

# **EFFECT OF PALM OIL AS AN ALTERNATIVE PLASTICIZER IN TYRE TREAD COMPOUND**

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Addition

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## ABSTRACT

Sri Lanka is the leading exporter of solid tyres for off road vehicles, accounting for nearly 20% of the global market. Petroleum based mineral oils play a major role as plasticizers in tyre compound formulation. Mineral oil plasticizers are nonrenewable resources and some of them have been identified as carcinogenic. Besides, annex 17 of the EU REACH Regulation restricts eight PAHs and extender oils contain more than 1mg/kg of BaP, or more than 10mg/kg of the sum of all restricted PAHs. Therefore applicability of palm oil as a cost effective, renewable and eco-friendly alternative was investigated throughout the experiment.

Experiment was carried out to investigate curing characteristics, physical- mechanical properties and thermal oxidative properties of a NR/ SBR based black tyre tread compound. Aromatic, naphthenic and paraffinic mineral oils and palm oil were separately assigned for a previously determined compound formulation as treatments. CRD method was used and each property was tested and measured independently with appropriate number of replicates according to the ISO procedures. Palm oil based tyre tread compound signified better performance in abrasion resistance, rebound resilience, elongation properties and lowest compression set. Tensile properties of the compound were also in admissible level with respect to other plasticizer based compounds. Rheometrical data implied the lowest delta cure value for palm oil based compound and hence reduction of the crosslinking density. Therefore palm oil can be used as an alternative plasticizer for mineral oil plasticizers with even better performances and co-activator effect of palm oil in curing system is suggested for further investigations.

*Key words:* Palm oil, Plasticization, Mineral oil plasticizers, Cure characteristics, Mechanical properties