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IMPACT CHEMICAL TREATMENTS OF SOME BLENDED MICROFIBER CONSTRUCTION ON APPEARANCE PROPERTIES

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ABSTRACT

Different fabrics with various construction from polyester microfibers with 144 or 288 fibers /cross-section and cotton ring spinning fibres are used to prepare eighteen samples according to a selected experimental natal design. Hexanediol and sodium hydroxide solution were used in treatment on different fabrics. Many properties were determined such as tensile Strength and Elongation %, Roughness, moisture regain % and loss in weight properties. Then the treated fabrics as well as washing were dyed with Basic, Reactive and disperse dyestuffs. The dyeability of untreated and treated fabrics and washing fastens was determined.

Key Words: Microfiber, Polyester /Cotton Fabrics, Different Construction, Disperse, Reactive And Basic Dyes, 1, 6- Hexanediol, Sodium Hydroxide, Dyeability, Washing Fastens.

I INTRODUCTION

Synthetic fiber industry has been enforced to make developments due to the growing performance demand for textile products. (1) Polyester fiber becomes more popular due to its unique properties such as mechanical characteristics good such as heat resistant, chemical inertness and good tensile strength. The micro polyesters have been more focal point in research through the past decade because of its aesthetic and highly soft touch. (2, 3) Microfibers are the fineness fibers with below 0.1 tex. This is the general definition of microfibers, although Japan are already made with fiber fineness below 0.01 tex. (4) Some examples for microfiber application are sportswear, Medical wear, protective, and various filter material, furnishings etc. It can be assumed that their use increases due to the characteristics of the aesthetic and physical fabric. Microfibers offer a great variety of applications in fashion clothing owing to their additional softness, drape, comfort and easy care properties. (5, 6) Microfibers are used in a variety of fabrics, include coats, suits, suit jacket blouses, dresses, wall coverings, upholstery, sleeping bags, tents, filters and toweling. (7) Fabrics produced from microfilaments are best due to their properties such as light weight, wind waterproofness and breathability. Textile Tightly Produced from microfilament has a very compact structure due to the small dimensions of the pores between fibers inside the Threads and yarns between themselves. These fabrics provide a very good resistance against the wind for various end uses such as parachutes, sails, protective clothing and tents from the wind while serving lightweight properties and high durability. (8) Microfibers are most commonly found in polyester and nylon (9). At the start of the development, the researchers searched intensively for suitable fields of application for their microfibers, since they had not yet find in previous clothing and technical textile concepts. [10 - 12]

Hexanediol used as cross linking agents to improve the pilling properties of acrylic fabric. [13] Polyester and their blend with acrylic fabrics were treated with alcoholic sodium hydroxide solutions offer a possibility of dyeing the blend with a cationic dye in one bath. [14] FAST tests were carried out on treated polyester/ cotton fabric to illustrate the relation between fabric construction and some treatments. [15] Various type of enzymes used to improve the hydrophilicity of several polyester fibers, this enzymes improve the water wetting and absorbent properties than alkaline hydrolysis. [16] The hydrolysis of polyester fibers using various bases in non-aqueous and aqueous media was thoroughly investigated. [17] The changes in the extent of attack were determined by the loss in weight. Sodium methoxide forms methyl ester end groups during the interchange reaction with polyester, resulting in a more rapid loss in weight. [18] The variation of the dyeing properties of polyester fibers were always given in terms of structural changes by using a two – phase theory involving crystalline and amorphous regions. [19] Preselling and plasticization of polyester fibers promote its physico-mechanical properties, [20] moisture regain as well as its dyeability. [21]

This work studies the effect of treatment with sodium hydroxide and1,6- Hexanediol on different construction of microfiber polyester fabrics as well as its blends with cotton carded and compacted fibers. Some physical and mechanical properties (moisture regain %, surface roughness, loss in weight, tensile strength and elongation) were evaluated. The appearance properties such as the colour strength of dyed fabrics with suitable dyestuffs were estimate.

II EXPERIMENTAL

2.1. Fabric

The samples were produced using different materials, a polyester (microfibers with 144 or 288 and are fibers that are less than one denier per filament.), cotton carded yarn and also cotton compact spinning, using of textile Structures (Twill 1/2, plain 1/1 and satin 4) All samples have been produced following fabric effective width = 170 cm, and the warp setting / cm = 30, warp count =50/2 Ne). Table 1 shows the different constructions and the specifications of the eighteen fabrics under study.

