



ANALYSIS OF DIFFERENT TREATMENTS OF MATERIALS INTENDED FOR MATTRESS COVERS

BOHM Gabriella¹, ŞUTEU Marius Darius¹, DOBLE Liliana¹, FETEA Lucian²

¹ University of Oradea, Faculty of Energy Engineering and Industrial Management, Department Textiles, Leather and Industrial Management, 410058, Oradea, România, E-mail: bohmgaby@gmail.com

² Lava Knitting srl, Eurobusiness Parc P.P.Carp street 23, 410605, Oradea, România, E-Mail: lucian@lavatextiles.com

Corresponding author: BOHM Gabriella, E-mail: bohmgaby@gmail.com

Abstract: *The study on the chemical treatment of mattress cover materials for domestic and medical use is particularly important to understand how these materials can be improved in terms of resistance to different factors and durability in different contexts. In this paper, the materials for making three mattress covers (two mattress covers for home use and one mattress cover for hospital/medical care) were treated and tested in order to obtain basic information about the chemical treatment of fibers in mattress covers. Chemical treatments applied to materials can significantly influence their quality, strength and durability. It is essential to achieve the desired performance depending on the use of the mattress cover. The tests performed have provided valuable basic information regarding the behaviour of treated materials under different conditions, giving a clearer picture of their strength and the potential benefits or disadvantages of the chemical treatments applied. We noticed that chemically treated materials showed greater stain resistance and are easier to clean compared to untreated ones. Also, chemical treatments have helped to increase the durability of materials, thus extending the life of mattress covers. We used materials such as cotton, polyester and microfiber to make the mattress covers, and then subjected them to various chemical treatments to test their resistance to various external factors, such as blood stains or other liquids.*

Key words: *mattress cover, chemical treatments, fibers, household, medical regimen.*

1. INTRODUCTION

It is essential that mattress cover manufacturers comply with safety and health standards in the fibre treatment process to minimise risks for users [1].

It is important that consumers are informed about the materials used in mattress production and that the chosen products meet the safety and health standards [2].

Changes in Californian furniture flammability testing rules have shifted the focus from foam products to their covers [3], so the prevalence of these additives in current mattress covers is an important unknown. "Certi-PUR-US" is an industry-based certification program requiring foam products to be free of heavy metals, PBDEs, TDCPP or TCEP ("Tris") flame retardants, as well as numerous flame retardant additives [4], [5].

Consumers may think that CertiPUR-US certified mattresses have undergone rigorous testing and do not contain hazardous substances [6].

2. MATERIALS AND METHODS

Natural fibers such as cotton, linen, wool and silk tend to be more comfortable due to their breathability and ability to absorb moisture. They can provide a pleasant sensation to the skin and may be more suitable for people with sensitive skin or allergies. On the other hand, synthetic fibers such as polyester or nylon are often preferred for certain characteristics, such as water resistance and quick drying. However, they can be less breathable and retain more heat compared to natural materials. Fibrous mixtures between natural and synthetic fibers can combine the advantages of both types of fibers, giving textile products properties that meet several requirements.

In this paper, the materials for making three mattress covers (two mattress covers for home use and one mattress cover for hospital/medical care) were treated and tested in order to obtain basic information about the chemical treatment of fibers in the new mattress covers.

The constituent components of the three mattress covers were each undersampled by cutting each layer and then it was proceeded to collecting the samples in small, labeled bags. Each sample was sampled over its entire layer depth, with section areas of approximately 1 - 2cm. This paper highlights the difference in finishing treatments, depending on the areas of use of knitted materials, intended for mattress covers [7].

All samples were made with a Motic Fig. 1 microscope, which is commonly used in research laboratories. They are known for their durability, precision optics and user-friendly interface.



Fig. 1: Motic microscope [7]

Table 1: Treatment of household cover (mattress) type 1

Treatment	LIKROLL
Recipe	Citric Acid 0.2% Elastofin STO501 1.4%, Temp:150 ⁰ C
Request width	229-231 cm
Request weight	267-278 gr/m ²
Composition	18% Viscose, 82%Pes
Color	Opera,Black, Basalt, Black

Table 2: Treatment of household cover (mattress) type 2

Treatment	LIKROLL
Recipe	Citric Acid 0.2% Elastofin STO501 1.4%, Temp:150 ⁰ C
Request width	229-231 cm
Request weight	354-369 gr/m ²
Composition	25% Viscose from Bamboo, 75%Pes
Color	Bleached, Natural, Maldive, Ciment



Fig. 1: Treated material for household cover (mattress) type 1

Fig. 2: Treated material for household cover (mattress) type 2

The main components of each mattress cover tested and their observed compositions are summarised in Tables 1, 2 and 3. The different components of the two mattress covers, for home use, which were mixtures of Citric Acid 0.2%, Elastofin STO501 1.4%, / pick-up 100% poids/weight control, Temp:1500C, compared to covers intended for hospital use, which have in their composition Citric Acid 0.2% Elastoin STO501 1.4% Tanabiotic 0.7%, Temp:1200C, are different and require immersion treatment, to get that 100% to 150% solution load.

