Journal of Textiles, Coloration and Polymer Science
https://jtcps.journals.ekb.eg/

Eco-Friendly Pretreatment for Printing Fragrant Textile

J. I. Abd El-Thalouth [a], Nancy.S.El-Hawary [b] , M.S.Mahmoud El-Sarty [a]

a Helwan University, Faculty of Applied Arts, Printing, Dyeing and Finishing Department, Giza, Egypt
b National Research Centre, 33 El-Behouth St. (former El-Tahrir str.), Dokki, P.O. 12622, Giza, Egypt

The main objective of this work is to investigate the effect of treating different kinds of fabrics (wool, cotton, and linen) to enhance their printability and introduce multi-function products like fragrant and soft handle

The pre-treatment samples were subjected to two baths the Mordant bath and the fragrant bath with different factors studied in which the examination was carried out with different concentrations for improving the printability of three kinds of natural fabrics i.e., cotton, wool, and linen to apply with natural dyes printing Measuring their K/S values, Handle test, fastness properties, absorption, and Ability to keep fragrances (Percentage of loss in weight)**Keywords:** Denim, Washing, Technology, Laser, Ozone.

Keywords: printability, Mordant bath, fragrant bath, Handle test, fastness properties, fragrances.

Introduction

Cotton is a delicate fabric. The monarch of textile fibers. staple fiber that develops around cotton plant seeds in a protective capsule known as a boll, The most popular type of textile for apparel is created from the fiber when it is spun into yarn to create a soft, breathable fabric. [2]

The major component of cotton is cellulose, which is a member of the significant class of organic compounds known as "Carbohydrates" and which also contains substances like sugar and starch. They are made of carbon, oxygen, and hydrogen.

Each glucose molecule has six carbon atoms, twelve hydrogen atoms, and six oxygen atoms. Glucose has the chemical formula C6H12O6, which can also be written as C6(H2O)6. This chemical interacts with "Cellulose" and other compounds. With the removal of water, two of these cellobiose molecules can be joined to produce a larger molecule. Chain length or "Degree of Polymerization" refers to the number of repeating units. [3]

Wool is a popular and indispensable material The proteins in wool, a complex biological fiber, provide elasticity and great performance capabilities The diverse physical and chemical characteristics of the different parts of wool are caused by this heterogeneous composition. The amino acids that make up the proteins in wool are known as amino acids because they have basic amino (-NH) and acidic carboxyl (- 2COOH) groups. [4]

Wool includes 18 of the 22 naturally occurring amino acids. The size and chemical characteristics of the side groups of amino acids can be categorized as follows: hydrocarbon, which is hydrophobic (hate water); hydrophilic (love water); acidic; basic; and amino acids which include sulphur. The amino acids are linked together to create lengthy polymer chains in proteins, including those found in wool. [4]

A natural fabric made from the fibers of the flax stem is linen. Linen is supple, adaptable, and glistening.it characteristics have a number of very distinct advantages. linen is naturally permeable and makes a perfect mattress material for people who live in severely hot or cold areas because it doesn't retain air temperature. Interestingly, the qualities that make linen so resilient also prevent it from producing lint and cause it to become even more flexible with usage and cleaning. [5] Cellulose, which makes up to 79.56% of the components of flax fiber, is the primary chemical

*Corresponding author: M.S.Mahmoud El-Sart, E-mail: engineer.marwa.elsarty@gmail.com
(Received 13/09/2023, accepted 15/10/2023)
DOI: 10.21608/jtcps.2023.236229.1237

polymer in flax fibers. The primary wall, secondary wall, and center lumen from the outside to the inside are the three layers that make up the construction of a single fiber 9. In addition to lignin, which accounts for up to 9.4% of the construction of fiber, cellulose, which is deposited as spiral layers inside the flax hair, offers flax fibers their qualities of toughness, flexibility, and moisture absorption [6]

Natural dye colors derived from substances found in nature, such as plants, animals, and minerals, are referred to as «natural dyes».

Since ancient times, natural dyes made from plants, animals, and minerals have been used to color food as well as to cosmetically and craftily dye clothing, leather, skin, and hair. [7]

The coordinating power of transition metal ions is often high and/or they can produce weak to medium contact and attraction forces. These metallic mordants react with the fiber's dye to form an insoluble precipitate or lake that fixes both the dye and the mordant, making them respectably wash fast. [8]

Aluminum mordant is required if darker hues are being dyed. On the weight of the material, 10–20% of an amount of alum can often be utilized. The treatment material is submerged in the alum solution, which is then fixed by additional chemicals or ageing. To get satisfactory dyeing effects, it is recommended to fix the alum on the fiber by precipitating it with salts like sodium carbonate or sodium phosphate. [9]