Table1: Samples Produced Specifications

Number Sample	Fabric structure	Yarn type	Weft/cm
1	Satin 4	Microfiber 144	20
2	Twill 1/2	Microfiber 144	23
3	Plain 1/1	Microfiber 144	26
4	Satin 4	Microfiber 288	20
5	Twill 1/2	Microfiber 288	23
6	Plain 1/1	Microfiber 288	26
7	Satin 4	Cotton carded yarn/ Microfiber 144	23
8	Twill 1/2	Cotton carded yarn / Microfiber 144	26
9	Plain 1/1	Cotton carded yarn / Microfiber 144	20
10	Satin 4	Cotton carded yarn / Microfiber 288	26
11	Twill 1/2	Cotton carded yarn / Microfiber 288	20

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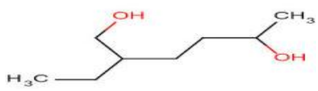
12	Plain 1/1	Cotton carded yarn / Microfiber 288	23
13	Satin 4	Cotton compact spinning/ Microfiber144	23
14	Twill 1/2	Cotton compact spinning/ Microfiber144	26
15	Plain 1/1	Cotton compact spinning/ Microfiber144	20
16	Satin 4	Cotton compact spinning/ Microfiber288	26
17	Twill 1/2	Cotton compact spinning/ Microfiber288	20
18	Plain 1/1	Cotton compact spinning/ Microfiber288	23

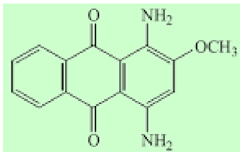
Warp/cm: 30

2.2. Chemical and Dye

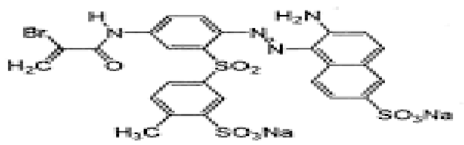
1.6- Hexanediol 98% (Formula HO ($CH_2)_6$ OH) is a colorless crystalline solid that melts at 42^{o}C and boils at 250^{o}C , (Sigma Aldrich . com). It is soluble in water and is hygroscopic .All the other chemicals are laboratory grads.



1, 6-Hexanediol



C.I. Disperse red 11



C.I. Reactive red 84

2.3. Treatment

The fabrics were treated in solutions of (2.5% w/v) 1,6- Hexanediol (H) or sodium hydroxyl (HN) with a liquor ratio 1: 25 for 1hr. at 90 °C The samples were rinsed with tap water, and finally air dried.

2.4. Dyeing

Dyeing was carried out with two baths, the first with reactive dye and the second with disperse dyes.

2.4.1. Dyeing With Reactive Dye

Dyeing process was carried out at 60ºC, L.R 1:50. Dyeing bath contains 2% (w.o.f) C. I. Reactive 84, pH was adjusted from 4 to 4.5 then the fabric was immersed and the temperature was raised to 85ºC in water bath for 60 min. At the end

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of dyeing, the dyed samples were rinsed with tap water and washing in a bath containing 2g/L non-ionic detergent (Hostapal CV, Clariant) at 40 °C for 30 minutes. The fabrics were then rinsed and air dried.

2.4.2. Dyeing With Disperse Dye

The dye bath of C.I. Disperse Red 11 was prepared by pasted the dye with 1% acetic acid in hot water, then added 2g/l of carrier. The dye bath was gradually heated to $100^{o}C$. The sample fabric was added to the bath and the dyeing continued for 60 min., at liquor ratio 1:50. The dyed sample was thoroughly washed in warm and cold water and airdried.

2.5. Measurements

2.5.1 Colour Strngth (INTENSITY) (K/S)

Color intensity of the prints (k/s) was measured at the wave length of the maximum absorbance using a SF600+-CT Data colors spectrophotometer.

2.5.2 Moisture Regain

Measurements of moisture regain of the fabrics were performed using the standard ASTM method 2654–76 (West, 1981)[17]. Moisture regain of the samples was calculated according to the following equation:

$$\text{Moisture regain } \% = \frac{W_1 - W_2}{W_2} \times 100$$

Where W_1: Weight of sample (gm) after saturation in the standard humidity atmosphere.
W_2: Constant weight (gm) of dry sample.

2.5.3. Fabric Surface Roughness

Surface roughness of treated and untreated fabrics was measured according to JIS-94 standard using surface roughness tester Model SE 1700∞ (Kosaka Laboratory Ltd. Japan).

2.5.4. Tensile Stregth and Elongation

The tensile strength and elongation of fabric before and after treatment are evaluated using a Instron Tensile Tester (USA) according to ASTM D 76 Standard Specification for Textile Testing Machines. The average is taken for 10 samples (5x 20 cm).

III RESULTS AND DISCUSSION

3.1. Weight Loss

The data of the loss in weight % of different Construction polyester fabrics as well as polyester blend fabrics of the untreated treated with 1,6- Hexanediol (H) or sodium hydroxyl (HN) are given in table 2. In significant loss in weight % was found to increase with sodium hydroxyl (HN) treatment than the 1,6- Hexanediol (H) one, the increase loss in

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weight % attributed to the possible degradation of the treated polyester fabrics with (HN). [22, 23] The loss in weight % are lowest with both 20 and 23 weft/cm on fabric than fabric has 26 weft/cm. Less weight per square meter microfiber 144 hair and microfiber 288 hair, due to the low hair in cross section and when mixing microfiber cotton increases weight because of the intensity of the quality of cotton = 1.45 g/ cm ^{3}, polyester = 1.38 g/cm^3.

