CHAPTER III

EXPERIMENTAL PROCEDURES

The experimental procedures have been explained under the following heads:

1. Materials used.
2. Determination of preliminary data of fabrics.
3. Preparation and application of finish.
4. Determination of wrinkle recovery.
5. Determination of tensile strength and elongation.
6. Evaluation of appearance of fabrics after induced wrinkling and ironing.

1. Materials used

Fabrics used: Four fabrics were used for this study. They were 100 percent cotton cambric (Fabric A), 67/33 polyester/cotton blend (Fabric B), 100 percent polyester (Fabric C), and 50/50 polyester/cotton (Fabric D). Fabrics were scoured in a solution containing 2 grams per litre of soap and 2 grams per litre of soda ash at 80°C for one hour. The material to liquor ratio was maintained at 1:30.

Finishes used: Two finishes used in the study were Ahuracryl Tx50* and Super-finish EU**. The characteristics

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*Manufactured by Ahura Chemical Products Pvt. Ltd., 84-Sion Road, Sion East, Bombay 400 022.

**Manufactured by Texchem, 132, Dr. Annie Besant Road, Bombay 400 018.

of these finishes as given by the manufacturers are stated below:

Ahuracryl Tx50

General Characteristics	:	Ahuracryl Tx50 is an acrylic based emulsion. It yields a soft, pliable and transparent film which has good wash fastness.
Colour	:	Milky white.
Solubility	:	In cold or warm water.
Active matter content	:	50 percent
pH	:	5.5

Superfinish EU

General Characteristics	:	This is a reactive thermo-setting resin having chemical nature as DMDHEU (dimethylol-dihydroxyethyleneurea). It imparts shrinkproof crease resistance finish to cellulose and cellulose/synthetic fiber blends.
Colour	:	Pale Yellow
Solubility	:	In cold water
Active matter content	:	45 to 50 percent
pH	:	7.5

2. Determination of Preliminary Data of Fabrics

(a) Determination of fabric count (10b): The number of ends and picks per centimeter were determined using the Alfred Suter Counter. Average of five readings was recorded as fabric count.

(b) Determination of weight per unit area of the fabrics (10a): Five specimens of 5 cm x 5 cm were cut at random from the fabrics. The specimens were conditioned over a saturated common salt solution at room temperature, in a dessicator. Each conditioned specimen was weighed separately, on an analytical balance. An average of five readings was obtained and the weight per unit area in grams per square meter was calculated using the formula,

$$\text{Weight in gm/sq.m.} = \frac{W \times 100 \times 100}{5 \times 5},$$

where 'W' is the average weight in grams of the specimens.

(c) Determination of thickness of fabrics (10C): Compressometer was used to determine the thickness of the fabrics. One specimen at a time was placed on the anvil without any folds and tension. The pressure foot was lowered upon the specimen by rotating the knob until upper dial read 5 (equal to 0.1 lb. per square inch pressure) and the reading was recorded from the lower dial. The pressure was then increased until the upper dial read 40 (equal to 1 lb. per square inch pressure), and the lower dial reading was recorded again. The difference between the two readings gave the thickness of the fabric in inch (X 0.001). The average of five readings was taken as the fabric thickness. This was converted to centimeters and reported to the nearest 0.001 cm.

3. Preparation and Application of Finish

The effect of the acrylic (thermoplastic) and DMDHEU (thermosetting) finishes alone and so also in combination was studied. Ammonium persulphate was used as a catalyst. Various concentrations and combinations used were as given below:

A. Acrylic finish

	% conc. of finish (dry basis)				
	0.5	1.25	2.0	2.5	
Ahuracryl Tx50	1.0	2.5	4.0	5.0	ml
Water	99.0	97.5	96.0	95.0	ml
Total	100.0	100.0	100.0	100.0	ml

B. DMDHEU finish

	% conc. of finish (dry basis)				
	0.5	1.25	2.0	2.5	
Superfinish EU	1.0	2.5	4.0	5.0	ml
Ammonium Persulphate	1.0	1.0	1.0	1.0	gm
Water	99.0	97.5	96.0	95.0	ml
Total	100.0	100.0	100.0	100.0	ml