Curcuma is a strong dye that may directly color cotton, wool, and silk. Although the resultant shade is lightfast to washing, it is slow to light. On textile materials, turmeric dye (curcumin) imparts a yellow hue. it possesses anti-tumor, anti-fungal, and anti-inflammatory properties. It's the main component of the pigments found in colorant extracts made from curcumin. [10]

Printing on fabric was first practiced thousands of years ago. Printing, which can be carried out manually or automatically, applies a design in color. The two hand printing techniques are blocking printing and flat screen printing. Although printing requires a thickening and dye bath solution combination, the dyes used in printing are the same as those used in conventional dyeing. [11]

The process of adding perfume to any textile substrate is known as fragrance finishing. Under diverse circumstances of activity that cause sensory and thermal excitement, the human body produces sweat. Sweat that has been contaminated by bacteria produces unpleasant odors and stains that can appear on the forehead, back, or armpits. As a result, adding diverse scents to textiles during the fragrance-finishing process increases the value of the finished goods. [12]

Microencapsulation are microscopic particles with a diameter of 1 to 1000 lm, also known as microcapsules. This economical technique is utilized in the textile industry to apply various functional agents to fabrics in order to obtain improved functionality endurance. [13]

There have been many attempts to directly add perfumes to fibers and fabrics, but as all fragrances are volatile, their endurance is low. Microcapsules can be used to physically apply solution, dispersion, or emulsion to fabrics by cushioning, coating, spraying, or immersing. The capsules are attached to the fabric by binders, which keep them there while being worn and washed. [13]

Capsules can be applied to specific regions of a fabric or textile product thanks to printing. The microcapsules are equally distributed across the cloth surface after being printed on and are durable through multiple items of washing. [13]

The purpose of the current study was to natural dye flat printing and finishing fragrant textile microcapsules with jasmine oil fragrance into cotton, wool and linen fabrics in order to determine which of these two techniques is more effective for fragrantly finishing fabrics. Chemicals and reagents of Potassium aluminum Sulphate (alum), Jasmine oil, ethanol and methanol alcohol, Turmeric natural dye, Natural Gum ST 80.

Methodology and Measurements

Materials

Three fabrics were used to study Fragrant Finishing with natural dye.

100%Cottonfabrics (157g\m2),100%Wool fabrics (205g\m2), and Linen fabrics (202g\m2) used for this study were supplied by Misr for the spinning and weaving company, EL-Mahalla El-Kobra, Egypt.

Treatments

Pre-Treatment Method

Samples of natural fabrics were treated with aqueous solutions containing different concentrations of treatment materials at different temperatures for different intervals of time depended on type of used materials, squeezed, dried at room temperature and fixation in hot air oven then printed with natural dyes

Measurements

Measurements of Color Strength (K/S)

-Color measurements

The color strength of the printed fabrics was assessed by reflectance method, which is performed on Ultra-scan PRO spectrophotometer (Hunter Lab, USA) under illuminant D65, 10° standard observer. The color strength (K/S) in visible region of the spectrum (400–700 nm) was calculated based on Kubel kae–Munk equation shown below:

$$K/S = \frac{(1-R)2}{2R}$$

Where, (K) is adsorption coefficient, (R) is reflectance of dyed sample and (S) is scattering coefficient.

-Colorimetric data

The colorimetric parameters of all colored samples were measured using the CIELAB color spaces using a Hunter-Lab spectrophotometer (Hunter Lab DP9000).

The positive values of L*, a* and b* indicate the lightness, redness, and yellowness of the dyed fabrics, respectively.

Handle test

In textile testing, sensory evaluation would more typically be applied to sensations of sight (e.g., color, wrinkling) or touch (e.g., fabric handle properties). However, sensory evaluation detecting the presence and quality [14]

Color Fastness Test Methods

Color fastness of the prints to washing, perspiration and light was evaluated. Wash fastness (ISO 105-C02 (1989) was evaluated using the visual ISO Gray Scale for both color change (AATCC Evaluation Procedure (EP 1- similar to ISO 105-A02) and color staining (AATCC EP 2- same as ISO 105-A03). Light fastness (Xenon arc) was evaluated using ISO 105-B02. [15]

Colorfastness to washing

Color fastness in laundry was determined according to two major laundry detergent standards, ISO 105 C06. The stability test was performed in a washing machine (atlas - Germany). ISO 105 C06 method procedures 1. Use 5 g / L non-ionic detergent at 50 ° C for 45 minutes when solution 150. 3. The collected sample was removed and rinsed with a running tap. 4. It is squeezed, opened, and dried in the air. The evaluation of wash fastness was performed using the grey scale by change in color (for the test sample) and staining (for the adjacent specimen). [16]

Color Fastness to Perspiration

Color fastness perspiration test (acid and alkaline) were carried out according to international standard ISO 105-E04 2018. The effect on the color of the test specimen was evaluated by reference to Grey Scale for color change [17].