Table2: Loss in weight % of different Construction untreated and treated with hexanediol and sodium hydroxide

Number Of samples	Thread Type(X_1)	Yarn structure (X_2)	Weft/cm (X_3)	Weight Of untreated	loss Weight% Of treated with (H)	loss Weight % Of treated with (HN)
1	1	1	1	107.3	0.12	5.456
2	1	2	2	111.5	0.684	6.72
3	1	3	3	118.55	3.498	9.696
4	2	1	1	107.75	0.2104	5.658
5	2	2	2	115.85	0.788	6.854
6	2	3	3	119.1	3.94	11.97
7	3	1	2	116.6	0.456	6.473
8	3	2	3	120.9	1.521	9.075
9	3	3	1	108.3	0.1	1.76
10	4	1	3	122.35	1.58	9.354
11	4	2	1	108.95	0.11	4.034
12	4	3	2	117.2	0.55	6.645
13	5	1	2	116.8	0.221	5.904
14	5	2	3	123.55	0.871	7.627
15	5	3	1	108.4	0.042	0.497
16	6	1	3	127.95	1.109	8.033
17	6	2	1	110.75	0.085	1.656
18	6	3	2	118.32	0.4152	6.201

Conditions: 2.5% w/v 1,6- Hexanediol (H) or sodium hydroxyl (HN), Material: liq. ratio 1:25, for 1hr. at 90 °C.

3.2.Moisture Regain % and Surface Roughness

The moisture regain % and roughness of different Construction polyester fabrics as well as polyester blend fabrics of the untreated treated with 1,6- Hexanediol (H) or sodium hydroxyl (HN) are given in table 3. The treatments show that increase moisture regain % value with treatment with both sodium hydroxide and 1,6- hexanediol than untreated samples. The same holds true elsewhere. [24] These improvements increased with loss in weight increase. There is an inverse relationship between the absorption of moisture and weight, after processing at least the weight and increase the absorption of moisture due to blanks interfaces between large hairs. Above treatment showed a better handle and appearance of the fabric samples.

The data of roughness shows that the treatment with 1,6- Hexanediol (H) or sodium hydroxyl (HN) decreases than untreated treated samples, this may be attributed to hydrolysis effect of the (HN). There is a direct correlation between surface roughness and weight per square meter, 144 microfibers less weight than microfiber 288hair due to lack of hairs in cross section, at least after the processing of surface roughness and increase smoothness.

Table 3: Moisture regain % and Roughness of different Construction untreated and treated with hexanediol and sodium hydroxide

Number Of samples	Moisture Regain % of untreated	Roughness µ of untreated	Moisture Regain % of treated with (H)	Roughness µ of treated with (H)	Moisture Regain % of treated with (HN)	Roughness µ of treated with (HN)
1	3.94	20.3	4.23	19	4.62	17.41
2	3.82	20.91	4.12	19.6	4	18.4
3	3.61	23.3	3.7	20.2	2.6	19.1
4	3.93	20.1	4.22	18.8	4.61	17.35
5	3.81	20.9	4.11	19.4	3.6	18.1
6	3.5	23.1	3.6	20.1	2.5	19.02
7	3.92	22.6	4.21	19.7	4.6	19.01
8	3.7	24.22	4	21.2	3.51	21.01
9	4.2	20.8	4.42	19.23	5	17.9
10	3.63	24.2	3.9	20.8	3.3	20.1
11	4	20.5	4.32	19.21	4.8	17.78
12	3.84	22	4.14	19.62	4.11	18.61
13	3.91	22.8	4.15	19.63	4.2	18.7
14	3.64	25.23	3.92	21.1	3.5	20.2
15	4.1	20.81	4.41	19.22	4.9	17.8
16	3.62	24.21	3.8	20.3	3.2	20.01
17	3.95	20.7	4.31	19.2	4.63	17.6
18	3.83	22.2	4.13	19.61	4.1	18.5

Conditions: 2.5% w/v 1,6- Hexanediol (H) or sodium hydroxyl (HN), Material: liq. ratio 1:25, for 1hr. at 90 °C.

3.3. TENSILE STRENGHTH AND ELONGATION

Tables 4 and 5 illustrate the tensile strength and elongation % of different construction of all polyester fabrics, polyester blend fabrics with cotton and the untreated one for both treatments with 1,6- Hexanediol (H) or sodium hydroxyl (HN).

The results of the weft of samples show that there is limited decrease in the tensile strength in case of treatment with 1,6- Hexanediol than warp. But the tensile strength of the samples treated with sodium hydroxide more decreases than untreated one.

