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**TRABAJO DE GRADO PREVIA LA OBTENCIÓN DEL
TÍTULO DE INGENIERA TEXTIL**

ARTÍCULO CIENTÍFICO (INGLÉS)

TEMA:

ACABADO PROTECTOR UV A BASE DE DIÓXIDO DE TITANIO
MEDIANTE LA ENCAPSULACIÓN CON NUVA TTC EN GÉNEROS DE
ALGODÓN

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Protector finish based UV Titanium Dioxide by encapsulation with Nuva TTC cotton goods

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Abstract. *The development work was done in order to obtain a UV protective finish on 100% cotton fabrics knit; because at present with human activity the ozone layer has been eroded, causing the UV rays from reaching directly to earth affecting human health, this work is something counteract this type of situation.*

Keywords

Finishing, impregnation, ultraviolet rays: UVA, UVB, UVC, temperature, bath ratio, pH.

Resumen. *El desarrollo del trabajo se realizó con la finalidad de obtener un acabado protector UV en géneros de algodón 100% en tejido de punto; porque en la actualidad con la actividad del hombre la capa de ozono se ha ido desgastando, provocando que los rayos UV lleguen de forma directa a la tierra afectando a la salud del ser humano, con este trabajo se contrarrestara en algo este tipo de situación.*

Palabras claves

Acabado, impregnación, rayos ultravioleta: UVA, UVB, UVC, temperatura, relación de baño, pH.

1. Introduction

This research aims to treat the cotton fabric (knitting) with titanium dioxide allowing this work and act as UV protector, giving additional information to the person using the treated material protection.

The method used for the development of this research was conducted by the impregnation, working with pressure until the amount of moisture required by the material, in this case working with a pick-up of 80%.

To determine the UV protection, measurement equipment was used as in the light meter, allowing this to obtain data that favor the development of research, with the respective measures in each range of ultraviolet radiation such as UVA, UVB, UVC, determining that the finish obtained acts positively, helping to care for the human being who is constantly exposed to ultraviolet radiation.

All the above measurements are made in a variety of colors to make a comparison between ultraviolet radiation ranges in terms of the amount of irradiance that is received between a treated with the detailed work on this process and untreated material, which allowed out determining percentages and UV protection.

Likewise it is essential to talk in terms of quality, since this depends on the value and acceptance that this work may have in the future, for that was washing tests, friction and

exposure to sunlight, the results to be favorable.

2. Materials and methods

To carry out this work was needed to perform an exhaustive search of information, starting with having the technical specifications of each product to be seized.

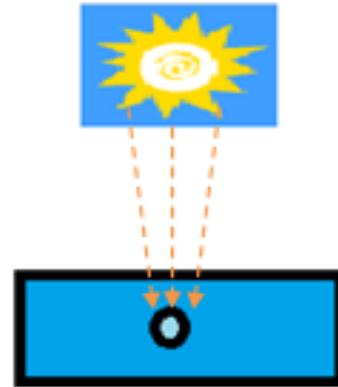
With the information necessary plan process, it is the ideal process for this finish by impregnation, ie it worked with pressure and temperature for the respective drying and curing of the material is made. Continuing well do the various measures irradiance, which is the amount of radiation that gets through at one point; UVA, UVB, UVC, done this in different colors to determine percentages provide protection to this man: for this measurement equipment called Lux Meter consisting of probes for measuring the irradiance fields are used.

3. Process, measurement and determination of the% protection

The program flow of the process is as follows:

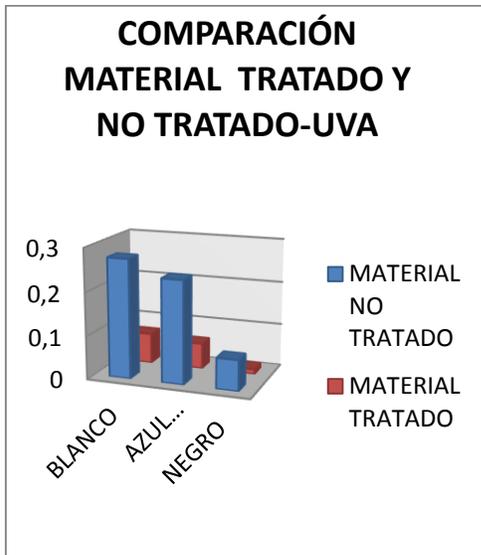


Once detailed the process, the respective measurements were made using the light meter, in the following image simulation is how the measurements are performed.