Light Fastness

The light fastness test was performed on printed samples according to ISO 105-B021988 test method using a xenon lamp.

Samples were exposed to a continuous light for 35 hours to determine the degree of color resistance for light photo-degradation. [18].

Absorption

The absorbency time test determines the suitability of a fabric for a particular use, as in the case of gauze or toweling. A drop of water is allowed to fall from a fixed height onto the taut surface of a test specimen. The time required for the water drop to disappear is measured and recorded as wetting time [19]

Ability to keep fragrances (Percentage of loss in weight)

-The % loss in weight gained was estimated by calculating, first the weight gained due to padding in the alcoholic solution of the perfume oil, as follows:

Weight loss = (A-B)

where A and B are the weights of the fabric after and after different intervals of storing time the perfume oil solution.

$$\% \text{ loss in weight} = \frac{\{(A-B)-(B-C)\} \times 100}{(A-B)}$$ [20]

Results and Discussions

Effect of pre-treatment on the K\S of Curcuma printed sample

To achieve the goal, the samples of different kinds i.e. (wool, cotton, and linen) were subjected to a pre-treatment bath with respect to the following Chart and detailed in the experiment section in picture {1}

Effect of different concentrations of alum on the K\S of the treated fabrics.

The pre-treatment samples were subjected to Mordant bath with different alum concentrations (10%,8%,5%) W.O.F

in addition to the Fragrant bath using ethanol as an alcohol with a concentration of 40 ml and jasmine oil of 2.25 ml

The Mordant bath was applied to the fabrics at L: R 1:50 for 60min at 60 ℃ all samples were squeezed and then subjected to immersed in the fragrant bath and then steamed at 100℃ for 3 min then all the treated samples were adjusted to direct screen-printing using Curcuma dye as detailed in the experimental section the modified sample was subjected to washing for either 5 times and\or 10 times before adjusting to K\S measurement as shown clearly in the previous chart

Color strength for sample washed for 5 times

In this part, the pre-treated printed sample was subjected 5 times washing then applied to K\S measurement, and the data were collected in Table (I)

As clear from the data of the table (I) that the K\S of the treated sample were found to depend on

a) kind of fabric used

B) The concentration of alum used in the Mordant bath

It is also clear that the modification bath has a remarkable effect on the K\S of the fabrics i.e., all samples in question are characterized by a K\S value lower than that of the standard sample irrespective of the kind of fabric used.

In all cases studied it was found that at a concentration of 10 % W.O.F alum (standard condition), the sample acquired higher K\S values, this observation was found clearly in all kinds of fabrics.

This observation was expected since alum is known as a natural mordant for printing especially with natural dye as it compacts on the dye to form a complex film with the dye on the surface of the fabrics

Subjecting the samples to 5 times washing improves their handle to a little extent, these phenomena were found to be depending on the kind of fabric used

i.e., in case of the cotton sample the treatment cause softness to all the examined cases while in case of linen the treatment didn't affect the handle i.e. the samples still characterize by a harsh filling

in case of wool sample increase the conc. of alum more than 8% is accompanied by a handle in the softness of the fabric these phenomena may be due to that at higher conc. Form complex with higher molecular weight in the surface of the fabric, this sticky film (compared to the unabsorbed tied molecule) was compacted with the fabric in a form to be difficult to isolate by only 5 times washing

Color strength for sample washed 10 times

In this part, the pre-treated printed sample was subjected 10 times washing then applied to K\S measurement, and the data were collected in Table (II)

As shown from the data of Table (II) all samples in question are characterized by K\S which is higher than that blank in all kind of fabrics and also the standard sample recorded the highest value in all kinds of fabrics, this shows us that increasing the concentration of the alum conc. has an effect on the intensity of the color.

It's well observed that the concentration of 10% W.O.F alum acquires the highest K\S of fabrics used.

Table (II) also classified that in all cases studied the K\S were found to be less than that of Table (I), This observation was expected since repeating time of washing cases a slight degradation in color especially in natural color printing

It is also clear from the data in table (II) that all treated samples characterized by a difference in handle especially when compared to the blank sample

The handle test was applied using sensory evaluation.

In all cases studied the data showed that treating fabrics with the mordant bath followed by the fragrance bath then printed and fixed ended with washing for 10 times case softness to all kinds of fabrics i.e., Wool, cotton, and linen except standard sample for linen This is the result of the different textile compositions of the fibers

These phenomena prove that the modification bath increase the affinity of the fabrics to absorb the printed film and hence reduce the harsh filling caused by the printed process.