The elongation values increased in both warp and weft directions with all treatments, but in higher increment with treatment with sodium hydroxide.

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Table 4: Tensile strength & Elongation of different Construction of treated with hexanediol

Number Sample	Warp		Weft		Warp treated (H)		weft treated (H)	
	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %
1	0.3564	11.25	0.2964	21.25	0.3211	12	0.2867	22.75
2	0.63715	12.32	0.4038	25.375	0.5112	13	0.4261	25.5
3	1.1885	13.75	1.093	32.375	1.179	14.25	1.0188	33.25
4	0.3696	11	0.318	21.125	0.3211	12.125	0.3356	22.75
5	0.76455	12.25	0.4789	24.875	0.6123	13.13	0.5339	24.5
6	1.2135	13.75	1.176	28	1.245	15.625	1.174	30.5
7	1.00445	11.75	0.5111	23.25	0.6921	12.375	0.6345	23.25
8	1.241	12.62	1.425	27.375	1.292	13.25	1.255	28.52
9	0.4227	10.61	0.3188	20.625	0.3323	11.25	0.3516	19.5
10	1.2565	12.42	1.462	25.5	1.399	13.5	1.36	26
11	0.477	10	0.3752	20.125	0.421	11.5	0.4025	14.25
12	1.109	11.32	0.761	21.875	1.0996	12.375	0.7251	23
13	1.0695	12	0.7279	24.75	1.0085	12.375	0.679	23.5
14	1.251	13.5	1.445	27.875	1.362	13.5	1.255	28.75
15	0.445	10.75	0.354	21.125	0.372	11.5	0.3967	20.25
16	1.381	12.5	1.544	26.5	1.421	13.5	1.406	26.5
17	0.60785	10.5	0.3946	20.25	0.455	11.625	0.4259	19.5
18	1.181	11.5	0.9375	23.125	1.1102	12.875	0.7251	23.25

Conditions: 2.5% w/v 1,6- Hexanediol (H) Material: liq. ratio 1:25, for 1hr. at 90 °C.

Table 5: Tensile strength & Elongation of different Construction of treated with sodium hydroxide

Number Sample	Warp		Weft		Warp treated (HN)		weft treated (HN)	
	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %	Tensile strength Kg f/mm2	Elongation %
1	0.3564	11.25	0.2964	21.25	0.2985	12.75	0.2889	24.25
2	0.63715	12.32	0.4038	25.375	0.3696	14	0.41865	27.25
3	1.1885	13.75	1.093	32.375	1.052	17	0.9885	33.75
4	0.3696	11	0.318	21.125	0.3001	12.75	0.3287	22.75
5	0.76455	12.25	0.4789	24.875	0.4695	13.75	0.4471	27.25
6	1.2135	13.75	1.176	28	1.075	15.5	1.0594	31
7	1.00445	11.75	0.5111	23.25	0.5078	13.25	0.4496	26.75
8	1.241	12.62	1.425	27.375	1.1225	14.75	1.167	27.75
9	0.4227	10.61	0.3188	20.625	0.3271	12	0.33375	19

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10	**1.2565**	**12.42**	**1.462**	**25.5**	**1.1885**	**14.25**	**1.289**	**27.5**
11	**0.477**	**10**	**0.3752**	**20.125**	**0.3321**	**11.5**	**0.3393**	**16.75**
12	**1.109**	**11.32**	**0.761**	**21.875**	**1.0025**	**13**	**0.45625**	**25.25**
13	**1.0695**	**12**	**0.7279**	**24.75**	**0.9255**	**13.25**	**0.46985**	**27.25**
14	**1.251**	**13.5**	**1.445**	**27.875**	**1.151**	**14.75**	**1.328**	**30**
15	**0.445**	**10.75**	**0.354**	**21.125**	**0.3287**	**12.5**	**0.3548**	**20.5**
16	**1.381**	**12.5**	**1.544**	**26.5**	**1.251**	**14.5**	**1.3505**	**27.5**
17	**0.60785**	**10.5**	**0.3946**	**20.25**	**0.337**	**11.75**	**0.36645**	**17**
18	**1.181**	**11.5**	**0.9375**	**23.125**	**1.0065**	**13**	**0.7485**	**25.75**

Conditions: 2.5% w/v sodium hydroxyl (HN), Material: liq. ratio 1:25, for 1hr. at 85°C.

3.4. Colour Strength

Table 6 shows colour strength of treated and untreated of different construction of all polyester fabrics, polyester blend fabrics with cotton for both treatments with 1,6- Hexanediol (H) or sodium hydroxyl (HN) dyed with reactive dyes and disperse dyes. An increase in the dye exhaustion on polyester and its blend fabrics was found to be depended on the treatment. The increase in the dye exhaustion by the alkali treatment with sodium hydroxide solution than 1,6-Hexanediol (H), may be attributed to the improved hydrophilicity as it is shown from the increase of the moisture regain results.

