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CHAVEEWAN RAKDEE : STUDY FOR PREPARATION OF CARBON BLACK/NATURAL RUBBER MASTERBATCH FROM NATURAL RUBBER LATEX. THESIS ADVISORS : PRAMUAN TANGBORIBOONRAT Ph.D., KRISDA SUCHIVA Ph.D., 134 p. ISBN 974-661-907-1

Carbon black/natural rubber (CB/NR) masterbatch in the form of capsule was prepared by using an acid precipitation technique. Effect of concentration of non-ionic surfactant (Nonidet P40) added in CB suspension, on the particle size of CB was investigated first. The results indicated that 9.0 %w/w_{CB} of aqueous solution of Nonidet P40 provoked a monomodal particle size distribution of CB while 1.0-8.0 %w/w_{CB} provided bimodal particle size distribution. The maximum concentration of Nonidet P40 for adsorption on CB, determined by UV absorption and surface tension measurements, was 1.4 %w/w_{CB}. However, the minimum concentration of Nonidet P40 solution used to disperse CB agglomerates providing the stable CB/NR latex mixture was 1.5 %w/w_{CB}. The morphology of the CB/NR capsule studied under Scanning Electron Microscope (SEM) revealed that CB agglomerates were entrapped and well dispersed in NR matrix. After extraction with toluene at room temperature, about 43.9% of NR remained in the CB/NR capsule. This quantity greatly decreased when soxhlet extraction was used. It is believed that this unextracted NR was not bound rubber. The bound rubber in the CB/NR was generated after shearing the capsule in the internal mixer. The longer the mixing time, the higher the bound rubber content. Both physical and chemical interactions between CB and NR occurred in the product.

The surface modifications of CB by liquid phase oxidation and partial graphitization were also studied for use in further improving interaction between CB and NR in the capsule. SEM micrographs showed that the CB surface modification method significantly affected the capsule morphology. Bound rubber in the CB/NR capsule could not be increased by using graphitized CB whereas bound rubber in the oxidised CB/NR capsule could not be measured.

Moreover, the epoxidised natural rubber (ENR) latex was synthesized to be used to increase the interaction between CB and NR. The addition of ENR into the NR capsule affected the solubility of NR in toluene and could improve the interaction between CB and NR in the CB/NR capsule.