The softness was found to be clear in the fabrics irrespective of their kind especially when compared to the blank sample

Also repeating the washing process for 10 times increase the softness without causing a remarkable decrease the K\S values which indicate a higher stability of the printed film on the surface of the modified sample

Effect of change in time of fragrant bath on the fastness properties of the treated fabrics.

The pre-treatment sample were subjected to alum bath concentration 10% W.O.F for a time 60 min in addition to using ethanol as an alcohol with concentration of 40 ml and 2.25 ml of jasmine oil for (30,60,90) min

The pretreated bath was applied to the fabrics at L: R 1:50 at 60 ℃ followed by the Fragrance bath as shown clearly in the previous chart

Fastness properties for sample washed for 5 times

In this part, the pre-treated printed sample was subjected 5 times washing then applied to Fastness properties measurement, and the data were collected in Table (III)

Here after 5 time washing the wool sample's fastness properties to washing are very good and in light is excellent and very good on Acid and alkaline perspiration

also, the cotton sample's fastness properties to washing are very good and in light is excellent and very good on Acid and alkaline perspiration

and the linen sample's fastness properties to washing are very good and in light is excellent and very good on Acid and alkaline perspiration

its notice well from the results that for all types of fabrics, the blank sample is the weakest result in washing and light and perspiration, unlike the standard sample, which shows the best results

Fastness properties for sample washed for 10 times

In this part, the pre-treated printed sample was subjected 10 times washing then applied to fastness properties measurement, and the data were collected in Table (IV)

Here after 10 time washing the wool sample's fastness properties to washing are good and in light is good and good on Acid and alkaline perspiration also, the cotton sample's fastness properties to washing are good and in light is good and good on Acid and alkaline perspiration

and the linen sample's fastness properties to washing are good and in light is good and good on Acid and alkaline perspiration

Also repeating the washing process for 10 times decrease the fastness properties values which indicate a higher stability of the printed film on the surface of the modified sample

also classified that the 10 times washing in all cases studied the fastness properties were found to be less than that of the 5 times washing, this observation was expected since repeating time of washing cases on slight degradation in fastness properties

its notice well from the results that for all types of fabrics, the blank sample is the weakest result in washing and light and perspiration, unlike the standard sample, which shows the best results

Effect of pre-treatment two bathes on the absorption of the modified fabrics

Three kinds of fabrics i.e., (wool, cotton, and linen) were subjected to two bathes pretreatment process, as detailed before all prepared samples were subjected to an absorption test after wasting for one time only

Effect of alum conc. on the absorption of the modified fabrics

Here we examine at table (VI) the effect of different concentrations of alum in the pretreatment bath This experiment consists of two baths, the first bath is the mordant bath, which contains Water and Alum at a temperature of 60 ℃and the sample

The concentration of alum was (10%-8% and 5%) w.o.f.

Then after a 60 min with continuous Flipping the samples were squeezed and then immersed in the fragrant bath

This fragrant bath contains jasmine oil and ethanol alcohol

The sample is placed for 30 min in a covered container to ensure that the alcohol does not volatilize with constant stirring

Finally, the samples were dried and installed in an oven device at a temperature of 100 ℃ for 3 minutes.

Then modified samples were subjected to using a natural printing paste flat silk screen printing

Then fixation is carried out in a hot steamer at 100 ℃for 15 minutes

Then the samples were subjected to an absorption test using the absorbency time test as detailed in the experimental section

As clear from the data of table (VI) it's found that the efficiency of the absorption time of fabrics varies completely.it is observed that absorption time depends on

a) the kind of fabric used

b) the conc. of alum in the mordanting bath

When comparing the absorption time of the three fabrics on question the data shows that the absorption followed the order of cotton ≥ wool ≥linen

These phenomena hold true in all cases studied

The high absorption time for cotton fabrics was expected since the cotton cellulosic fabric is characterized by three hydroxyl groups in their un hydro glucose unite with a free primary hydroxyl group and the secondary groups. these groups cause the high performance for cotton fabrics to absorb water molecules while on modifying cotton fabrics with mordanting bath comprise different conc. of alum their absorbency decreases

the decrease in cotton efficiency for absorbing water molecule were expected due to the induce of

alum particles in the inner structure of the fabrics which decrease the inner space parts in the morphological structural of the cellulose fabric and hence decrease their efficiency to absorb water drop

in case of wool fabrics, the absorption time was found to be decreased in compared to that of cotton sample. these phenomena were expected since wool being a proteinic fabric with different kind of bonds and functional groups have to absorb water much earlier while comprising scales in their outer surface reduce its efficiency in absorbing water molecule This efficiency decreases also by introducing alum particles in their surface