Table 6: Color intensity of untreated and treated with hexanediol or sodium hydroxide

Number Sample	K/S value of untreated	K/S value of treated with (H)	K/S value of treated with (HN)
1	**5.3**	**5.9**	**6.2**
2	**5.8**	**6.2**	**6.8**
3	**6.1**	**7.2**	**7.1**
4	**5.3**	**6**	**6.4**
5	**5.8**	**6.3**	**6.8**
6	**6.3**	**7.3**	**7.3**
7	**5.6**	**6.1**	**6.6**
8	**6**	**6.5**	**6.9**
9	**5.1**	**5.6**	**6.1**
10	**6.1**	**6.6**	**7**
11	**5.2**	**5.8**	**6.2**
12	**5.7**	**6.2**	**6.8**
13	**5.4**	**6**	**6.4**
14	**6**	**6.3**	**6.9**
15	**5.1**	**5**	**5.9**
16	**6**	**6.4**	**6.9**
17	**5.1**	**5.1**	**5.9**
18	**5.5**	**6.1**	**6.6**

Dyeing with C.I. D 18, 1 %(o. w. f.) pH 4, 95ºC, for 1hr., material: liq. ratio 1:100

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Table7: Multiple regression equations

	Equation	Multiple
$\textbf{Weight}_{(after)}$	$Y= 99.57 + 1.135\ X_1 - 0.74\ X_2 + 6.7\ X_3$	0.96
$\textbf{Moisture}_{(after)}$	$Y= 4.17 + 0.009\ X_1 + 0.01\ X_2 -0.2\ X_3$	0.84
$\textbf{Roughness}_{(after)}$	$Y= 18.1 + 0.25\ X_1 – 0.16\ X_2 + 1.75\ X_3$	0.91
$\textbf{Moisture}_{(H)}$	$Y= 4.53 + 0.02\ X_1 - 0.009\ X_2 -0.24\ X_3$	0.83
$\textbf{Roughness}_{(H)}$	$Y= 18.1 + 0.05\ X_1 – 0.02\ X_2 + 0.75\ X_3$	0.82
$\textbf{Moisture}_{(HN)}$	$Y= 5.58 + 0.07\ X_1 – 0.11\ X_2 -0.82\ X_3$	0.87
$\textbf{Roughness}_{(HN)}$	$Y= 16.33 + 0.1\ X_1 – 0.13\ X_2 + 1.13\ X_3$	0.84
$\textbf{Tensile strength}_{(warp,\ after)}$	$Y= -0.15 + 0.06\ X_1 +0.01\ X_2 + 0.4\ X_3$	0.93
$\textbf{Elongation}_{(warp,\ after)}$	$Y= 9.93 -0.16\ X_1 +0.06\ X_2 + 1.2\ X_3$	0.89
$\textbf{Tensile strength}_{(weft\ ,after)}$	$Y= -0.44 + 0.07\ X_1 – 0.01\ X_2 + 0.5\ X_3$	0.91
$\textbf{Elongation}_{(weft\ ,after)}$	$Y= 17.87 -0.47\ X_1 +0.39\ X_2 + 3.59\ X_3$	0.87
$\textbf{Tensile strength}_{(warp,\ H)}$	$Y= -0.37 + 0.06\ X_1 + 0.01\ X_2 + 0.47\ X_3$	0.94
$\textbf{Elongation}_{(warp,\ H)}$	$Y= 10.7 -0.15\ X_1 +0.16\ X_2 + 1.13\ X_3$	0.82
$\textbf{Tensile strength}_{(weft\ ,H)}$	$Y= -0.25 + 0.04\ X_1 – 0.02\ X_2 + 0.4\ X_3$	0.93
$\textbf{Elongation}_{(weft\ ,H)}$	$Y= 17.1 -0.8\ X_1 +0.41\ X_2 + 4.54\ X_3$	0.84
$\textbf{Tensile strength}_{(warp,\ HN)}$	$Y= -0.36 +0.06\ X_1 +0.02\ X_2 + 0.4\ X_3$	0.9
$\textbf{Elongation}_{(warp,\ HN)}$	$Y= 11.2 -0.26\ X_1 +0.18\ X_2 + 1.45\ X_3$	0.89
$\textbf{Tensile strength}_{(weft\ ,HN)}$	$Y= -0.3 +0.04\ X_1 -0.01\ X_2 + 0.43\ X_3$	0.86
$\textbf{Elongation}_{(weft\ ,HN)}$	$Y= 18.9 -0.8\ X_1 -0.06\ X_2 + 4.77\ X_3$	0.84
$\textbf{K/S}_{(after)}$	$Y= 4.89 -0.05\ X_1 -0.008\ X_2 + 0.45\ X_3$	0.95
$\textbf{K/S}_{(H)}$	$Y= 5.42 -0.14\ X_1 -0.03\ X_2 + 0.57\ X_3$	0.86
$\textbf{K/S}_{(HN)}$	$Y= 5.88 -0.06\ X_1 +0.025\ X_2 + 0.45\ X_3$	0.91

