STUDY OF WASTE-MICA FILLED NATURAL RUBBER COMPOSITES AND THEIR PROPERTIES

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ABSTRACT

Ribbed Smoked Sheet (RSS) rubber is one of raw natural rubber (NR) which produced by latex *Hevea brasiliensis*. As well RSS is the major consuming raw NR type in the manufacturing of dry rubber products such as tyres, tubes, automobile parts, etc. But the thing is not given sufficient mechanical properties to end products when using only NR in the rubber industry. Therefore at the beginning black fillers were used as a filler to improve mechanical properties. But there are several bad effects with the Carbon Black (CB) usage as a filler. CB is environmentally harmful as well as carcinogenic for lives. Then researchers began to investigate in low cost mineral fillers. Therefore Mica was used as a filler in the rubber industry but it is not commonly used because of the low compatibleness with NR. Waste-Mica (WM) is eliminated during the mica processing but WM can be having good properties similar to mica. If that assumption will be a reality no need do mica processing for fillers because mica is usually used in paints industry. As well can be overcome the adverse effects of CB. Thus WM and CB were separately incorporated with NR and their rheological, physical, thermal and morphological properties as well as characteristics were evaluated following standard test procedures. When consider about the rheological properties, both cure time (T_{90}) and scorch time (TS_2) are high in WM/NR composites. T_{90} and TS_2 of WM/NR composites have increased with the filler amount. Under physico-mechanical properties, CB/NR has more high tensile values than WM/NR as well as gradually decreased with the filler loading in both. Abrasion resistance of WM/NR is below to CB/NR. Hardness of WM/NR is also below to CB/NR but has increased with the filler amount. Rebound resilience of WM/NR is relatively upper than CB/NR. Compression set of both is lower than the control. There is no significant difference of compression set between two composites at each level of filler loads. Swelling ratio of both has dropped with filler loads as well as the cross linking density of both has increased when filler amount is increased. Thermal stability and thermal conductivity of WM/NR are better than CB/NR. EDAX and XRD characterizations has expressed similarity of WM to Mica. Dispersion and reinforcement of fillers has clearly shown in SEM micrographs. Mechanical deformation of both has been monitored as a function of temperature using the DMA. In conclusion, WM has good Physio – mechanical properties as a reinforcing filler although not much similar to CB. WM is not a perfect alternative filler instead of CB.

Key Words: Natural rubber, Carbon black, Waste-mica