Concerning linen fabrics, linen being a cellulosic fabric has a cotton like structure while the high precent of crystalline portion linen compared to the amorphas region, lead linen to absorb water much latter than cotton fabrics while introducing alum molecule into their surface and inter part increase their deficiency of absorption 3.3. Effect of pretreatment two bathes on the ability to keep fragrance (percentage of loss in weight) of the modified fabrics

Three kinds of fabric were selected in order to investigate their efficiency to retain the fragrance on their surface to achieve the goal the different fiber types i.e., (wool, cotton, and linen) were subjected to pretreatment in two different bathes as detailed before

The samples then printed and adjusted to percentage of loss in weight test to investigate the efficiency of the fabric to comprise the jasmine oil molecules in their surface as a result of modifying in difference baths

Effect of time of fragrant bath on the ability to keep fragrance for the modified fabrics

The pretreated modified printed sample were subjects to measuring in weight for different intervals of times on freshly dried, after two weeks, one month, two month and three months respectively and the weight where then collected to calculate the % loss in weight the % loss in weight represent the efficiency of the fabric to hold over the oil molecules for long time

the data of weight loss calculated and illustrated in figure (1)(2)(3)

When we have a brief look on the previous table, we can easily illustrate that the efficiency of the fabric to retain the jasmine oil molecule differs depending on

a) kind of fabric used

b) time of storing

c) the conc. of alum used in mordanting bath

comparing the % loss in weight in table we can easily investigate that the difference of the fabric to comprise the oil follow the order of

cotton≥ wool ≥linen

while storing time cause a decrease in weight which indicate a decrease in fabric efficiency to retain fragrance while this phenomics holds true in all standard sample with their different kinds

while modifying cotton samples with difference conc. of alum cause a remarkable increase in the ability of, the fabric to retain the jasmine oil for a long period of time which clearly shown in the % loss in weight

by adjusting the sample to store two weeks, one month and two months at change in time (30,60, and 90) min

The high performance of modified cotton fabric in retaining the jasmine oil was expected These phenomena may be due to the high efficacy of cotton fabric to comprise the alum particles and hence absorb the oil molecule

the absorbs alum molecule can form capsulation like shape with jasmine oil particles which in terms attached to the fabric surface and hence reduce its ability to volatile which in term increase the efficacy of treated fabrics to comprise and retain the fragrance jasmine oil in their surface for long period of time

this capsulation form increases the retiming time of cotton sample

the efficacy of the cotton fabrics to retain fragrance was repeated in case of wool and linen fabrics but in a lower form

these phenomena were expected science

the efficiency of the letter to absorb alum are smaller than that in case of cotton fabrics as detailed before

Conclusion

Given the data attached to the research on the pre-treatment experience

We found that increasing the concentration of alum increased the color intensity of the fibers, especially for wool fibers, and this is a result of the strength of the fibers and their properties.
Also, the result of repeated washing led to a slight weakness in the color intensity, but when you try the fragrant % loss in weight
We found that the microencapsulation occurred between the fibers successfully, and the capsules retained the oil inside their collar, thanks to the presence of the alum, which helped them to be imported for more than 3 months.

It has also been noted that cotton, wool, and linen fibers have a stable odor within the fabric for the longest possible period, up to three months, against washing, light, and sweat.

The use of natural dyes and preparation of perfumes with environmentally friendly natural materials has led to ensuring the sustainability of the environment for future generations, reducing pollution resulting from textile printing, overcoming the problems of using synthetic colorants, synthetic thickeners, and synthetic fabrics on the environmental balance and human health and improving the function, health properties and quality of the resulting fabrics. Maintaining the environmental balance. Increasing the durability and service life of treated fabrics. Get K/S printed fabrics, overall fastness, absorbency, fragrance testing, and handle properties

Pictures:

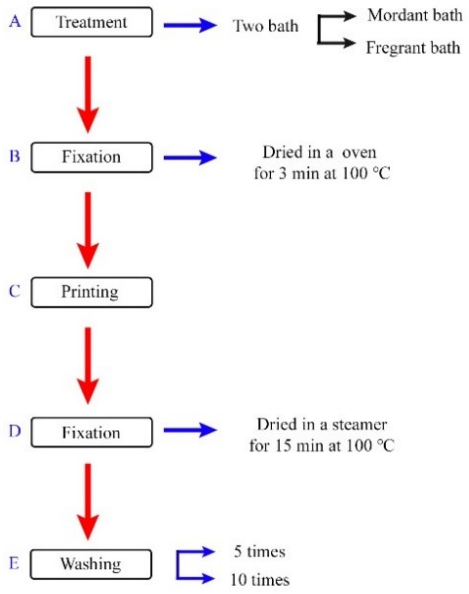


Table (I) Effect of different concentrations of alum on the K\S of the treated fabrics after 5 washing

