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PEROXIDE VULCANIZATION OF POLYMERS

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The present article reviews the use of different organic peroxides used for the crosslinking of various types of rubbers. The rubbers include both unsaturated and saturated elastomers as well as elastomer blends. The use of co-curing agents (coagents) to improve the vulcanizate properties is also discussed. Peroxide cure depends upon a number of factors like type and concentration of peroxides, type of elastomers, compounding ingredients like fillers, antioxidants, processing aids *etc.* However, by the proper selection of elastomers and coagents, peroxide cure systems can be effectively used as an alternative to sulphur cure system.

Keywords: Coagent, Natural rubber, Organic peroxide, Vulcanization

INTRODUCTION

When rubber is exposed to atmosphere, oxygen present in air easily oxidizes rubber and gradually transforms it into a solid substance at room temperature. This fact laid the foundation stone of rubber vulcanization by means of organic peroxides. In 1915, Ostromislensky (Ostromislensky, 1930) used benzoyl peroxide to vulcanize natural rubber. However, vulcanization of rubber with benzoyl peroxide never found wide applications because of the large proportion of benzoyl peroxide necessary for a good level of cure and blooming of the decomposition products, benzoic acid, on to the vulcanizate.

Although peroxides and sulphur can cure most types of rubbers, the chemistry behind peroxide crosslinking and the properties it provide, are much different. Due to these chemical differences, many additives that are essential in sulphur cured formulations might interfere with peroxide curing. There are many types of vulcanizing systems and hence deciding which system is ideal for a given application depends on the required curing conditions, the elastomer or elastomers blend employed and the desired physical properties of the vulcanizates. The process has acquired very little importance in unsaturated rubbers since the mechanical properties are inferior to those obtained with accelerated sulphur cure. However, peroxide vulcanization has got good ageing and low set properties. Interest in the industrial use of peroxides as curing agents increased with the introduction of a number of fully saturated elastomers (Hofman, 1999) for which the usual accelerated sulphur systems are unsuitable and also with the commercial introduction of dicumyl peroxide (DCP) in

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