

UTILIZATION OF BROWN COTTONS FOR ENHANCED FLAME RETARDANCE
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Abstract

Whereas cotton is not typically flame resistant, its desirable attributes such as hand and absorbency make it the preferred fiber for certain apparel applications. Improved flame retardance would substantially boost the market for this natural fiber. Several researchers have reported on the superior flame resistance of naturally colored brown cotton as compared to white cotton. This study compares the properties of selected green and brown cottons with those of a collection of colored cotton obtained from domestic and international sources. The data reveal that the pigmented fibers tend to be shorter and weaker than white cotton. The range of micronaire of the colored cotton is great. However, some pigmented fibers exhibit fiber length, strength, uniformity, and other characteristics suitable for commercial use. The thermal and flammability responses of selected brown cottons are reported for a set of needled nonwovens. Initial horizontal and vertical tests of flammability are reported. Data suggest these particular brown cottons are better thermal insulators than the green cotton and demonstrate that they also tend to burn more slowly. Thermogravimetric analyses evidence that the amounts of char residues coincide with the rates of burning. Fiber color intensifies with many wet processes. Preliminary extractions by select polar aprotic solvents reduced the horizontal flame resistance of the brown cotton, concomittant with an observed color shift but not its removal. Work is underway to analyze the post-extraction nonwoven materials and solutions and their respective properties with the hope of better explaining the witnessed color responses. A follow-up study will test the flammability of heavy-weight knits and woven fabrics.