

Scouring of Blended Textile Materials: A Review

Goutam Bar^{1,2*} and Kavita Chaudhary¹

¹Banasthali Institute of Design, Banasthali University, India

²Department of Textile Design, National Institute of Fashion Technology, India

ISSN: 2578-0271



***Corresponding author:** Goutam Bar,
Banasthali Institute of Design, Banasthali
University, Banasthali, Rajasthan, India

Submission:  August 09, 2022

Published:  August 26, 2022

Volume 7 - Issue 1

How to cite this article: Goutam Bar, Kavita Chaudhary. Scouring of Blended Textile Materials: A Review. Trends Textile Eng Fashion Technol. 7(1). TTEFT. 000655. 2022. DOI: [10.31031/TTEFT.2022.07.000655](https://doi.org/10.31031/TTEFT.2022.07.000655)

Copyright@ Goutam Bar. This article is distributed under the terms of the Creative Commons Attribution 4.0 International License, which permits unrestricted use and redistribution provided that the original author and source are credited.

Abstract

Different textile fibers contain various types of impurities with varied percentages. Textile materials with mono fiber components can be scoured according to their impurities. However, the scouring of blended materials depends on blend compositions. Blends with identical fiber components can be scoured easily, whereas scouring blended materials with unlike fibers requires a comparatively complex process. This review article summarised the scouring methods of different blended textile materials.

Keywords: Blended textile material; Impurities; Pre-treatment; Scouring

Introduction

Blended textile materials are materials in which two or more fiber components are present in the material structure. The characteristics of a blended material depend on several factors; among those, the fiber components, the blend ratio, and the blend homogeneity are the most important. Blending can be done in different stages like fiber blending during yarn spinning, yarn blending in case of plied yarn having yarns of varying fiber components, and fabric development having yarns of different fiber components. In the context of apparel and home textile products, blending is done to improve the aesthetics and functional properties of the fabric, such as wrinkle resistance, dimensional stability, elasticity, comfort, etc. Value addition to the product is another significant aspect of blending. Blending is also done to reduce the cost and enhance the durability of the materials [1].

The coloration of textile material starts with pre-treatments to remove impurities and improve the fiber's absorbency, which includes scouring and bleaching. Scouring plays a vital role in removing impurities from the fibers. The degree of pre-treatment required depends on the type of fiber, chemical composition, and impurities present in the material. Natural cellulosic fibers contain a higher percentage of impurities compared to manmade fibers. Fibers having higher lignin content requires a double bath pre-treatment process. Optimal pre-treatment of the textile material enables better whiteness, higher dye absorbency, solid dyeing effect, and better fastness properties of the textile materials. In the case of blended materials, combined scouring and bleaching can be done in the single-bath single-stage method, single-bath two-stage method, or double-bath two-stage method, depending on the blend components and their properties. Scouring of blended textile materials differs from the materials having single fibers. In the case of blended materials, impurities are to be removed from all the component fibers. The present article focuses on scouring different fiber-blended textile materials.

Impurities in the fibers

Fibers are grouped as manmade, lignocellulosic, cotton, silk, and wool fibers according to impurities present in the fibers. Manmade fibers have only added impurities like spin finishes. Lignocellulosic fibers contain lignin, pectin's, coloring matter, fats and waxes as impurities

[2]. Wool contains natural grease/ wax, fats, suint, acquired impurities like vegetable matters, dirt, wool burrs, etc. [3]. Cotton fiber contains 6 to 7 percent natural impurities such as natural oil, waxes, pectin, dirt, dust, vegetable matter, coloring matter, etc. [4]. Sericin is the significant impurities in the silk fiber, varying from 20-30 percent. Significantly less amounts of wax, inorganic matter, and starches are also in silk fiber.

Scouring of manmade/manmade fiber blends

The manmade fibers contain only added impurities, so a milder scouring process is sufficient [5]. Polyester/viscose blend is well-known and widely used for apparel products. Added impurities are removed from the polyester/viscose blended material by

treating with 5g/l non-ionic detergents in warm water for one hour [6]. Scouring of Polyester/acrylic blended materials can be done either in slightly acidic or alkaline pH with 0.5 to 1g/l non-ionic detergent for 30 minutes (Table 1). Acidic pH of 5-6 is maintained with acetic acid, and scouring is done at 60 °C. Alkaline pH of 7-8 is maintained using sodium carbonate, and processing is done at a relatively lower temperature (40-50 °C). Acrylic/viscose blended textile materials are scoured with 0.25% synthetic detergent for 30 minutes at 90 °C. The pH of the bath is maintained to 5.5-6 using 0.5% sodium acetate. With 2-5% synthetic detergent and 2-5% trisodium phosphate viscose/nylon blended materials are scoured at 70 °C for 30 minutes [7].

Table 1: Major blends.

