

STUDIES OF ELONGATION AND SORPTION RATIO OF SOME CHEMICALLY MODIFIED COTTON VARIETIES

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Purified lint samples of AC-134, Pak-22 and L.S.S. were tested with solutions of NaOH (30%) and KOH (40%) at 34°C. Treated and untreated products were examined for various properties such as elongation and sorption ratio in order to determine the effect of treatments on these properties. Treatments with both chemicals produced marked changes in these properties. The fibre elongation and their sorption ratio increased significantly during first half hour of treatment.

INTRODUCTION

The fibre structure is regarded as the criterion of its quality. The properties such as flexibility, resilience, dyestuff affinity etc. are included in the assessment of the quality of a textile material. The importance of one particular property depends in most of the cases on the end use of its products. Recently, research attention has been directed to chemical modification of cotton varieties to impart improved properties to its fibres. With this aim in view some commercial cotton varieties have been treated with different chemicals for different periods. Grant (1956) and Mc Donald *et. al.* (1957) reported large increase in the elasticity of single fibre treated with NaOH and Ethylamine. Pandey and Iyenger (1969) reported a rapid increase in elongation during the first half to one hour of treatment with NaOH (30%) and KOH (40%) and little increase thereafter. They also found that sorption ratio increased by chemical modification with NaOH (30%) and KOH (40%).

MATERIALS AND METHODS

Chemically purified lint samples of AC-134, Pak-22 and L.S.S. were employed. The treatments were carried out in slack state of fibre. Treatments with NaOH (30%) and KOH (40%) were carried out for half hour and one hour at 34°C.

Extensibility of fibre at 3-mm gauge-length was determined with the help of spintab stielometer according to the method laid down in A.S.T.M.

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Standards (1963). The sorption ratio was calculated by dividing the moisture regain of chemically modified samples by that of untreated samples using the formula given by Pandey and Iyenger (1969).

TABLE 1. *Analysis of variance for elongation of chemically modified cotton varieties.*

Due to :	D.F :	S.S :	M.S :	F-Ratio :
Varieties :	2	10.41	5.20	52.00**
Treatments	4	481.01	120.25	1202.50**
Varieties and Treatments	8	5.79	0.72	7.20**
Error	30	3.01	0.10	

** Highly Significant.

Mean values for treatment combinations.

	C ₀ t ₀	C ₁ t ₁	C ₁ t ₂	C ₂ t ₁	C ₂ t ₂
V ₁	5.1	6.8	6.9	13.5	13.7
V ₂	6.0	8.8	9.0	14.0	14.1
V ₃	6.2	8.0	8.2	13.2	13.7
V ₁ = AC-134	t ₀ = Control			C ₀ = Control	
V ₂ = Pak-22.	t ₁ = half hour			C ₁ = NaOH (30%)	
V ₃ = L.S.S.	t ₂ = 1 hour			C ₂ = ROH (40%)	

TABLE 2. *Analysis of variance for sorption ratio of chemically modified cotton varieties*

Due to	D.F	S.S :	M.S :	F-Ratio :
Varieties	2	0.03	0.015	3.00 NS
Treatments	4	1.75	0.437	87.40**
Varieties and Treatments	8	0.01	0.001	0.20 NS
Error	30	0.15	0.005	

** Highly Significant
NS Non-Significant.

Mean values for treatment combinations.

	C ₀ t ₀	C ₁ t ₁	C ₁ t ₂	C ₂ t ₁	C ₂ t ₂
V ₁	1.00	1.46	1.48	1.48	1.49
V ₂	1.00	1.52	1.53	1.55	1.55
V ₃	1.00	1.44	1.46	1.48	1.48
V ₁ = AC-134	t ₀ = Control			C ₀ = Control	
V ₂ = Pak-22	t ₁ = ½ hours			C ₁ = NaOH (30%)	
V ₃ = L.S.S.	t ₂ = 1 hours			C ₂ = KOH (40%)	

RESULTS AND DISCUSSION

Elongation: The analysis of variance (Table-I) indicated that all the varieties showed a positive response to both the chemicals. Lint samples treated with NaOH (30 per cent) showed gradual increase in elongation with increase of time. The effect was significant upto first half hour of treatment. Treatment with KOH (40 per cent) showed that the increase in elongation percent was considerably large with treatment time. The increase was very rapid upto the first half hour. The increase in elongation per cent was from 5.1 per cent to 9.9 per cent, 6.0 per cent to 9.0 per cent and 6.2 per cent to 8.2 per cent for AC-134, Pak-22 and L.S.S. respectively when treated with NaOH (30 per cent). The corresponding increases in elongation with KOH (40 per cent) treatment were from 5.1 per cent to 13.7 per cent, 6.1 per cent to 14.1 per cent and 6.2 per cent to 13.7 per cent.

These results were in agreement with those of Grant (1956), McDonald *et. al.* (1957) and Pandey and Iyenger (1969).

Sorption Ratio:

The differences among the mean values of sorption ratio of native and chemically modified cotton varieties for different treatments were highly significant (Table II). It was found that sorption ratio increased from 1.0 to 1.48, from 1.0 to 1.53 and from 1.0 to 1.46 for AC-134, Pak-22 and L.S.S. respectively when treated with NaOH (30%). When these varieties were treated with KOH (40%) the increase in sorption ratio was from 1.0 to 1.49, 1.0 to 1.55 and 1.0 to 1.48 for the three varieties. In short all the varieties showed a rapid increase in the sorption ratio with NaOH (30%) and KOH (40 per cent) during the first half hour of their treatment, after that practically no increase was observed.

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