C. Combination finish 1

	% conc. of finish (dry basis)			
	2.5	2.5	2.5	
Ratio of Tx50 : EU	1:4	1:1	4:1	
Ahuracryl Tx50	1.0	2.5	4.0	ml
Superfinish EU	4.0	2.5	1.0	ml
Ammonium Persulphate	1.0	1.0	1.0	gm
Water	95.0	95.0	95.0	ml
Total	100.0	100.0	100.0	ml

Combination finish 2

	% conc. of finish (dry basis)			
	5.0	5.0	5.0	
Ratio of Tx50 : EU	1:4	1:1	4:1	
Ahuracryl Tx50	2.0	5.0	8.0	ml
Superfinish EU	8.0	5.0	2.0	ml
Ammonium Persulphate	1.0	1.0	1.0	gm
Water	90.0	90.0	90.0	ml
Total	100.0	100.0	100.0	ml

Catalyst was dissolved in water before adding to the finish solution. A sample size of 100 cm x 25 cm of each fabric was padded with the solution on padding mangle to get approximate 120 percent wet pick up. The samples were dried at room temperature. When completely dry, they were cured at 140°C for five minutes in an oven. Samples were then cut and conditioned for testing.

4. Determination of Wrinkle Recovery (29)

Wrinkle recovery of fabrics was determined on Monsanto wrinkle recovery tester. Ten 4 cm x 1.5 cm specimens in warp direction were cut. The samples were conditioned prior to testing. The specimen was creased in the specimen holder and compressed under a pressure of 500 gm in the plastic press for five minutes. After five minutes the specimen was removed and suspended in the tester for recovery, the dangling specimen leg was lined up with the vertical line. The specimen leg was aligned frequently during the five minute recovery period after which the angle was measured. The average of ten readings, five creased face to face and five creased back to back was taken as the recovery of the fabric.

5. Determination of Tensile Strength and Elongation (10d)

The tensile strength and elongation of the treated and untreated fabrics were determined on the Scott Tester. Samples of 15 cm x 3 cm for fabric A and D and 15 cm x 2 cm for fabrics B and C were cut at random in the warp direction from each fabric. They were ravelled from both sides to measure exactly 2.5 cm for fabrics A and D and 1.5 cm for fabrics B and C. This size of the sample was so chosen so that the strength was within the range of the machine (namely 50 lbs). The samples were conditioned in a standard atmosphere over a saturated solution of common salt. The

distance between the jaws was 7.5 cm. The specimen was mounted in the two jaws and machine was started and run till the sample broke. The breaking strength and elongation were noted from the graph. An average of five readings was taken.. The percentage elongation at breaking point as well as at intermediate loads were calculated from the formula:

