

**FTIR AND BULK DENSITY STUDY OF VULCANIZED NATURAL
RUBBER/SODIUM BICARBONATE COMPOSITE**

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ABSTRACT

FTIR AND BULK DENSITY STUDY OF VULCANIZED NATURAL RUBBER/SODIUM BICARBONATE COMPOSITE

The study's main objectives were to characterise the NR/SB samples using Fourier Transform Infrared Spectroscopy (FTIR) and physical testing, specifically density measurement, and to investigate the mechanism of peroxide vulcanization with the NR/SB composite. Dicumyl peroxide (DCP), the peroxide that is employed, breaks down into radical peroxides that react with the chains of natural rubber (NR). The study found that, as seen in the FTIR spectra, the peroxide radicals can remove hydrogen from the tertiary and secondary carbon groups in the NR. In the NR, particularly in the side chain vinyl groups, addition reactions also take place between the peroxide radicals and the unsaturated double bonds. Major and minor products are produced as a result of addition reactions. The addition of sodium bicarbonate caused the CO₂ and water to break down, causing pores to form in the rubber samples. The FTIR spectra, which displayed modifications in hydrogen bonding and the presence of C=O bond stretching vibrations from sodium carbonate and acetophenone, supported this. From the initial time until the 5th minute, density measurements revealed a reduction, showing the development of cells as a result of crosslinking. Beyond 5 minutes, however, density increased as a result of cell collapse and possible NR breakdown. The proliferation of cells and product leakage were factors in the deterioration. The research advances knowledge of the crosslinking procedure and probable deterioration in such composites, which may have an impact on the creation and improvement of NR-based materials.

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