

Low temperature degradation and characterization of natural rubber

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Abstract:

Low temperature degradation of natural rubber was performed with potassium persulfate ($K_2S_2O_8$, KPS) in the latex stage at 30 degrees C to accomplish a good processability of the rubber. Various grades of natural rubbers were used as a source rubber. Gel content, molecular weight and chemical structure of the rubbers were characterized by swelling method, size exclusion chromatography and 1H NMR spectroscopy, respectively. The well characterized natural rubber was subjected to oxidative degradation with KPS at 30 degrees C. Mooney viscosity decreased when the latex was degraded with 1.0 phr of KPS and it was dependent upon the amount of KPS. Molecular weight and gel content of the degraded natural rubber were about one-half as low as those of the source rubber. Chemical structure of the rubber was analyzed through Fourier transform infrared and 1H NMR spectroscopic methods. The degraded natural rubber was found to contain carbonyl and formyl groups as an evidence of the oxidative degradation. Tensile strength of a vulcanizate prepared from the degraded natural rubber was the same as that prepared from the source rubber, even though the gel content and the molecular weight of the degraded rubber were distinguished from those of the source rubber. (C) 2011 Elsevier Ltd. All rights reserved.

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