Table 3: Treatment of cover (hospital mattress)

Treatment	PADDER
Supplements	Active Biotic
Recipe	Citric Acid 0.2% Elastofin STO501 1.4% Tanabiotic 0.7%, Temp:120 ⁰ C
Request width	239-241 cm
Request weight	340-354 gr/m ²
Composition	18% Viscose, 3,5% Elastne, 78,5%Polyester
Color	Natural, Nude

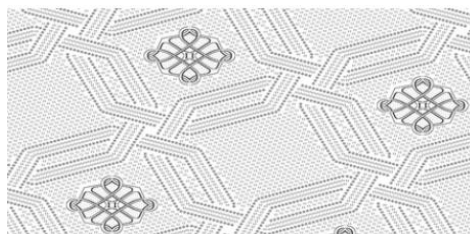


Fig. 3: Antiseptically treated cover material (mattress)

The tests performed showed that chemically treated materials showed increased stain resistance and were easier to clean compared to untreated materials. Chemical treatments have also helped strengthen the fibers and increase their durability.

It is important to note that chemical treatments can also have certain disadvantages, such as potential impact on the environment or possible harmful effects on the health of users. Therefore, it is advisable to use them responsibly and to use safe chemical treatment methods to maximize the benefits and minimize the risks.

3. CONCLUSIONS

This paper highlights the difference in finishing treatments, depending on the areas of use of knitted materials, intended for mattress covers.



In conclusion, chemical treatments can be beneficial for improving the quality and durability of mattress covers, and this information is valuable for textile manufacturers and end consumers alike.

It is also very important to properly educate consumers about the impact of chemicals on their health and the environment. Consumers should be aware of the potential risks associated with chemicals used in the products they purchase and be encouraged to opt for safe and sustainable products.

REFERENCES

[1] Bohm G., Şuteu, M.D., Doble, L., Fetea, L., Porav V. - "Comparative analysis of the treatments attached to the materials in the composition of the mattress covers" *Annals of the University of Oradea, Fascicle of Textiles, Leatherwork*, ISSN 1843-813X, Oradea, Volume 24, 2023, No. 2, pp. 19-22.

[2] Stapleton H.M., Klosterhaus S., Keller A., Ferguson P.L., van Bergen S., Cooper E., Webster T.F., Blum A. Identification of Flame Retardants in Polyurethane Foam Collected from Baby Products. *Environ. Sci. Technol.* 2011;45:5323–5331. doi: 10.1021/es2007462.

[3] BHGS (California Bureau of Household Goods and Services) Technical Bulletin 117-Residential Upholstered Furniture Standard Fact Sheet. [accessed on 03 aprilie 2024]; Available online: https://bhgs.dca.ca.gov/industry/tb_117_faq_sheet.pdf.

[4] AFPP (Alliance for Flexible Polyurethane Foam Inc.) CertiPur-US Technical Guidelines for Molded Foam. 20 November 2020. [accessed on 03 aprilie 2024]. Available online: <https://certipur.us/technical-guidelines>.

[5] Petreas M., Gill R., Takaku-Pugh S., Lytle E., Parry E., Wang M., Quinn J., Park J.-S. Rapid methodology to screen flame retardants in upholstered furniture for compliance with new California labeling law (SB 1019) *Chemosphere*. 2016; 152:353–359. doi: 10.1016/j.chemosphere.2016.02.102.

[6] SFDE (San Francisco Department of the Environment) FAQ for Retailers Selling Upholstered Home Furniture in San Francisco, Including Information about Flame Retardant Chemicals. 2018. [accessed on 03 aprilie 2023]. Available online: https://sfenvironment.org/sites/default/files/fliers/files/sfe_th_flame_retardants_faq_for_retailers.pdf

[7] Şuteu, M.D, Bohm G., Doble, L. - "Study on the treatment of textile materials for the manufacture of mattress covers" *Annals of the University of Oradea, Fascicle of Textiles, Leatherwork*, ISSN 1843-813X, Oradea, Volume 23, 2022, No. 2, pp. 71-74.