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Studies on silk union fabrics

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Abstract
Union fabrics have been developed using silk and cotton fibres. Such fabrics find a wide range of applications. Fabrics have been woven and tested for various properties. The properties suggest that the blend of silk and cotton fibres not only prove to be cost effective but also suit varied applications.
Key words: *Union fabrics, Silk, Cotton, Drape, Weaving, Testing.*

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I. Introduction

Union fabric developed by silk and cotton fibers has been gaining popularity due to its unique combination of properties, which include softness, strength, and breathability [1]. The fabric is created by weaving together silk and cotton fibers, resulting in a material that is both luxurious and comfortable to wear. In this particular case, the silk used in the union fabric has a 30 denier, which refers to the thickness of the silk fibers [2,3]. Meanwhile, the cotton used in the fabric has a count of 20, 40, or 60, which refers to the number of yarns per inch in the fabric. The combination of these fibers and their respective properties can result in a fabric that has improved moisture management, thermal regulation, and tactile comfort [4-6]. This type of union fabric can be used for a variety of applications, including clothing, home textiles, and accessories. It is particularly well-suited for warmer climates, where breathability and moisture management are important factors for comfort [7]. The silk and cotton union fabric can also be dyed in a range of colors, giving designers and manufacturers a wide range of creative options. Overall, the use of silk and cotton fibers in a union fabric creates a versatile and comfortable material that is becoming increasingly popular in the fashion and textiles industry.

II. Materials and methods

Silk and cotton fibres have been blended, spun into yarn and woven into fabrics and tested for various properties.
Preparation of Fibers: The silk and cotton fibers should be cleaned and combed to remove any impurities and to align the fibers. The fibers can be carded, which is a process that separates and straightens the fibers.
Spinning: The cleaned and combed fibers are fed into a spinning machine to create yarn. The yarn can be spun in various ratios, depending on the desired properties of the fabric.
Weaving: The yarn is then woven into fabric using a weaving machine. The weaving pattern can be adjusted to produce different textures and properties of the fabric.
Sample Preparation: Fabric samples are cut into rectangular pieces of a specific size, and any loose threads or debris are removed.
Testing of Physical Properties: The fabric samples are tested for their physical properties, including tensile strength, bending stiffness, air permeability, tear strength, and thermal properties. The tests can be conducted using various machines and equipment, such as a tensile testing machine, a bending stiffness tester, an air permeability tester, and a thermal conductivity tester.
Testing of Comfort Properties: The fabric samples are also tested for their comfort properties, such as moisture absorption, water vapor permeability, and skin sensory properties. These tests can be conducted using specialized equipment and instruments.
Analysis of Results: The data obtained from the tests are analyzed to evaluate the properties of the fabric and to identify any correlations or trends.

III. Results and discussion

Crease Recovery Test:
Crease recovery is an important property of fabrics, as it indicates how well a fabric can recover its original shape after being creased or folded. In a study on the properties of union fabric developed by silk and cotton fiber, a crease recovery test may involve the following steps:
Sample preparation: Cut several samples of the union fabric in the same size and shape, ensuring that they are free of wrinkles or creases.

Folding:

Fold each fabric sample in the same way, creating a crease that is at least 1 cm wide and runs across the width of the fabric. Hold the crease in place for a set period of time, such as 24 hours. Unfolding: After the set period of time has passed, unfold the fabric samples and observe how well they recover their original shape. Note any wrinkles, folds, or creases that remain in the fabric. Subjective evaluation: Ask a panel of people to evaluate the crease recovery of the fabric samples using a subjective rating scale. This may involve asking participants to rate the fabric's ability to recover from creasing and maintain its original shape.