Fiber Groups	Blends
Manmade/manmade	Polyester/acrylic, Polyester/viscose, Acrylic/viscose, Viscose/nylon
Cotton/manmade	Cotton/polyester, Cotton/viscose, Cotton/acrylic, Cotton/ nylon
Wool/manmade	Wool/polyester, Wool/nylon, Wool/acrylic, Wool/viscose, Wool/acetate
Wool/silk	Wool/silk
Manmade/silk	Polyester/silk
Cotton/ligno-cellulose	Cotton/linen, Cotton/jute, Cotton/ramie
Cotton/silk	Cotton/silk

Scouring of cotton/manmade fiber blends

Cotton/polyester and cotton/viscose blends are widely used in apparel. Cotton/polyester blended materials can be scoured in a jigger using 2 to 5g/l of sodium carbonate and 2 to 5g/l detergent at boiling temperature. 0.1% sodium hydroxide and 0.1% soap solution are used to scour viscose/cotton blended materials and treated for one hour at boiling temperature [7].

Scouring of wool/manmade fiber blends

Raw wool fiber contains approximately 50% impurities on the weight of raw wool fiber [8]. Before blending wool fibers, raw wool is scoured with mild alkali and non-ionic detergent at 40-50 °C in four different bowls having varied detergent and alkali concentrations. First bowl contains 0.8% detergent and 0.2% sodium carbonate. The second and third bowls contain 0.4% and 0.37% detergent, and the fourth bowl contains plain water [5]. Wool fiber blended textile material mainly contained combing and spinning oil [6]. Scouring of blended materials also depends on the blend percent. Polyester-rich polyester/wool blends can be scoured in open width form, whereas wool-rich blends are scoured in rope form. The scouring process is performed with 0.5 to 1% non-ionic detergent and 0.4g/l sodium carbonate at pH 8-9 for 30 minutes at 50 °C. Synthetic detergent can be used in lieu of sodium carbonate to prevent the degradation of wool in alkaline pH [7]. Polyester/wool knitted fabric is scoured in tubular form with 1.9% sodium carbonate and 4% soap solution for 25 minutes at ambient temperature. Wool/viscose blended textile materials are scoured with 3% non-ionic detergent and 1ml/l ammonia for 20 minutes at 45 °C. Scouring of wool/nylon blended materials are also done

with 1-3g/l sodium carbonate and 2-3g/l of non-ionic detergent at 50 °C [7].

Scouring of cotton/lignocellulosic fiber blends

Jute/cotton blended fabric was scoured in exhaust method using 4% sodium carbonate at 80 °C for varied times like 60, 90, 120 and 150 minutes. The result shows that increasing scouring time improved the fabric drapability due to removing the higher amount of impurities [9]. 45/55 cotton/linen blended fabric was scoured and bleached in a single stage using tetraacetythylenediamine (TAED) in a universal dyeing machine. Pretreatment was done with TAED-20mmol/l, H₂O₂ - 42mmol/l, EDTA-1g/l, Wetting agent-2g/l, Sodium phosphate - 0.2M at 70 °C for 40 minutes. The pH of the bath was adjusted to 7.2 [7]. Scouring of cotton/linen blended materials can also be done with 6.5g/l sodium carbonate at 60 °C [10].

Conclusion

As removing natural and additive impurities is the primary objective of scouring, selecting suitable chemicals and process parameters is of utmost importance. For additive impurities, mainly in manmade fibers scouring is done with non-ionic detergent at 50-70 °C. Scouring with non-ionic detergent at a slightly alkaline pH below 50 °C for 30 minutes removes impurities from the wool component in wool fiber blended materials. As the cotton component contains natural oils and waxes, cotton fiber blended materials are scoured with either sodium hydroxide or sodium carbonate and some wetting agent at around 80 °C. Lignocellulosic fiber blended materials can be scoured with sodium carbonate at 60-80 °C.

References

1. Ibrahim NA (2011) Dyeing of textile fibre blends. In book: Handbook of Textile and Industrial Dyeing, Woodhead Publishing Limited, Sawston, United Kingdom, pp. 147-152.
2. Patra AK (2016) Linen and its wet processing. Fiber Plants, pp. 65-84.
3. Hauser P (2015) Fabric finishing: pre-treatment/ textile wet processing. Textiles and Fashion, pp. 459-473.
4. Kan CW, Lam CF (2018) Atmospheric pressure plasma treatment for grey cotton knitted fabric. Polymers 10(1): 53.
5. Trotman ER (1984) Dyeing and chemical technology of textile fibres. Charles Griffin & Company Limited, Nottingham, UK.
6. Sah M, Gahlot M, More PK (2015) Process optimization of dyeing polyester/viscose blended fabric with annatto (*Bixa orellana*) seeds: An ecological dyeing process. International Journal of Tropical Agriculture 33(4): 3673-3677.
7. Karmakar SR (1999) Chemical technology in the pre-treatment processes of textiles. Elsevier, Amsterdam, Netherlands, pp. 86-131.
8. Ganguly D, Mondal C, Choudhury AKR (2015) Dyeing of wool silk and their blends in single bath dyeing process I. Asian Dyers 12(2): 46-52.
9. Nagaje VV, Indi YM, Deshpande RH, Nagla JR (2015) Studies in pre-treatments and dyeing of jute/ cotton blend. International Conference on Trends, Innovations & Market potential in Technical Textiles, Shanga Verlag publisher, pp: 18-23.
10. Li L, Li Q (2020) Combined scouring and bleaching of cotton/linen blends by a near-neutral activated peroxide system. Fibers & Textiles in Eastern Europe 6(144): 104-109.