



FLAME RESISTANCE OF WOOL FABRICS We frequently report in *Textile Topics* various mechanical processing studies that are conducted at the Textile Research Center. Not so often do we mention our activities in chemistry, although this area of our research is involved in a number of significant programs. We would prefer to have a better balance in the nature of the reports we publish in *Topics*, but this is not always possible as much of our research in chemistry is of a proprietary nature. Occasionally, however, we are able to carry a statement on a program that we feel will be of interest to our readers. Such is the case with the following report prepared by Dr. R. D. Mehta on research conducted for the Natural Fibers & Food Protein Commission of Texas. We appreciate NFFPC's permission to publish this report.

"While studying the applications of various strong and weak bases onto wool fabrics for their flame resistance response, it was found that an application of a weak base of sodium bicarbonate imparted a high level of flame resistance to wool fabrics. So far in published literature, a flame resisting treatment for wool with sodium bicarbonate has not been reported. The treatment is not durable to washing, but it does resist dry cleaning with perchloroethylene. A flameproofed wool is likely to find most use in home furnishings, such as drapery fabric, which would probably not be washed but dry-cleaned. Therefore, treatments durable to dry cleaning may be adequate in many cases for wool fabrics.

A desized and scoured 6.2 oz. plain weave wool fabric was padded through 1% - 10% (wt/vol) aqueous solutions of sodium bicarbonate for about 80% \pm 10% wet pickup and subsequently dried at 60°C for 3½ minutes. After overnight conditioning under ambient atmosphere, the fabric specimens were tested by the vertical flame test for 12-second ignition and for the oxygen index value. The results, shown in the table on the following page, indicate that treatment with even 1% sodium bicarbonate resulted in 19.4 cm charlength and 3.3 second afterflame time. This meets the requirement of FAA 25.853b regulation, which specifies the average charlength not to exceed 20.3 cm and afterflame time 15 seconds. The charlength decreased to a range of 14.1 to 9.8 cm without any afterflame time with 3%-10% concentrations of sodium bicarbonate. The oxygen index value of the untreated wool fabric increased from 23.8 to a range of 25.6 to 35.1 after treatment with the indicated concentrations of sodium bicarbonate. The oxygen index value increases with the increase in the flame resistance of the material. The wool fabric treated with 5% sodium bicarbonate passed the vertical flame test after 5 dry cleaning cycles. Each cycle consisted of dry-cleaning the specimen for 30 minutes in a 1-liter capacity launderometer jar containing 10 stainless steel balls with perchloroethylene, using material to liquor ratio of 1:20. The increase in the flame resistance of wool may be ascribed to the lowering of the decomposition temperature of the wool because of the presence of sodium bicarbonate/sodium carbonate. This would help flammable gases escape prior to reaching the ignition temperature. Further work is needed to confirm this hypothesis through thermogravimetric analysis of the treated wool.

The wool fabric aftertreatment with sodium bicarbonate would meet the flame resistance standards needed for theater scenery, curtains and furnishings in public assemblies, hotels and hospitals. Since sodium bicarbonate is inexpensive, nontoxic and easy to apply by pad/dry process or by spraying, its application for flame retarding wool could increase the utilization of this fiber for certain end uses where fire protection is necessary."

Effects of Various Concentrations of Sodium Bicarbonate on the Flame Resistance of Wool

Concentration of Sodium Bicarbonate (Percent) (wt/vol)	Wet Pickup (%)	Vertical Flame Test for 12-Second Ignition		Oxygen Index Value
		Charlength	Afterflame Time	
		(cm)	(sec)	
1	74	19.4	3.3	25.6
3	69	14.1	Nil	28.8
5	95	6.4	Nil	32.8
10	90	9.8	Nil	35.1
Control		BEL*		23.8

* = Burned to Entire Length

NEW EQUIPMENT ORDERED It is the desire of the Textile Research Center to maintain laboratories equipped with the latest machines and instruments so we can keep our investigations on the front edge of technology. We do not feel reliable research can be conducted on outdated equipment. Rather, we strongly believe that the position of any research organization is in front of the manufacturing techniques used by industry. We are not always able to keep the Center in the forefront, but we try to place ourselves in a position to be of as much service to industry as possible.

With this in mind, we have recently placed orders for the latest model Schlafhorst Autocoro Rotor Spinning Machine and for a Peyer AL 101 Fiberlength Measuring System. The Autocoro will be the ninth open-end machine installed at TRC for use in our research. We are aware that a number of textile companies are already using this machine, and we believe it is important for us to have the same equipment to conduct research for our many friends in manufacturing. The thrust of our studies with the Autocoro will be to determine fiber properties (particularly of the cotton produced in Texas) that give the highest yarn quality.

After considering our needs for measuring cotton fiber length and uniformity, we have placed an order for the Peyer AL 101 System. This will be a great help to us in cotton quality evaluations and will save considerable time in our testing programs. Inasmuch as we test many thousands of cotton samples each year with the total number of individual tests running more than one-half million, we find it imperative that we have the best possible instruments to obtain accurate measurements in the least amount of time.

TEXTILE ENGINEERING DEPARTMENT ACTIVITIES Several members of Texas Tech's Kappa Chapter of Phi Psi Fraternity attended the 78th Phi Psi National Convention in Philadelphia, Pennsylvania November 1 - 4, 1984. The Philadelphia College of Textiles & Science hosted the event. During the convention, the fraternity participated in the 100th birthday celebration of PCT&S. Kappa Chapter presented Dr. James P. Gallagher, president of PCT&S, with a Texas-shaped birthday card made from fabric produced at the Textile Research Center.

Chapters from Auburn University, Georgia Tech, Clemson University, Philadelphia College of Textiles & Science, North Carolina State University, the Institute of Textile Technology and Texas Tech University entered competitions in oral presentations, written reports, and photographic archives based on each chapter's activities during the year. For the first time, the fraternity held a talent competition, sponsored by the Philadelphia College of Textiles & Science alumni chapter. Texas Tech's Kappa Chapter was proud to win first place in oral presentation and talent, and second place in the photographic archives.

Kappa Chapter members attending the convention were Lori Alread, Elizabeth Baird, Sohail Barlas, Sergio Borjes, Cecilia Martinez and Andrew Talbott. They were accompanied by Robert Hale, President of Phi Psi Grand Council; Kay Caddel, Advisor and Grand Council Secretary; David Davis and Anita Montgomery.

VISITORS Visitors to the Textile Research Center during November included Robert H. Chapman, Jr. and Robert H. Chapman, III, Inman Mills, Inman, SC; Paul W. Baker, Hadley-Peoples Manufacturing Co., Siler City, NC; Harold R. Hokes, Jr. and James Pope, Zellweger Uster, Inc., Charlotte, NC; Steve Zawislak, Gentex Corporation, Carbondale, PA; Norris B. Hart, Lummus Corporation, Columbus, GA; Osvaldo R. Moreira, Fibramalva S.A.I.C., Resistencia, Chaco, Argentina; Eric Lorthiois, Santee River Wool Comb-
ing Co., Jamestown, SC; and Robert Tonner, Prouvost Lefebvre & Co., Boston, MA.