X_1 = Fabric construction X_2 = Yarn type X_3 = ne weft/ cm

4. Samples producing to determine the best end-using Clothes by used the radar chart to different functional properties

Use total area of the law the following account:

= 1/2 (sin 360/8) x ((A x B) + (B x C) + (C x D) + (D x E) + (E x F) + (F x G) + (G x H) + (H x A))

A = Weight
B = Moisture
C = Roughness
D = Tensile strength (warp)
E = Elongation (warp)
F = Tensile strength (weft)
G = Elongation (weft)
H = K/S

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Table8: The percentage of the total area and the quality of the samples produced of different Construction untreated

Number Sample	Weight %	Moisture%	Roughness%	warp		weft		K/S %	Radar area	Arrangement
				Tensile strength%	Elongation %	Tensile strength%	Elongation %			
1	100	94%	99%	26%	89	19%	95%	84%	1.519814	18
2	96%	91%	96%	46%	81	26%	79%	92%	1.611173	14
3	91%	86%	86%	86%	73	71%	62%	97%	1.862311	8
4	100	94%	100	27%	91	21%	95%	84%	1.540386	17
5	93%	91%	96%	55%	82	31%	81%	92%	1.679525	11
6	90%	83%	87%	88%	73	76%	72%	100%	1.960204	7
7	92%	93%	89%	73%	85	33%	87%	89%	1.788684	10
8	89%	88%	83%	90%	79	92%	74%	95%	2.074099	3
9	99%	100	97%	31%	94	21%	98%	81%	1.585291	15
10	88%	86%	83%	91%	81	95%	79%	97%	2.130486	2
11	98%	95%	98%	35%	100	24%	100	83%	1.638043	13
12	92%	91%	91%	80%	88	49%	92%	90%	1.982761	6
13	92%	93%	88%	77%	83	47%	81%	86%	1.842623	9
14	87%	87%	80%	91%	74	94%	72%	95%	2.001808	5
15	99%	98%	97%	32%	93	23%	95%	81%	1.583528	16
16	84%	86%	83%	100%	80	100%	76%	95%	2.1525	1
17	97%	94%	97%	44%	95	26%	99%	81%	1.665022	12
18	91%	91%	91%	86%	87	61%	87%	87%	2.022442	4

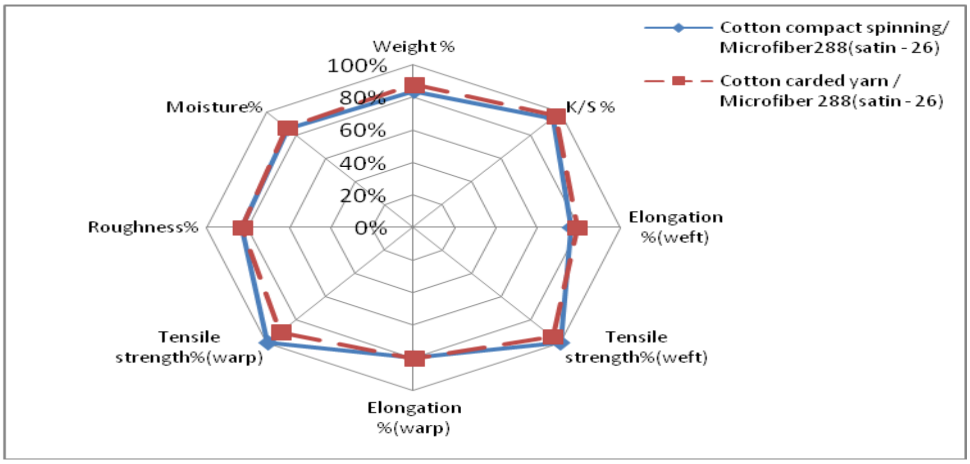

Figure 1: Two samples of better quality compared to untreated

Figure**1** and table **8** shows radar chart of untreated microfiber, it was found that the best two samples which achieves the best performance of the sample, sample number **16** (Cotton compact spinning/ Microfiber288 – satin- 26 pick\cm),

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Radar area were given **2.1525** and number **10** (Cotton carded yarn/ Microfiber 288 – satin- 26 pick\cm), Radar area were given **2.130486.**

Table9: The percentage of the total area and the quality of the samples produced of different Construction treated hexanediol

