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VULCANIZATION KINETICS AND PROPERTIES OF NR–EVA BLENDS

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Blends of natural rubber (NR) and ethylene vinyl acetate (EVA), in varying proportions, were prepared with three different cure systems and evaluated for vulcanization kinetics and physical properties. The dicumyl peroxide (DCP) system required a higher energy of activation and longer cure time compared with the sulphur system and the mixed cure system consisting of DCP and sulphur. Most of the important technological properties were better for the blends vulcanized using the mixed cure system compared with those cured with DCP. The blends showed better abrasion resistance, higher hardness, modulus and tear resistance as the proportion of EVA increased.

Key words:- Natural rubber, Ethylene vinyl acetate, Vulcanization kinetics, Cure system, Blends.

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INTRODUCTION

Heterogeneity of elastomer blends results from thermodynamic incompatibility of the components at molecular level. At or below room temperature, elastomer blends remain in separate phases, of which the minor component forms a dispersed phase. Size and distribution of the dispersed phase depend on several factors such as Mooney viscosity, density and solubility parameter of the components, rate of shear during blending and temperature. Properties of elastomer blends depend not only upon the size of the dispersed phase but also on the extent of cure of each. Even if the curative system is selected with utmost care, uneven cure between the phases can occur owing to the difference in the solubilities of the curing agent in each phase and also to the difference in the rates of vulcanization of the components. Many other factors such as uneven distribution of filler and plasticiser also make it difficult to have a blend with balanced properties. Nevertheless, it is common practice to prepare and use blends of two or three elastomers so as to achieve the desired processing characteristics and physical properties. Thus, blending of natural rubber (NR) and ethylene propylene diene rubber (EPDM) or nitrile rubber (NBR), with polyvinyl chloride is reported to improve ozone resistance of NR and NBR respectively (Almond, 1962; Mathew, 1984; Mathew *et al.*, 1988). Blends of NR and butadiene rubber (BR) are reported to have balanced processing characteristics and better abrasion resistance when used for truck tyre tread compounds (Baker and Wallace, 1986). Thermoplastics such as isotactic poly-