$$\text{Percentage elongation} = \frac{Y \times 100}{X}$$

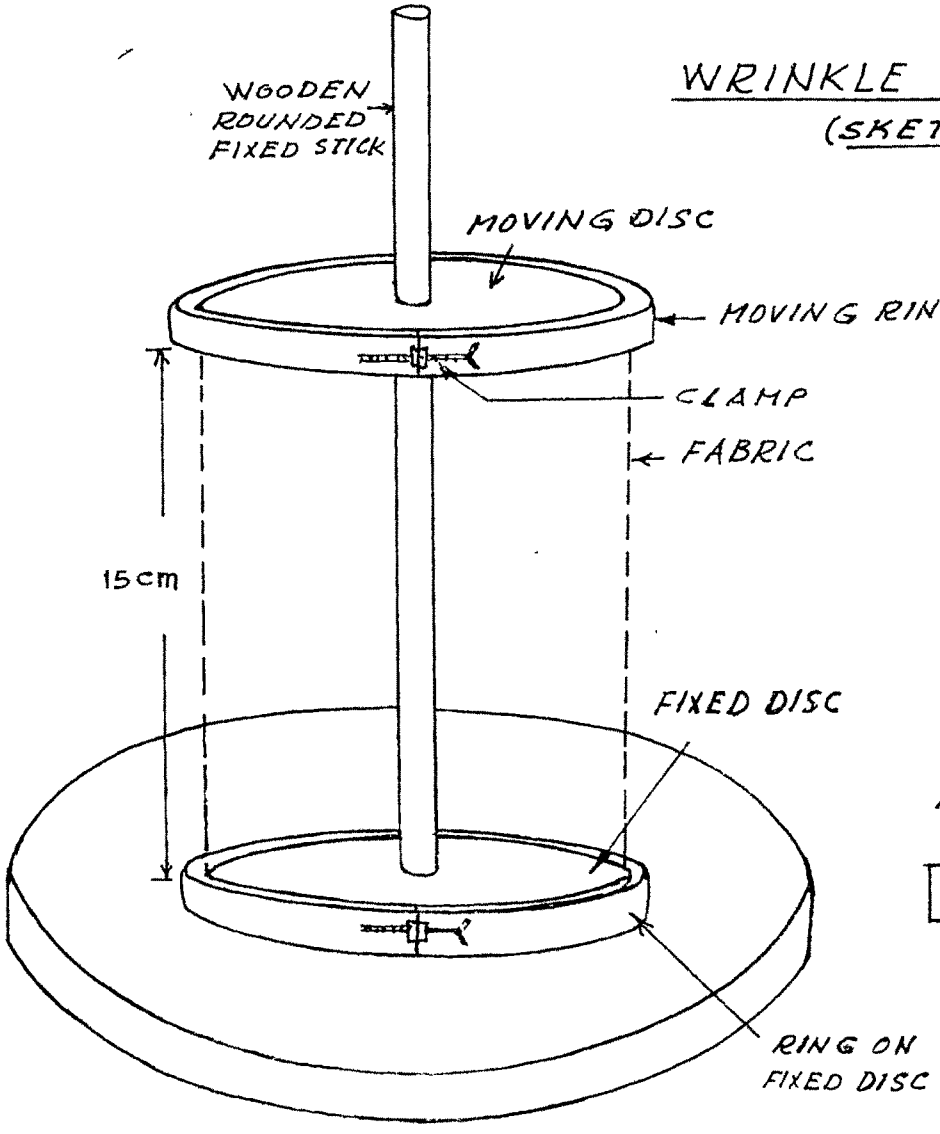
Y = Elongation obtained from the graph.

X = Length of the specimen (7.5 cm) under test.

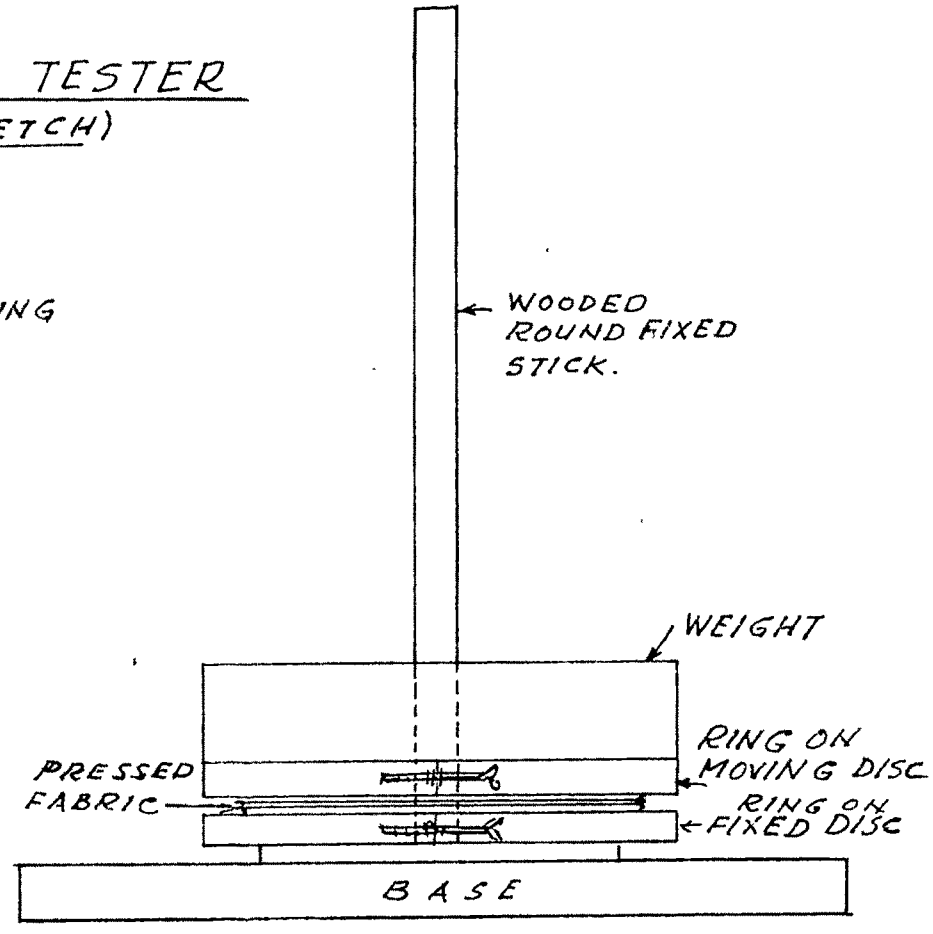
6. Evaluation of Appearance of Fabrics after Induced Wrinkling and Ironing.

