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Effect of styrene butadiene rubber on the light pyrolysis of the natural rubber

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Abstract

The use of styrene butadiene rubber (SBR) in tire rubber presents a challenge for the recycling of tire rubber because of its complex degradation behavior compared with that of natural rubber (NR). The effect of the composition of SBR on the degradation of NR was observed by light pyrolysis at variable times at 300 ℃. The morphology, sol-gel evolution of the NR/SBR blends and the degradation mechanism was investigated. In addition, the structural evolution of the sol and gel fractions were measured by Fourier transform infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA). The results indicated that the mechanism of degradation between SBR and NR differed significantly at 300 ℃. The broken molecular chains present in SBR recombined with themselves or those of NR to form a new crosslinked network. The results also showed that the ratio of NR/SBR in the sol and gel fractions remains almost constant and unrelated to the original ratio of the NR/SBR blends. Following an increase in SBR content, the sol fraction of different NR/SBR blends mainly consisted of the small molecular chains of NR, whereas the gel fraction mostly constituted re-crosslinked SBR molecular chains.

Keywords: light pyrolysis; degradation; recombination; styrene butadiene rubber; natural rubber

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