NITRILE RUBBER COMPOUNDS WITH IMPROVED FLEX-CRACK RESISTANCE

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Incorporation of reinforcing fillers is essential for enhancing of technologically important physical properties of elastomers. Various types of carbon black are highly efficient in reinforcing elastomers. Within the family of black fillers, reinforcing efficiency varies widely and this depends mainly on the particle size of the filler. For certain applications, along with reinforcement, resistance to flex-crack also has importance. In this study, conventionally used blacks namely HAF, FEF and GPF were compared for their flex-crack resistance in nitrile rubber vulcanizates. Nitrile rubber was selected since the study was aimed at developing a flex-crack resistant vulcanizate which can perform in hydrocarbon oil medium. By increasing the dosage of carbon black from 40 to 60 phr, flex-crack resistance improved up to 50 phr loading for the three fillers and this decreased thereafter. Among the fillers used, the one with the largest particle size produced the highest flex-crack resistance.

Keywords: Acrylonitrile rubber, Fatigue, Flex-crack resistance, Particle size, Reinforcement

Rubber vulcanizates are well noted for their flexibility in static and dynamic applications. In this respect, resistance to flex-cracking is of significance. The resistance to fatigue failure of polymers is dependent on many factors such as elastomer, type of filler and its particle size and loading, presence of antidegradants, type of cure system and the state of cure of the matrix (Mars, 2004). Flex-crack resistance of polymers has been studied by many investigators (Beaty,1964; Lake,1972). It is largely dependent on the easiness with which the molecular chains in the rubber matrix are flexed. This study aims to develop a flex-crack resistant vulcanizate which can perform in hydrocarbon oil medium. Among the oil resistant elastomers, acrylonitrile butadiene rubber (NBR) is commonly used for oil contact applications. For the improvement of physical properties of elastomers, incorporation of reinforcing filler is essential. The addition of carbon black to rubber compounds can result a pronounced reinforcing effect depending on both the filler type and its volume fraction (Medalia, 1987). The major factor controlling the reinforcement of rubbers by fillers is the size of the filler particles. The type of filler used and its dosage are decided by the end-use specifications. Improvements in various technological properties with filler are a function of the particle size, surface area, structure and the extent of compatibility of the filler to the polymer (Kraus, 1978).

Since the objective of this work is to examined the effect of black fillers on flex-crack resistance of nitrile rubber vulcanizate

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