Cons. of alum %	handle	K/S	(CIE Lab)			
Wool			L*	a*	b*	ΔE
0(blank)	harsh	1.14	81.29	-5.80	29.12	0
5	soft	4.00	38	-6	-36	39
8	soft	4.56	38	-6	-34	39
10 (standard)	harsh	4.78	38	-8	-33	38
Cotton			L*	a*	b*	ΔE
0(blank)	harsh	1.52	81.29	-5.65	26.19	0
5	soft	3.50	43	-8	-37	26
8	soft	3.70	43	-8	-36	26
10 (standard)	soft	3.87	41	-7	-35	2
Linen			L*	a*	b*	ΔE
0(blank)	harsh	1.56	80.43	-2.24	20.62	0
5	harsh	3.77	42	-9	-38	36
8	harsh	3.88	42	-9	-39	36
10(standard)	harsh	3.98	40	-8	-36	37

Table (II) Effect of different concentrations of alum on the K\S of the treated fabrics after 10 washing.

Cons. of alum %	Handle	K/S	(CIE Lab)			
Wool			L*	a*	b*	ΔE
0(blank)	harsh	1.55	81.29	-5.80	29.12	0
5	soft	3.44	53	-9	-38	27
8	soft	3.57	51	-9	-37	27
10(standard)	soft	3.70	50	-8	-36	27
Cotton			L*	a*	b*	ΔE
0(blank)	harsh	1.54	81.29	-5.65	26.19	0
5	soft	2.77	55	-8	-35	28
8	soft	2.87	55	-8	-36	28
10(standard)	soft	3.00	54	-8	-35	27
Linen			L*	a*	b*	ΔE
0(blank)	harsh	1.60	80.43	-2.24	20.62	0
5	soft	2.73	55	-9	-34	36
8	soft	3.10	54	-7	-34	36
10(standard)	harsh	3.33	54	-7	-34	36

Table (III) effect of time of fragrant bath on the overall fastness properties of the printed sample for 5-time washing

Time of essential oil(min.)	Fastness properties						
	Washing		Light	Acidic Perspiration		Alkaline perspiration	
	St.	Alt.		St.	Alt.	St.	Alt.
wool							
0(blank)	2-3	2-3	2-3	2	2	2	2
30(standard)	4	4	6-7	4-5	4-5	4-5	4-5
60	4-5	4-5	6-7	4-5	4-5	4-5	4-5
90	4-5	4-5	6-7	4-5	4-5	4-5	4-5
cotton							
0(blank)	2	2	2	1-2	1-2	1-2	1-2
30(standard)	3-4	3-4	4-5	4	4	4	4
60	4	4	4-5	4	4	4	4
90	4	4	4-5	4	4	4	4
linen							
0(blank)	2	2	2	2	2	2	2
30(standard)	4	4	5	4-5	4-5	4-5	4-5
60	4-5	4-5	5	4-5	4-5	4-5	4-5
90	4-5	4-5	5	4-5	4-5	4-5	4-5

Table (IV) Effect of time of fragrant bath on the fastness properties of the treated fabrics after 10 washing.

Time of essential oil(min.)	Fastness properties						
	Washing		Light	Acidic Perspiration		Alkaline perspiration	
	St.	Alt.		St.	Alt.	St.	Alt.
Wool							
0(blank)	2	2	2	2	2	2	2
30(standard)	3-4	3-4	3-4	3-4	3-4	3-4	3-4
60	3-4	3-4	3-4	3-4	3-4	3-4	3-4
90	3-4	3-4	3-4	3-4	3-4	3-4	3-4
cotton							
0(blank)	2	2	2	1-2	1-2	1-2	1-2
30(standard)	3	3	3	3	3	3	3
60	3	3	3	3	3	3	3
90	3	3	3	3	3	3	3
linen							
0(blank)	2	2	2	2	2	2	2
30(standard)	3-4	3-4	3-4	3-4	3-4	3-4	3-4
60	3-4	3-4	3-4	3-4	3-4	3-4	3-4
90	3-4	3-4	3-4	3-4	3-4	3-4	3-4

Table (VI) Effect of time of fragrant bath on the ability to keep fragrance for the modified fabrics

Cons. of alum %	Absorb time
wool	
0(blank)	1.80sec
5	1.87 sec
8	4.37 sec
10(standard)	8.85 sec
cotton	
0(blank)	1.69sec
5	1.71 sec
8	2.61 sec
10(standard)	2.74 sec
linen	
0(blank)	5.00sec
5	5.13 sec
8	6.52 sec
10(standard)	13.76 sec

