SOME NOVEL COTTON-CONTAINING NONWOVEN PRODUCTS

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Incorporating cotton into nonwoven products can require novel approaches because the nonwovens market is highly oriented to synthetic fibers. While cotton fibers can contribute desirable properties of softness and absorbency to these products, some current methods for producing nonwovens depend on fiber fusibility and require fiber lengths that can only be provided by synthetic or high quality cotton fibers. Because most nonwoven materials are intended for markets of low-cost products, use of premium cotton fibers should be avoided where possible. Lower quality cotton fibers or linters can provide many of the same property benefits to nonwoven goods as do premium fibers. Devising ways to incorporate low-grade, waste cotton fibers or linters into blended cotton/synthetic products is a challenge. Linters are short fuzz fibers that undercoat the lint on the seed surface and remain on the seed after ginning lint fibers. Fiber fuzz removed from the seed as linters following ginning also contains the short, broken base-ends of many lint fibers that remain on the seed surface after the main portion of the fiber has been broken off. The average length of these sheared fibers is 5 mm. They are difficult to separate into individual units and usually remain clumped in small bundles. Blending with longer fibers is difficult. Therefore new approaches must be used to incorporate linters into synthetic nonwoven products.

Use of fusible synthetic fibers is one means of incorporating cotton linters into nonwovens. Fused fibers can attach to the short linter bundles, immobilizing them within the fabric structure. Webs of fused synthetic fibers can also be used to form networks that entrap the linter bundles to prevent movement. The added body provided to the material by the linter bundles produces nonwoven sheets usable as padding or fillers. Novel methods of folding and heat-setting the nonwoven sheets can provide thick, resilient cushioning materials.

Cotton fibers can also be blended with recycled polyester fibers to form nonwoven products that are thermally insulative. Waste polyester fibers and cotton fibers that required no chemical processing were used to produce a low-cost, semi-durable nonwoven product. Materials used were 60% reprocessed polyester and 40% greige cotton. These products were tested for use as thermal blankets, intended for short-term uses as in medical or military facilities, and in disaster relief centers. They were structured to be durable through limited launderings. Fabrics were given a carboxylic acid finish to improve structural stability during use and laundering. The finish greatly reduced surface matting of loose fibers. These blanket material were light-weight, had a good hand, and exhibited excellent thermal and comfort qualities.

Structural relationships of the synthetic fiber-cotton lint-cotton linters within the nonwoven products is of great importance to producing successful materials for specific end-uses. Microscopical examinations allow better understanding of these interrelationships, and of what spatial interactions are necessary to produce a successful product. Light and scanning-electron microscopy have been used to study novel nonwoven materials to indicate ways that they can best be processed to obtain maximum utility of properties of the blended fibers. Dyeing techniques were used to delineate locations and functions of various types of fibers within the products.

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