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Effect of Pore Structure on Absorption/Adsorption Property of the Split Microfiber Fabrics

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The nylon/polyester(N/P) conjugate fibers were split by alkaline hydrolysis and then finished with antimicrobial agent. Effect of splitting and finishing on absorption/adsorption property onto the microfibers were studied. Also optimum splitting conditions were investigated for the superior absorption rate and capacity. Absorption behaviors of microfiber fabrics were analyzed by degree of splitting, shrinkage, fabric density, and weight loss.

The microfiber fabrics obtained by NaOH treatment under various conditions for the splitting of N/P bicomponent conjugate filaments varied in morphology, weight loss and pore structure. Excellent absorption properties were obtained under 140℃ conditions with about 10% of weight loss. The optimum splitting conditions were 0.3%/40min (12.6% Wt. loss), 0.6%/30min (16.3% Wt. loss), and 0.9%/20min (11.3% Wt. loss) for a faster rate and greater extent of water absorption. Complete splitting and even separation of microfibers under those conditions produced the most and best capillary channels transported water into fabric with a sharp edged cross-section of mono- filament.

High values of adsorption, add-on (%) and good durability to repeated laundering and dry cleaning, of the agent on the finished N/P microfiber fabrics were shown, which was in contrast to a conventional fiber fabric. This was most likely due to the high surface area and surface irregularities by splitting and hydrolysis. Absorption capacity of the finished fabrics decreased due to the some pore spaces being filled with the adsorbed agent, while absorption rate increased due to capillary sorption. The water absorption instrument newly devised for this study was shown to be an excellent measurement system. It was possible to measure amount of water absorption with time, and to distinguish the differences of absorbency between the split-type N/P microfiber knitted fabrics, which had various pore structures in shape and size created and deformed during splitting and finishing process.