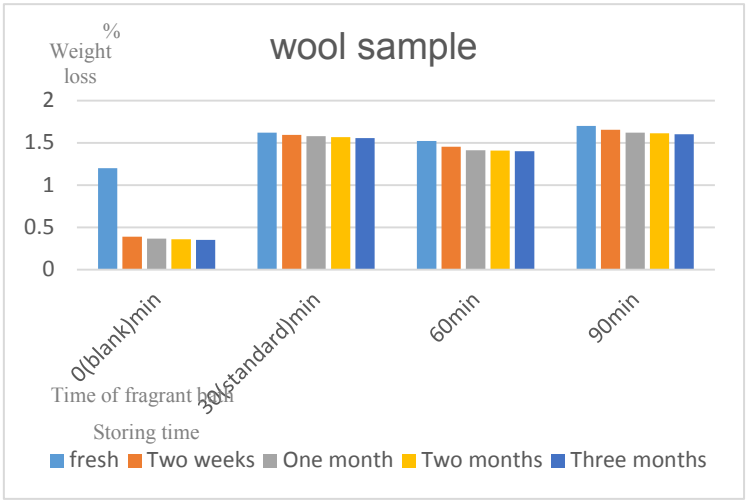


Figure 1. effect time of fragrant bath on the ability to keep fragrance (percentage of loss in weight) for the wool fabrics

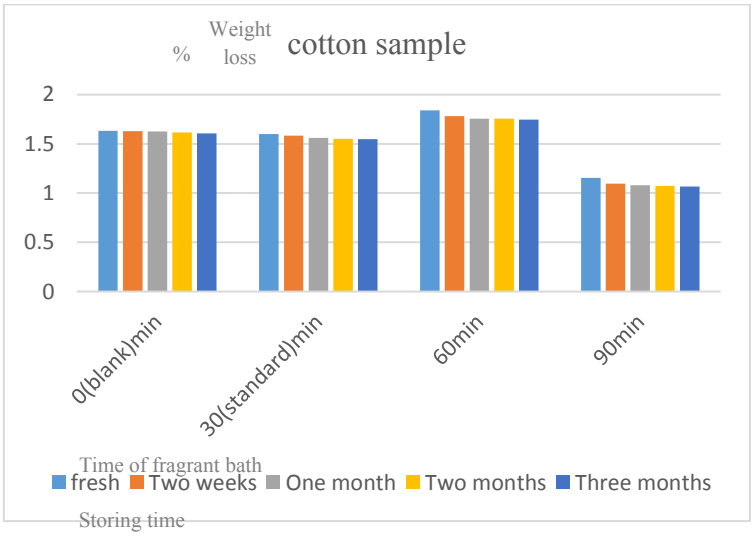
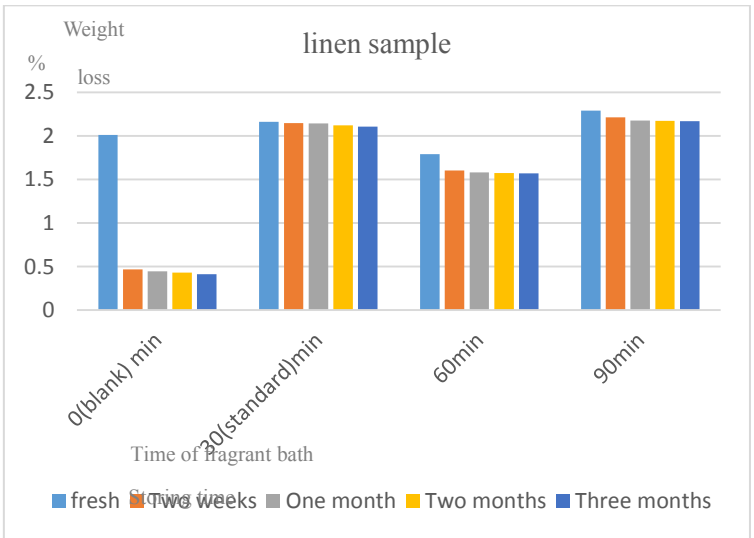


Figure 2. effect of time of fragrant bath on the ability to keep fragrance (percentage of loss in weight) for the cotton fabrics



N: B the samples were subjected to one time washing
N: B the storing takes place in plastic Bag
Figure 3. effect of time of fragrant bath on the ability to keep fragrance (percentage of loss in weight) for the linen fabrics

