analyzed as a function of exposure time to 70 $^\circ$C heat and UV radiation, as well elongation by mechanical strain. In these spectra, growth of the 1740cm^{-1} peak is assigned to increase populations of the C=O band. Carbon black filler rubber is shown to slow the rate of oxidation in pure natural rubber. Crystallization of rubber composites under strain is characterized by changes in the shapes of the CH stretch bands.

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