

A Study of Natural Rubber Latex – Filler Interaction

By

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This thesis was submitted to the Department of Chemical and Process Engineering of the University of Moratuwa in partial fulfillment of the Degree of Master of Science in Polymer Science and Technology.



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Abstract of the study

An attempt has been made to evaluate natural rubber latex – filler interaction. 180°-peel test of flexible to rigid joints was performed to determine the peel strength of natural rubber latex –kaolin joints in order to evaluate the interaction of natural rubber latex with standard rubber grade kaolin and activated one by ion exchange reaction with amino –functional derivatives. Experimented natural rubber latex compounds were pre vulcanized with sulphur and ionization radiation. Radiation vulcanization was performed using ^{60}Co source irradiator, originally designed for sterilization of medical products, with reduced gamma rays dose rate. Its suitability for radiation vulcanization of locally produced natural rubber latex was confirmed experimentally.

Obtained results showed that the peel off test device was acceptable for evaluation of natural rubber latex –filler interaction irrespective of the vulcanization system used with latex compound. Peel test results displayed the influence of modified fillers on the peel strength values of tested laminates. Increased peel strength values of the samples containing modified kaolin were attributed to better interaction of the filler with rubber polymer.



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It was investigated, that facilitated interaction observed with natural rubber latex and modified kaolin resulted in improved properties of filled natural rubber latex compounds of both vulcanization system, and irradiated one was more susceptible within the experiment performed. Preference in mechanical stability time, viscosity factor and tensile was given to radiation vulcanization natural rubber latex (RVNRL).

Reinforcing effect of modified fillers in natural rubber latex compounds was lower of that observed earlier with dry rubber compounds. The reason for it could be associated with partial deactivation of the active centres initially brought by modification the phenomenon that have to be studied and overcome in the future. However, it is hoped that carried out research positively contributes to the understanding the mechanism of reinforcement of rubber polymers with fillers and development of the technologies upgrading cheap local mineral resources to use them more beneficially in natural rubber formulation technology.

Another aspect covered by research related to development of radiation vulcanization technology that gives a definite support for introduction to local latex based manufacturing industries.

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Every emblem certifying my relative success, whatever it is, reflects the precious love of my parents that they showed me without any lack in all the time.

CNP

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