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RESOLVE OF MASS BEATING PERCENTAGE SUBSEQUENT TO BLEACH OF CELLULOSE THROUGH DIVERSE BLEACH AGENT

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ABSTRACT

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Good preparation is the vital for successful. Natural or synthetic chemicals in fibres can interfere with wetting and dyeing performance. Preparation is the serious of process used to possible to produce an even and regular color on the material with facing least difficulties. The aim of this paper is to determine the weight loss percentage after bleaching of cellulose fabrics with various bleaching Agents. For this investigation commercially available three types of cellulose fabrics such as plain weave, single jersey and (1×1) rib were chosen. Weight of these fabrics was measured before and after bleaching with two different bleaching agents such as sodium hypochlorite and hydrogen per oxide. From weight loss percentage has been calculated for these fabrics.

***Key words**: bleaching, chromophore, oxidizing agent, per hydroxyl hypochlorous ion dechlorination.*

INTRODUCTION

The objective of preparation is to remove as much of the unwanted impurities color as possible from the fibres to produce a fabric that will uniformly the solution of dyes and chemicals (Broadbent and Arthur, 2001). So the coloration process will be uniform. Scouring generally removes all impurities except the natural coloring matters which have to be broken down by bleaching operation either with an oxidizing or a reducing bleaching agent. Almost invariably the oxidizing agents give a more permanent white. When the color is acted upon by a reducing agent, there is always the possibility that the oxygen in the air may reoxidizeit to its original state. (www.chimnica.it) Today the most commercial bleaches are oxidizing agents, such as sodium hydropochlorite (NaOCI), hydrogen peroxide (H_2O_2), Calcium hypochlorite $Ca(OCI)_2$ etc. Which are quite effective in "decolorizing" substance via oxidation (Kashem 2006)? After bleaching operation the weight loss of textile materials takes place and it depends on different types of bleaching agents which are used. The bleaching process also eliminates any traces of other impurities remaining from the previous preparation stapes and improves the absorbency of the material for deying and printing. Bleaching may the only preparatory process or it may by be used in conjunction with the other treatments, e.g. desizing, scouring and mercerizing. During bleaching operation other chemicals will be used in addition to the bleaching agent. These serve various function such as to active the bleaching system, to stabilize or control the rate of activation, to the give wetting and detergent action, to sequester metallic impurities etc. This section gives consideration to the selection of bleaching agents and to the role of the various chemicals used in conjunction (Anbumani 2007). Color in organic materials is the result of light absorption by certain chemical configurations called chromophores in molecules. C=C and=O are some examples of chromophores. A chromophores, eg C=C and C=O, is a part a molecule that is able to absorb UV or visible light and producing color in organic compounds. Oxidizing bleaches break up these double bonds (Booth 1996). Whereas reducing bleaches is due in part to their ability to remove these electrons which are activated by visible light to produce the various colors. Sodium hypochlorite (NaOCI) is ionized into metallic oxide and hypochlirous acid. Produced hypochlorous acid (HOCI) is then decomposed into hypochlorous ion (OCI) which is responsible for bleaching action and will produce a white material.

$$NaOCI + H_2O \longrightarrow NaOH + HOCI$$
$$HOCI \longrightarrow H^+ OCI^-$$

Fabrics bleached with hypochlorite will develop a distinctive chlorine order. This order can easily be removed with an after treatment consisting of sodium bisulfate of acetic acid. Hydrogen peroxide is a weak acid and lionizes in water to form hydrogen ion and per hydroxyl ion. Per hydroxyl ion responsible for bleaching action as it makes the material colorless.

$$H_2O_2 + H_2O \longrightarrow H^+ HOO^-$$

Hydrogen peroxide can also decompose. This reaction is catalyzed by metal ions e.g. Cu++, Fe+++. This reaction is not desired in bleaching because it is an ineffective use of hydrogen peroxide and causes fibre damage.

Due to the removal of coloring matters and fibres damage in bleaching, textile materials may loose its considerable weight and strength of materials can be highly affected for excessive fibre damage. So it is very necessary to study the weight loss of various fabrics occurred during different bleaching processes. However, the weight loss in case of various fabrics after bleaching with different bleaching are not clearly evaluated before.

The aim of this paper is to determine the weight loss percentage after bleaching of cellulose fabrics with various bleaching agents.