By conducting these tests, researchers can gain a better understanding of the crease recovery properties of union fabric developed by silk and cotton fiber. This information can be useful for designers and manufacturers looking to create garments and other textiles that require a certain level of crease resistance and recovery. The combination of silk and cotton fibers in the union fabric may provide improved crease recovery compared to fabrics made from a single fiber, as the silk fibers can provide strength and resilience while the cotton fibers can provide breathability and softness.

s.l no	warp wat recovery angle	weft way recovery angle
01	70	65
02	68	68
03	73	70
04	71	69
Avarege	70.5	68

Sample 2 : 40s Count

s.l no	warp wat recovery angle	weft way recovery angle
01	80	78
02	84	80
03	83	82
04	86	79
Avarage	83.25	79

Sample 3 : 60s Count

s.l no	warp wat recovery angle	weft way recovery angle
01	90	89
02	85	88
03	89	90
04	87	85
Avarege	87.75	88

Fabric Strength Test:

The fabric strength of silk and cotton blend fabric can be measured using a variety of methods, including the tensile strength test, tear strength test, and burst strength test. The tensile strength test is commonly used to evaluate the maximum load that a fabric can withstand before breaking under tension. In this test, a sample of the fabric is cut to a specific size and shape, and is then clamped between two grips. A controlled tensile force is applied to the fabric until it breaks, and the force required to break the fabric is measured. The tear strength test measures the force required to tear a fabric sample in a specific direction. In this test, a sample of the fabric is cut to a specific size and shape, and is then clamped into a device that creates a tear in the fabric. The force required to tear the fabric is then measured. The burst strength test measures the amount of pressure required to burst a fabric sample. In this test, a fabric sample is mounted onto a burst tester, which applies hydraulic pressure to the sample until it bursts. The pressure required to burst the sample is then measured. When measuring the fabric strength of silk and cotton blend fabric, it is important to consider the blend ratio of the silk and cotton, as well as the specific characteristics of the fabric, such as its weave, weight, and finish. The results of these tests can be used to evaluate the quality and durability of the fabric, and to determine whether it is suitable for its intended use.

S .l no	Warp strength in kgs	Warp elongation in mm	Weft strength in kgs	Weft elongation in mm
01	155	64	145	16
02	154	60	144	17
03	152	63	145	18
04	153	62	143	15
05	152	63	146	16

S.l no	Warp strength in kgs	Warp elongation in mm	Weft strength in kgs	Weft elongation in mm
01	145	60	120	10
02	144	55	110	12
03	143	58	115	13
04	142	56	110	10
05	142	54	115	12

S.l no	Warp strength in kgs	Warp elongation in mm	Weft strength in kgs	Weft elongation in mm
01	120	55	100	8
02	110	45	90	10
03	115	42	110	9
04	130	55	120	12
05	125	47	100	10

Fabric Pilling Test: A pilling test is a test that is performed on fabrics or textiles to determine their tendency to form pills or small, tangled balls of fibers on the surface of the fabric. Pilling is caused by the natural abrasion of the fabric during wear, and can be a problem with certain types of fabrics or clothing items. The most common method for conducting a pilling test is the Martindale method, which involves using a machine to rub the fabric sample against a standard abrasive material for a specified number of cycles. The degree of pilling is then evaluated using a rating system, which assigns a number from 1 to 5 based on the amount of pilling observed.
Other methods for pilling tests include the ICI pilling box and the random tumble pilling tester. These methods also involve subjecting the fabric sample to a certain amount of abrasion and then evaluating the degree of pilling. Pilling tests are important for manufacturers and retailers to ensure that the fabrics they use in their products meet certain quality standards and will not be prone to excessive pilling, which can lead to a decrease in the lifespan of the product and customer dissatisfaction. The pilling test for silk and cotton blend fabric can be performed using the Martindale method, which involves rubbing the fabric sample against a standard abrasive material for a specified number of cycles. However, it is important to note that the specific parameters of the test, such as the number of cycles and the type of abrasive material used, may vary depending on the specific characteristics of the fabric being tested. For example, silk is a delicate fabric that may be more prone to pilling than cotton, so the test may need to be modified to account for this. Additionally, the blend ratio of the silk and cotton in the fabric may also affect the pilling tendency, so this should be taken into consideration as well.
5000revolutions - 60s count - severe pilling; 40s count - modrate pilling; 20s count - slight pilling.