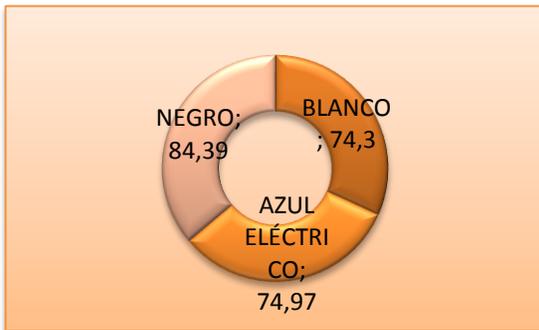
As previously mentioned with luxómetro irradiance which will produce data in the UVA, UVB and UVC areas measured, because this instrument has probes to provide us with the measurement for the irradiance occupied the following probes: LP471 UVA, with its spectral range 315nm to 400nm, LP471UVB, having spectral range of 280 nm to 315 nm and finally LP471UVC probe having a spectral range of 220 nm to 280 nm and in turn knowing that the measurement range having these probes is $0.1 \times 10^{-3} \text{ W / m}^2$ to 2000 W / m^2 .

At the end of the measurements could deduce that if you finish a percentage of acceptable protection to help protect humans. Which would indicate graphically.

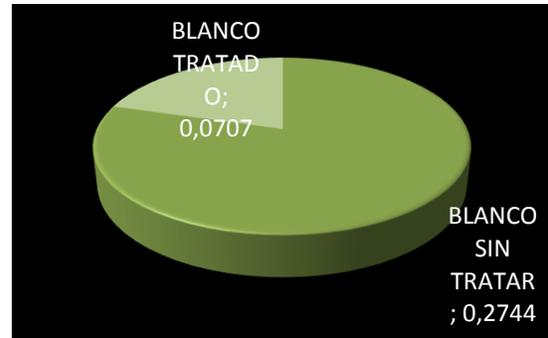


4. Results

Positive results were obtained as for the purpose of finishing both process and measurements taken respectively in the worked colors: black, electric blue and resulting in dark colors no better protection, which NOTED the following graphic.



The difference in raw material gets a lot of irradiance value is 0,2744w / m², while a material treated to reduce that amount 0,0707w / m² providing protection 74.3%, achieving protect humans , noting that the investigation is positive.



5. Conclusions

Titanium dioxide in the cotton fabric provides excellent protection from UV rays human beings, because this has the characteristic of absorbing UV rays, as raw material receives an irradiance of 0,2744w / m² and the treaty 0 , 0707 w / m² giving protection 74.3%

The Nuva TTC was used at a concentration of 20 g / l being the best performing share had before the wash cycles, sun exposure and providing friction durability of the finish, these parameters are made by taking into account the rules: such as Standard AATCC61-1992, AATCC16, ICONTEC 786.

Measurements made with the use of light meter, equipment that allows to know the amount of irradiance received is expressed in the measurement unit w / m², these measurements makes in the three fields of UVA, UVB and UVC, which confirms that UVA come in large proportion to the land while UVB lesser extent, leading to positive treatment performed gender cotton, stating that the respective measurements were performed with the material treated and untreated later allowing comparisons and deduce the effects that generates UV protective finish humans.

Cotton behavior was improved considerably, the material not treated in any process captures a lot of irradiance and to be treated with a product in this case the titanium dioxide has the characteristic of absorbing UV rays much Irradiance received significantly reduced, optimally Titanium Dioxide concentration of 20g / l, thus

achieving achieve a higher UV protection 50%.

Regarding defined nuances that the darker the better your protection, as in the case of the practices carried out in the color black protection gives a percentage of 84.39% while the white color gives protection 74.3%.

The process of fixing this finish is made by the impregnation method working at high temperatures are 110 ° C and 150 ° C respectively for drying and curing, thus achieving a good finish providing additional features to the material without affecting the characteristics Cotton own genre such as: touch, comfort, softness.

The finish will have an acceptable durability to suitable concentrations determined by detergent manufacturers and in turn the care it needs.

5. Recommendations

It is recommended to keep in mind that when using titanium dioxide white pigment being a low color hue, especially in the dark.

For washing gender, it should be typed in a delicate, short cycle and moderate agitation.

The use of clothing is recommended with this type of finish that help maintain health in terms of ultraviolet rays.

For the durability of UV protective finish should take into account the parameters of care as the way they are using water washing at room temperature, like using detergent according to the manufacturer's specifications.

For future studies related to this topic it is recommended to apply other fibers and try to define the UV protector, using specialized equipment such as spectrophotometer that measures range 100nm and 400nm.

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