References

1. Y. G. T. Girijappa, S. M. Rangappa, J. Parameswaranpillai and S. Siengchin “Natural Fibers as Sustainable and Renewable Resource for Development of Eco-Friendly Composites: A Comprehensive Review” September 2019
2. A. Wegier, V. Alavez , and D. Piñer “Cotton: Traditional and Modern Uses ” Chapter 18 , April 2016
3. S. Kumar” Physical-Chemical Structure of Cotton”2023
4. Rippon, J. A. “The Structure of Wool” Chapter 1,1992
5. L. Yan, N. Chouw, and X. Yuan, "Improving the mechanical properties of natural fiber fabric reinforced epoxy composites by alkali treatment," Journal of Reinforced Plastics and Composites, p. 0731684412439494, 2012.
6. Zhou, J., The Principles and Framework of Research on Digital Jacquard Fabric, J. of Textile Res., 24(3), 17-19 .2003.
7. L. Yan, N. Chouw, and X. Yuan, "Improving the mechanical properties of natural fiber fabric reinforced epoxy composites by alkali treatment," Journal of Reinforced Plastics and Composites, p. 0731684412439494, 2012.
8. M. A. Fuqua, S. Huo, and C. A. Ulven, "Natural fiber reinforced composites," Polymer Reviews, vol. 52, pp. 259-320, 2012.
9. D. M. Hamdy, H. A. Othman and A. G. Hassabo “Various Natural Dyes from Different Sources” J. Text. Color. Polym. Sci., Vol. 18, No. 2, pp. 171-190 .2021
10. E.S. Nwadiokwu, C. S Ezeanyanaso and D.A. Akinboade” APPLICATION OF TURMERIC DYE (CURCUMIN) ON COTTON FABRICS” Vol. 5, Issue 6. June 2019
11. A.A. Ragheb, S. Tawfik, J.I.Abd –El Thalouth, M.M.Mosaad” Development of printing natural fabrics with Curcuma natural dye via nanotechnology”1992
12. Astuti K” Surveying consumer acceptance of textile products with fragrance finish: A detailed review “2021
13. C. S. N. Rodrigues Teixeira “Microencapsulation of Perfumes for Application in Textile Industry”2010
14. Neves, J. S. M. F. "Tecnologia Têxtil–Matérias-primas Têxteis." Porto. Livraria Lopes da Silva Editora .1982
15. S. Saleh Mansour. "Antibacterial activity and ultraviolet (UV) protection property of some Egyptian cotton fabrics treated with aqueous extract from banana peel." African Journal of Agricultural Research 8.29 .2013
16. ISO. Textiles — Tests for Colour Fastness —Part C06Colour Fastness to Domestic and Commercial Laundering. international Standard, Switzerland Www.Iso.org, 2010
17. ISO. Textiles -- Tests for Colour Fastness -- Part B01Colour Fastness to Light Daylight. international Standard, USA Www.Iso.org, 2014.
18. "ISO (1988) Textiles Tests for Colour Fastness Colour Fastness to Artificial Light." N.D
19. CNS 13905 L3246 clause 5.1.1
20. J.I. Abd –El Thallous*, A.H. Naser and N. G. Gaber” Combined Printing and Creation of A “Host-Guest” Functional Textile for Depositing Fragrance” Egypt. J. Chem. 59, No.1, pp. 1–19 (2016)

طباعة اقمشه معطرة صديقة للبيئة

جاكلين ابراهيم عبد الثالوث [1] ، نانسي سيد صبح محمود الهواري [2] و مروة سعيد محمد محمود السرتي [1]

[1] جامعة حلوان - كلية الفنون التطبيقية - قسم الطباعة والصباغة والتشطيب – الجيزة – مصر.

[2] المركز القومي للبحوث - 33 شارع البحوث (شارع التحرير سابقاً) - الدقي - ص.ب. 12622- الجيزة - مصر.

الهدف من هذه الدراسة هو إنتاج أقمشة مستدامة وصديقة للبيئة ومناسبة للبرنامج التجريبي الحالي، وذلك باستخدام الأقمشة الطبيعية والمواد الطبيعية والأصباغ الطبيعية والزيوت العطرية الطبيعية. باستخدام الطباعة المباشرة على قماش الشاشة الحريرية

وقد لوحظ ان الالياف القطنيه والثوف والكتان لهم ثبات الرائحة داخل القماش لأطول فترة تصل الي ثلاث اشهر ممكنة ضد الغسيل والضوء والعرق.

وان استخدام الصبغات الطبيعيه والتجهيز بالعطور بمواد طبيعيه صديقه للبيئه ادي الي ضمان استدامة البيئة للأجيال القادمة، والحد من التلوث الناتج عن طباعة المنسوجات و التغلب على مشاكل استخدام الملونات الاصطناعية والمكثفات الاصطناعية والأقمشة الاصطناعية على التوازن البيئي وصحة الإنسان و تحسين الوظيفة والخصائص الصحية وجودة الأقمشة الناتجة مع الحفاظ على التوازن البيئي.و زيادة متانة الأقمشة المعالجة وعمر الخدمة الافتراضي. احصل على الأقمشة المطبوعة K/S، وخصائص الثبات الشامل، والامتصاص، واختبار العطر.