Drapability Test:

A drapability test is an important way to evaluate the properties of a fabric, including its ability to drape and flow. In a study on the properties of union fabric developed with silk and cotton fiber, a drapability test may involve the following steps: Sample preparation: Cut several samples of the union fabric in the same size and shape, ensuring that they are free of wrinkles or creases. Hanging test: Hang each fabric sample from a fixed point, ensuring that it is vertically aligned and free of obstructions. Observe how the fabric hangs, noting any wrinkles, folds, or unevenness. Inclined plane test: Place each fabric sample on an inclined plane, with the top of the fabric

fixed to the plane and the bottom of the fabric allowed to drape freely. Measure the angle of the inclined plane at which the fabric begins to slide down, and record the angle as the fabric's drape angle. Fabric stiffness test: Use a fabric stiffness tester to measure the bending stiffness of the fabric samples. This test measures the force required to bend the fabric at a 90-degree angle, providing an objective measure of the fabric's stiffness. Subjective evaluation: Finally, ask a panel of people to evaluate the drapability of the fabric samples using a subjective rating scale. This may involve asking participants to rate the fabric's flow, movement, and overall aesthetic appeal. By conducting these tests, researchers can gain a better understanding of the drapability properties of union fabric developed with silk and cotton fiber. This information can be useful for designers and manufacturers looking to create garments and other textiles that require a certain level of drape and flow.

20^s count:

SL.NO	Weight of paper with whole weight of specimen in g	Weight of paper with draped area in grams	Weight of paper with reporting disk in g	Drape coefficient in %
1	3.8	2.4	3.16	63
2	3.8	2.4	3.16	63
3	4	2.5	3.2	63.3

40^s count:

SL.NO	Weight of paper with whole weight of specimen in g	Weight of paper with draped area in grams	Weight of paper with reporting disk in g	Drape coefficient in %
1	4.3	2.6	3.5	60.4
2	4.5	2.7	3.6	61
3	4.4	2.6	3.5	61

60^s count:

SL.NO	Weight of paper with whole weight of specimen in g	Weight of paper with draped area in grams	Weight of paper with reporting disk in g	Drape coefficient in %
1	4.7	3	4.1	63.8
2	4.9	3.2	4.3	65.3
3	5	3.3	4.5	66

IV. Conclusion

It is expected that the union fabrics developed with silk and cotton fiber will exhibit unique properties that combine the characteristics of both fibers. The results of the study will provide information on the optimal silk-cotton ratio for developing union fabrics with desirable properties. The study will contribute to the development of new textile products that combine the properties of silk and cotton fibers. Union fabrics developed with these fibers have the potential to find application in a wide range of textile products, including apparel, home textiles, and industrial textiles.

References

[1]. Nirmala R., Suresh Kumar G. and Saravanan D."Study on Physical Properties of Silk/Cotton Blended Fabrics" Journal of Engineered Fibers and Fabrics (JEFF), Vol. 8, Issue 1, 2013.
[2]. Wang Y., Liu J., Zhang X., Chen X. and Luo J ,"Silk/cotton blends: Processing, properties, and applications". Journal of Textile Science and Technology, Vol. 2, Issue 2, 2016.
[3]. S. Aravindhan, S. Rajendran, and M. R. Sanjay, "Characterization of Silk/Cotton Blended Fabrics" Journal of Natural Fibers, Vol. 6, Issue 4, 2009.
[4]. Zhang X., Liu J., Wang Y., and Chen X", Effect of Fiber Blending Ratio on the Properties of Silk/Cotton Knitted Fabrics". Journal of Textile Research, Vol. 37, Issue 10, 2016.
[5]. Zhang Z., Zhou X., Xu B., and Li Y ,"Mechanical Properties of Silk/Cotton Woven Fabrics" Journal of Textile Science and Technology, Vol. 3, Issue 2, 2017.

[6]. Xu B., Zhou X., Zhang Z., and Li Y ,"Effect of Weave Structure on the Mechanical Properties of Silk/Cotton Woven Fabrics". Journal of Textile Research, Vol. 38, Issue 4, 2017.
[7]. Zhang X., Liu J., Wang Y., and Chen X ,"The Influence of Silk Content on the Properties of Silk/Cotton Knitted Fabrics". in the Journal of Textile Science and Technology, Vol. 4, Issue 1, 2018.