

Abstract Submitted  
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**Aging with Applied Strain of a Black-Filled Natural Rubber Vulcanizate: Intrinsic Flaw Sizes** CRITTENDEN OHLEMACHER, GARY HAMED, Dept. of Polymer Science, The Univ. of Akron — Black-filled natural rubber, with an inefficient sulfur cure, was aged at 90°C and 110°C under nitrogen, with and without applied strain. Samples aged under strain became “double networks” and retained a residual extension ratio. Intrinsic flaws are distributed randomly throughout the rubber, and influence its breaking strength. Intrinsic flaw sizes of single networks aged under nitrogen purge were larger than those of the unaged networks, except for the most severe aging. The increase is attributed to annealing of the network; however, as aging becomes more severe, this is offset by: 1) decreased ability of the rubber to dissipate energy, and 2) increased oxidation damage to the network. For samples strained to  $\lambda_i = 2.0$  for 48 hours at room temperature, the intrinsic flaw size increased by a factor of 1.7. Perhaps aging under strain promotes healing of network defects. For double networks, perpendicular specimens generally had intrinsic flaw sizes similar to single networks. Parallel specimens generally had smaller intrinsic flaw sizes than single networks, similarly aged. The limited extensibility of the oriented chains dominates the effects of microvoid healing and annealing.

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