Number Sample	Weight %	Moisture%	Roughness%	Warp Tensile strength%	Warp Elongation %	weft Tensile strength%	weft Elongation %	K/S %	Radar area	Arrangement
1	100	96%	99%	23%	94%	20%	63%	81%	1.390461	18
2	97%	93%	96%	36%	87%	30%	56%	85%	1.46327	15
3	94%	84%	93%	83%	79%	72%	43%	99%	1.826913	7
4	100	95%	100	23%	93%	24%	63%	82%	1.416462	17
5	93%	93%	97%	43%	86%	38%	58%	86%	1.542726	12
6	94%	81%	94%	88%	72%	83%	47%	100	1.879621	5
7	92%	95%	95%	49%	91%	45%	61%	84%	1.633305	10
8	90%	90%	89%	91%	85%	89%	50%	89%	1.975974	3
9	99%	100	98%	23%	100	25%	73%	77%	1.46439	14
10	89%	88%	90%	98%	83%	97%	55%	90%	2.07532	1
11	98%	98%	98%	30%	98%	29%	100	79%	1.624708	11
12	92%	94%	96%	77%	91%	52%	62%	85%	1.854718	6
13	92%	94%	96%	71%	91%	48%	61%	82%	1.775769	9
14	88%	89%	89%	96%	83%	89%	50%	86%	1.95587	4
15	99%	100	98%	26%	98%	28%	70%	68%	1.43813	16
16	85%	86%	93%	100%	83%	100	54%	88%	2.054119	2
17	97%	98%	98%	32%	97%	30%	73%	70%	1.478495	13
18	91%	93%	96%	78%	87%	52%	61%	84%	1.825688	8

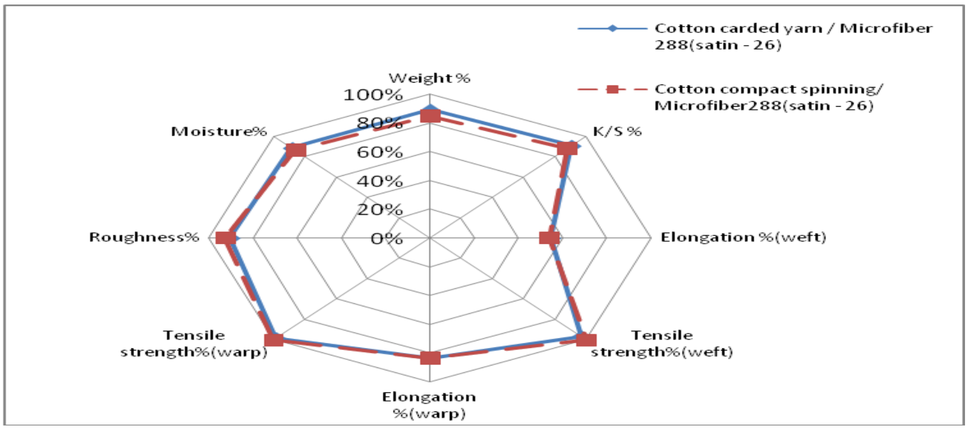

Figure 2: Two samples of better quality compared to treated hexanediol

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Figure**2** and table **9** shows radar chart of treated hexanediol, it was found that the best two samples which achieves the best performance of the sample, number **10** (Cotton carded yarn/ Microfiber 288 – satin- 26 pick\cm), Radar area were given **2.07532**- and sample number **16** (Cotton compact spinning/ Microfiber288 – satin- 26 pick\cm), Radar area were given **2.054119**.

Table10: It shows the percentage of the total area and the quality of the samples produced of different Construction treated sodium hydroxide

Number Sample	Weight %	Moisture%	Roughness%	warp		weft		K/S %	Radar area	Arrangement
				Tensile strength%	Elongation %	Tensile strength%	Elongation %			
1	100	92%	100	24%	90%	21%	69%	85%	1.426069	16
2	98%	80%	94%	30%	82%	31%	61%	93%	1.393786	17
3	95%	52%	91%	84%	68%	73%	50%	97%	1.596208	10
4	100	92%	100	24%	90%	24%	74%	88%	1.47613	15
5	94%	72%	96%	38%	84%	33%	61%	93%	1.389271	18
6	97%	50%	91%	86%	74%	78%	54%	100	1.706282	7
7	93%	92%	91%	41%	87%	33%	63%	90%	1.512993	13
8	92%	70%	83%	90%	78%	86%	60%	95%	1.85717	4
9	95%	100	97%	26%	96%	25%	88%	84%	1.545212	11
10	91%	66%	86%	95%	81%	95%	61%	96%	1.950536	1
11	97%	96%	98%	27%	100	25%	100	85%	1.599011	9
12	93%	82%	93%	80%	88%	34%	66%	93%	1.746176	6
13	92%	84%	93%	74%	87%	35%	61%	88%	1.661504	8
14	89%	70%	86%	92%	78%	98%	56%	95%	1.895135	3
15	94%	98%	97%	26%	92%	26%	82%	81%	1.488078	14
16	86%	64%	87%	100%	79%	100	61%	95%	1.945867	2
17	93%	93%	99%	27%	98%	27%	99%	81%	1.535306	12
18	91%	82%	94%	80%	88%	55%	65%	90%	1.837558	5

