EFFECT OF GRAPHITE DERIVATIVES ON MECHANICAL AND FUNCTIONAL PROPERTIES OF NITRILE RUBBER NANO COMPOSITES

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ABSTRACT

Acrylonitrile butadiene rubber (NBR) is a copolymer of acrylonitrile (ACN) and butadiene which has a remarkable resistance towards mineral oils, hydrocarbon fluids and aromatic solvents. In general NBR is compounded with conventional fillers such as carbon black (CB) to achieve the required reinforcement. The effect of two types of graphite derivatives and namely: natural graphite (200 mesh size), graphene (nanoparticles) on the electrical and thermal conductivity of NBR nanocomposites was investigated. The effect of increasing graphite powder and graphene nanoparticles loadings on rheological and mechanical properties like tensile strength, modulus and Elongation at break was studied. The graphite-filled NBR composites had poorer mechanical and functional properties than the graphene powder-filled nanocomposites because of the lower degree of interaction between the graphite layers and the rubber matrix. Conduction through the composites is explained on the basis of the formation of a continuous conductive network. On increasing the proportion of filler in both types of composites a change in electrical and thermal conductivity was observed. NBR/graphene vulcanisate containing 15 phr of graphene showed the best electrical conductivity and 18 phr level of NBR/graphene nanocomposite showed best thermal conductivity. According to the study results it can be recommended that Graphene derivatives has more effect for thermal and electrical conductivity than Graphite loaded NBR.

Keywords: Graphite, Graphene nanoparticles, NBR nanocomposite, Electrical conductivity, Thermal conductivity