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KENAF RETTING: COMPARATIVE STUDY OF BIOLOGICAL, ENZYMATIC AND CHEMICAL PROCEDURES

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Abstract

Purpose was to perform a comparative analysis between biological, enzymatic and chemical retting procedures with emphasis on small-scale reproducible methodologies plus kenaf fiber quality. The enzymatic process may be the better industrial choice due to lower bath temperature, use of one warm water rinse, and very efficient separation of fiber from bark and core.

Introduction

Knowing which retting process, biological, enzymatic or chemical, takes the least amount of time, costs the least and produces the best quality kenaf fibers would be an asset to the nonwovens industry. Biological or water-retting is costly, time consuming and an environmental pollutant. Enzymatic and chemical retting methods can be alternatives (Akin et al., 2000; Parikh et al., in review; Ramaswamy et al., 1994).

Materials and Methods

Tianung 2 was the kenaf cultivar used for experimental purposes. All three retting procedures used 20 g of 6-inch stalk, a 1:20 fiber to liquor ratio and an AHIBA Tex-O-Mat dyeing machine.

In biological retting the 27°C water bath was changed each day for six days before fiber separation occurred. The enzymatic retting process required a 45 minute 55°C water bath using 0.1% (owf) surfactant and 0.2% (owf) enzyme. For the chemical retting process, 20% (owf) caustic soda, 0.2% (owf) anthraquinone and 0.1% (owf) surfactant were used in a 110°C water bath for 30 minutes.

Results and Discussion

Biological retting took six days for completion. The original moisture content of the kenaf stalks was 6% while weight loss following retting was 33.3%. Environmental problems were created by odor and slime production. Fiber color was a very dark brown that could affect the types of value-added products produced.

Original moisture content of the kenaf stalks used in the enzymatic retting process was 8%. This procedure, requiring 45 minutes, was sufficient to easily separate the kenaf fibers from the bark and core. Weight loss following enzymatic retting was 31.4%. The fiber color was a visually pleasing light tan.

The chemical retting process, taking only 30 minutes for completion, produced similar results when compared to the enzymatic retting process with one exception. This exception related to the ease of fiber separation from the bark and core, which was better for the enzymatic retting process. Fiber color, just as with enzymatic retting, was a light tan. However, weight loss experienced after chemical retting was approximately 30%.

Conclusion

This comparative analysis has shown that the enzymatic retting process may be the better industrial choice. This is based on the use of a lower bath temperature, use of one warm water rinse, and very efficient separation of fiber from bark and core. These kenaf fibers would be appropriate for automobile textiles, needlepunched goods, or other nonwoven products.

References

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