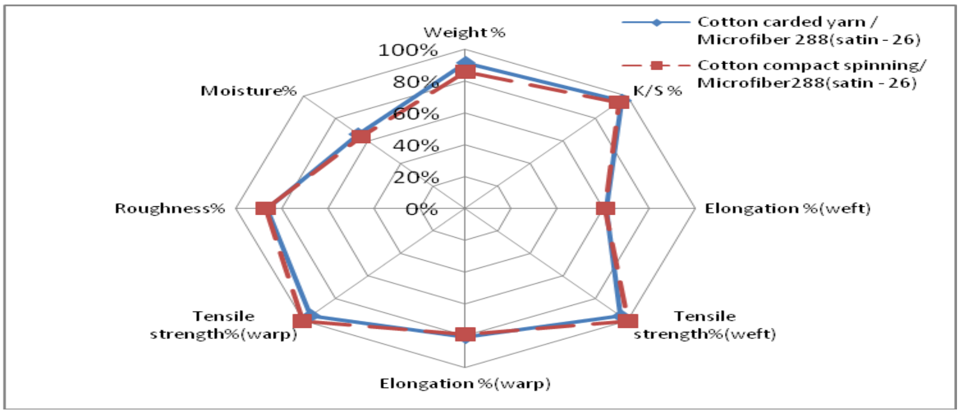

Figure 3: Two samples of better quality compared to treated sodium hydroxide

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Figure **3** and table**10** shows radar chart of treated sodium hydroxide, it was found that the best two samples which achieves the best performance of the sample, number **10** (Cotton carded yarn/ Microfiber 288 – satin- 26 pick\cm), Radar area were given **1.950536**- and sample number **16** (Cotton compact spinning/ Microfiber288 – satin- 26 pick\cm), Radar area were given **1.945867**.

Table 11: T- Test K/S & lose Weight with Untreated, Sodium hydroxide & Hexanediol

K/S value of untreated	K/S value of treated with (H)	K/S value of treated with (HN)	Weight Of untreated	loss Weight% Of treated with (H)	loss Weight %Of treated with (HN)	Weight of untreated	loss Weight %Of treated with (H)	loss Weight %Of treated with (HN)
5.3	5.9	6.2	107.3	0.1	5.5	107.3	107.4	113.2
5.8	6.2	6.8	111.5	0.7	6.7	111.5	112.3	119
6.1	7.2	7.1	118.6	3.5	9.7	118.6	122.7	130
5.3	6	6.4	107.8	0.2	5.7	107.8	108	113.8
5.8	6.3	6.8	115.9	0.8	6.9	115.9	116.8	123.8
6.3	7.3	7.3	119.1	3.9	12	119.1	123.8	133.4
5.6	6.1	6.6	116.6	0.5	6.5	116.6	117.1	124.1
6	6.5	6.9	120.9	1.5	9.1	120.9	122.7	131.9
5.1	5.6	6.1	108.3	0.1	1.8	108.3	108.4	110.2
6.1	6.6	7	122.4	1.6	9.4	122.4	124.3	133.8
5.2	5.8	6.2	109	0.1	4	109	109.1	113.3
5.7	6.2	6.8	117.2	0.6	6.6	117.2	117.8	125
5.4	6	6.4	116.8	0.2	5.9	116.8	117.1	123.7
6	6.3	6.9	123.6	0.9	7.6	123.6	124.6	133
5.1	5	5.9	108.4	0	0.5	108.4	108.4	108.9
6	6.4	6.9	128	1.1	8	128	129.4	138.2
5.1	5.1	5.9	110.8	0.1	1.7	110.8	110.8	112.6
5.5	6.1	6.6	118.3	0.4	6.2	118.3	118.8	125.7

V CONCLUSIONS

Fabrics produced from mixing polyester cotton Compact yarn the highest weight of a mixture of polyester carded yarn due to build-spinning method where a large twisting angle keep a large number of hairiness.

The moisture increased with treatment with sodium hydroxide than treatment with Hexandiol. There is an inverse relationship between the absorption of moisture and weight, after processing at least the weight and increase the absorption of moisture due to blanks interfaces between large hairs

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There is a direct correlation between surface roughness and weight per square meter, 144 microfibers less weight than microfiber 288hair due to lack of hairs in cross section, at least after the processing of surface roughness and increase smoothness.

Evidenced by the results of laboratory tests that when you add material processing of samples to give them a surface fineness caused the low tensile strength, due to the nature of the treatment when you add the chemical absorbs fabric altering the raw properties by accidental entanglement between the interaction of cellulosic chains by hydroxyl groups, and lead to a decrease in tensile strength. Elongation suit inversely with the tensile strength, the higher the tensile strength is less than the elongation.

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