THE EFFECT OF POSS ON THE ADHESION BETWEEN POLYESTER CORD AND NATURAL RUBBER

[1]NAZLI YAZICI, [2]SAMET DURSUN, [3]TUGAY YARICI, [4]BURAK KILIÇ, [5]BAGDAGUL KARAAGAC, [6]MEHMET KODAL, [7]GURALP OZKOC

Kocaeli University, Engineering Faculty, Chemical Engineering Department, Umuttepe Campus, 41380, Kocaeli / TURKEY
E-mail: [7]guralp.ozkoc@kocaeli.edu.tr

Abstract - Natural rubber (NR), a biopolymer, is produced by the rubber tree, Heveabrasiliensis, as a latex. NR is often used as a matrix in tire manufacturing process where it is reinforced with resorcinol formaldehyde latex (RFL) coated textile cords, such as polyester fibers, to improve adhesion between cords and fabrics. On the other hand, RFL coating process has many disadvantages. One of them is its toxic chemicals. The aim of this study is to improve the adhesion properties of polyester fiber utilized as tire reinforcing materials, to the NR compounds by using polyhedral oligomeric silsesquioxane(POSS) nanoparticles. In this study, metacryl POSS (M-POSS), which is a new generation additive/reinforcing filler, has been incorporated to a model (reference) NR based skim compound. M-POSS was assumed to directly accompany with vulcanization reaction thanks to its double bonds. It is also expected that it can chemically and/or physically interact with skim compounds via their reactive side groups. Adhesion characteristics of the compounds have been investigated by means of strip H-adhesion tests and thermodynamic work of adhesion measurements. Thermodynamic work of adhesion values were calculated for rubber matrix and reinforcing fiber couples. Distinguishing cured and uncured surface energy enabled to evaluate pure adhesion and possible reactions during vulcanization, separately. It was concluded that incorporating M-POSS to NR based skim compound improved the adhesion between rubber matrix and polyester fiber.

ACKNOWLEDGEMENT

This study was granted by The Scientific and Technological Research Council of Turkey (TUBITAK) (Project No: 116M587).