The principle of AATCC Test Method 128-1969 (2b) was the basis of the experiment. The apparatus made on this basis is shown in Figure 1. Three test specimens of size 28 cm x 15 cm with the long dimension running in the direction of the warp were cut and ironed at nylon setting and then conditioned in a standard atmosphere over a saturated solution of common salt. The top wooden disc of the tester was raised and the long edge of the specimen (28 cm) was wrapped around the top disc with the face side of the specimen on the outside. The specimen was clamped with a wooden ring with screw. The other edge of the specimen was similarly fixed around the bottom disc. The specimen was adjusted by pulling at the bottom edge, so that it was smooth without sagging between the top and the bottom discs.

WRINKLE TESTER
(SKETCH)



FABRIC MOUNTED FOR TESTING



FABRIC UNDER TEST

FIG. 1

The top disc was gently lowered with one hand till it came to rest. The two discs were then covered with a cut tin box and a total of 3,500 grams of weight was placed on the top of the box. After 20 minutes the weights and the box was removed. The top disc was raised gently and the specimen was removed from the tester so as not to distort any induced wrinkles.

The specimen was then hung on the screen with a hanger having adjustable clips. The background of the screen was grey and the wrinkles were observed under an overhead flurocent lighting system at an angle of 15°. The total height from the floor to the light was eight feet and the distance of the sample from the floor was five feet.

The observer stood directly in front of the test specimen, four feet away from the screen. For comparison, two photographs of three dimensional replicas were hung on each side of the test specimen to facilitate comparative rating. Equal portion of the photographs of three dimensional replica to the fabric specimen size was only exposed for comparison, the remaining part being covered with grey paper sheet. These photographs were changed by the investigator as desired by the observer. Each test specimen was independently evaluated by three raters and assigned the number of the photograph of replica which most nearly matches the appearance of the test specimen. Test specimens

were again rated by the three observers after twenty four hours.

To see any influence of the weight of the iron alone, each test specimen was ironed flat with cold iron for 10 seconds each on face and back side of the fabric. The test specimens were then again rated by three observers. To see the ease of ironing, each test specimen was ironed flat with iron at nylon setting using the same procedure as above. After ironing, the test specimens, were rated again by the three observers.

The fabric smoothness ratings are:

No.1 Rating was equivalent to standard 1 and represented the poorest appearance and poorest retention of original appearance.

No.2 Rating was next to No. 1.

No.3 Rating was next to No. 2.

No.4 Rating was next to No. 3.

No.5 Rating was equivalent to standard 5 and represented the smoothest appearance and best retention of original appearance.