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Development, Characterization and Properties of Novel Quaternary Rubber Nanocomposites

Authors : Kumar Sankaran, Santanu Chattopadhyay, Golok Behari Nando, Sujith Nair, Sreejesh Arayambath, Unnikrishnan Govindan

Abstract : Rubber nanocomposites based on Bromobutyl rubber (BIIR), Polyepichlorohydrin rubber (CO), Carbon black (CB) and organically modified montmorillonite clay (NC) were prepared via melt compounding technique. The developed quaternary nanocomposites were characterized analytically and their properties were compared against the standard BIIR compound. BIIR-CO nanocomposites showed improved physico-mechanical properties as compared to that of the standard BIIR compound. Hybrid microstructure (NC-CB) development, clay exfoliation and better filler dispersion in the quaternary nanocomposite significantly contributed to the overall enhancement of properties. Introduction of CO in the system increased the specific gravity and hardness of the compound as compared to that of the standard compound. XRD analysis, AFM imaging and HR-TEM measurements confirmed exfoliation and a good level of dispersion of the NC in the composites. Permeability of developed BIIR-CO nanocomposites decreases significantly as compared to that of the standard BIIR compound.

Keywords : rubber nanocomposites, morphology, permeability, BIIR
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