Study of Mechanical and Physical Properties of Nitrile Butadiene Rubber Glove with Sulfur, Accelerator and Particle Size of the Dispersion

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Sludge formation in the latex dipping tanks is the most destructive matter in the glove industry. This problem can cause quality defects of the glove and hence, high cost of production. This study was carried out to reduce the sludge quantity while the physical properties of the nitrile butadiene rubber glove by reducing the particle size of the dispersion. The particle size of the dispersion was reduced by increasing milling cycles in the pearl mill. Two milling cycles were considered in this study. Particle sizes of two samples were 2.5µm and 1µm according to the Dynamic Light Scattering test. Those dispersion samples were used to prepare compounds to measure the sludge quantity and gloves were prepared to investigate the physical properties. Particle size with the milling cycles was studied as a preliminary study. Further improvements of the physical properties of the glove were investigated using different sulfur/accelerator ratios within three sulfur vulcanizing systems. Two levels of sulfur/accelerator ratios in each system were used to determine the best ratio with better properties. Dispersion with 1 µm particle size was given at least sludge quantity than the dispersion with 2.5µm particle size while improving the properties. Standard property levels in nitrile butadiene glove were considered as the control in this study. 3.5/1 sulfur/accelerator ratio was given better properties than the 2.5/0.5, 0.4/0.5, 0.8/3, 1/1, 1.5/1.5 ratios. This is because vulcanizate with a high proportion of polysulfidic bonds obtained high mechanical strength. Therefore, it is effective to use dispersions made from 1µm particle size with 3.5/1 sulfur/ accelerator ratio in the production of a nitrile glove.

Keywords: Particle size, Physical properties, Sludge, Sulfur/accelerator ratio