MATERIALS AND METHODS

For this investigation three types of cellulose fabrics have been chosen. Specification of selected fabrics are mentioned below-

Fabric No: 01
Fabric type: Plain weave
Fabric composition: 100% cotton fibre
Ends/inch: 62
Picks/inch: 62
Warp count (Ne): 20 Ne
Weft count (Ne): 20 Ne
Twist/inch: 16
Yarn twist direction: z-twist
Fabric surface area density (gm/m^2): 149

Fabric No: 03
Fabric type: (1 ×1) Rib
Fabric composition: 100% cotton fibre
Course/cm: 76
Wales/cm: 31
Yarn count (Ne): 34 Ne
Twist/inch: 18
Yarn twist direction: z-twist
Fabric surface area density (gm/m^2): 170

Method of Bleaching with Sodium hypochlorite (NaOCI):
Selected fabrics have been immersed in the bleaching solution with sodium hypochlorite (NaOCI) bleaching agents and for this purpose following standard recipe was used.

Recipe for bleaching:

Chemicals used	Amount
Sodium hypochlorite (99.9% NaOCI)	1.5g/l
Na_2CO_3	3 %
Lissapol D(wetting agent)	0.5g/l
p^H	10.5
M:L Ratio	1:10
Temperature	60˚C
Time	6 hours

After bleaching operation at 60˚C for 6 hours the fabrics were taken in hot and cold bath for proper rinsing and washing. The bleached fabrics were then neutralized with 0.5 gram/litre=re acetic acid (CH_3COOH) at 80˚C for 15 minutes. After that bleached fabrics were subjected to dechlorination or “antichlor” treatment which was affexted by bisulphate in recipe as mentioned below:

Recipe for dechlorination:

Chemicals used	Amount
Sodium bisulphite	2%
M:L Ratio	1:10
Temperature	40˚C
Time	15 mins

Method of Bleaching with Hydrogen Peroxide (H_2O_2):
Selected fabrics have been immersed in the bleaching solution with hydrogen peroxide (H_2O_2) bleaching agent and for this following standard recipe was used.

Recipe for bleaching:

Chemicals used	Amount
Hydrogen Peroxide (35% H_2O_2)	7 g/l
Peroxide Stabilizer	1.5 g/l
Na_2CO_3	7 g/l
Lissapol D (wetting agent)	0.5 g/l
p^H	1:10
Temperature	95˚C
Time	1 hour

After bleaching operation at 95˚C for 1 hour the fabric were taken in hot and cold bath for proper rinsing and washing. The bleached fabrics were then neutralized with 0.5 gram/litre acetic acid (CH_3COOH) at 80˚C for 15 minutes.

Method of weight loss percentage (%) calculation:

Weight of three types of fabric has been measured before and after bleaching process for both bleaching agents. For weight measuring purpose digital electronic balance was used. After weight measurement, loss in weights due to bleaching were calculated and expressed as percentage.

RESULT AND DISCUSSION

Wight Loss (%) of Various Fabrics after bleaching with Sodium hypochlorite (NaOCI):

Table 1. "Calculation of weight loss (%) for various fabrics after bleaching with Sodium hypochlorite (NaOCI)"

Fabric no.	1	2	3
Fabric type	Plain Weave	Single Weave	(1 × 1) Rib
Weight of Unbleached fabric (gm)	5	5	5
Weight of Bleached fabric (gm)	4.47	4.47	4.36
Weight Loss (%) after bleaching	10.6.	5.20	12.80

The Above curve is showing the maximum weight loss of (1 × 1) Rib due to bleaching with sodium hypochlorite (NaOCI) whereas this is minor this is minor for single jersey and moderate for plain wave.

Weight Loss (%) of Various Fabrics after bleaching with Hydrogen Peroxide (H_2O_2):

Table 2. "Calculation of weight loss (%) for various fabrics after bleaching with hydrogen peroxide (H_2O_2)"

Fabric no.	1	2	3
Fabric type	Plain Weave	Single Jersey	(1 × 1) Rib
Weight of Unbleached fabric (gm)	5	5	5
Weight of Bleached fabric (gm)	4.63	4.82	4.51
Weight Loss (%) after bleaching	7.40	3.60	9.80

The above curve showing the maximum weight loss of (1 × 1) Rib fabric due to bleaching with hydrogen peroxide (H_2O_2) whereas this is minor for single jersey and moderate for plain weave. So, after observing two curves it can said that between two bleaching agents the weight loss of fabrics is higher for sodium hypochlorite (NaOCI) than hydrogen peroxide (H_2O_2) due to greater fibre damages during bleaching operation.

CONCLUSION

Bleaching is very necessary to remove coloring matters from cellulose fabrics and bleaching agents must be taken into consideration for the purpose. But it is important to identify which bleaching agent is more effective for fabric bleaching as well as industrial use. By this investigation it was possible to make a comparison between two different types of bleaching agent such as sodium hypochlorote and hydrogen peroxide and it can be said that both not lead to same result. Result show that the hydrogen peroxide is most suitable bleaching agent as amount of fibres damaged for applying this is less than sodium hypochlorite for different cellulose fabrics.

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