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EFFECT OF DIFFERENT COMMERCIAL BRANDS OF HOUSEHOLD BLEACHES ON THE WASH FASTNESS PROPERTIES OF DIFFERENT COMMERCIAL BRANDS OF AFRICAN PRINTS (WRAPPERS)

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ABSTRACT

Sequel to the problems associated with African Prints (wrappers) –colour fastness to household bleaches and the continued need to seek out the best ways of minimizing them, the effect of different commercial brands of household bleaches(B1 to B4) on quality performance of ten (10) selected Africa Prints/wrappers(W1 to W10) were investigated. In the analysis one treatment was employed i.e. ISO_3. The results show that the samples exhibits excellent wash fastness properties toward the household bleaches. The order of performance of the fabrics towards the household bleaches are Table 1:W3 toW10 >W2 >W1, Table 2: W1, W2 to W5-W10>W3>W4, Table 3 and Table 4:W1 to W10 shows excellent performance. It is therefore recommended that the household bleaches (B1 to B4) mentioned above are safe and can be used for washing African Prints (wrappers).

Keywords: African prints (wrapper), bleach, colour, colour fastness, wash fastness,

INTRODUCTION

The earliest form of bleach involved spreading fabrics and clothing out in a bleaching field to be whitened by the action of sun and water (Bloomfield, 2012). Modern bleaches resulted from the work of 18th Century Scientists including Swedish Chemist Carl Wilhelm Scheele, who discovered chlorine, (Encyclopaedia Britannica, 2012). French Scientists Claude Berthollet recongnized that chlorine could be used to bleach fabrics and who first made sodium hypochlorite (Eau de javel or javel water, named after a quarter in Paris where it was produced) (Douglas, 2012) and Antoine Germain labarraque who discovered the disinfecting ability of hypochlorite (Vogt *et al*., 2010). Scottish Chemist and industrialist, Charles Tennant first produced a solution of Calcium hypochlorite, solid Calcium hypochlorite (bleaching powder) Winder, C (2001). Louis Jacques first produced hydrogen peroxide in 1818 by reacting barium peroxide with nitric acid, (Encyclopedia Britannia, 2012; Thomas, 2011). Hydrogen was first used for bleaching in 1882, but did not become commonly important until after 1930 (Field, 2006). Sodium perborate as a laundry bleach had been used in Europe since the early twentieth century, but did not become popular in North American until the 1980s (Jakob *et al*., 2008). African Prints (Wrappers) are woven textiles dyed or printed and are designed structurally or applied. Structurally, thread are used to manipulate the design on the African Prints (wrapper) especially coloured threads (Vatsala, 2003). In applied design however, dyes or pigments are used to colour the fabrics through different techniques (Venkatarman, 2002). African Prints (Wrappers) are used by people during occasions like party, village meeting or even going to places such as church, market place etc. African Prints (Wrapper) as a textile is used to cover, protects, and improves aesthetic value of the wearer thereby improving their attractiveness. African Prints (Wrappers) also show case the status of the wearer as well as their royalty (Vatsala, 2003). The African Prints (wrappers) encounters a number of agencies during their life time which can cause the colour to fade or to bleed onto an adjacent uncoloured or light coloured item. One of the frequently questions we received from customers concerns one of the many aspects of textiles is colour fading. Colour however, is a highly visible phenomenon and is one of the frequently asked question(s) received from customers because it concerns one of the many aspects of textiles in regard to colour fading. It is particularly important to most consumers (Odabasi, 2008). All these worries by the customers are centered on the colour fastness of the wrappers. Colour fastness is one of the important factors in case of buyers demand and a major source of customer complaint hence the dyed material should give a high degree of fastness in extreme circumstances (Vickerstaff, 2000). The outstandingly important property of a dyed material is the fastness of the shade of colour. The term is usually used in the context of clothes. The first known use of the word colour fast was in 1916 in general, textiles should be tested for colour fastness before using bleach or other cleaning products (Tatjana, 2012). Colour fastness refers to the resistance of colour to fade or bleed of a dyed or printed textile materials (wrappers) to various types of influences and/or agencies e.g. water, light, rubbing, washing, perspiration, bleaches etc to which they are normally exposed in textile manufacturing and in daily use (European Union, 2007). The fastness of a colour can vary with the type of dye, the particular shade used, the depth of shade and how well the dyeing process has been carried out. However, dyes (colours) can also behave differently when in contact with different agents, for instance, dyes not be fast to washing in water. It is therefore important to test any dyed or printed textiles for the fastness of the colours that have been used in its decoration (Milner, 2012)

MATERIALS AND METHODS

Materials, Chemicals and Equipment

100% printed cotton fabric (wrappers), Scissors, Tape rule,Thread, Needle, water, Soda ash, (Na_2CO_3), Soaps, Detergents, House Bleaches, Analytical weighing balance (Saronus Max. 320g), Measuring cylinder, Pipette, Glass beaker, Magnetic stirrer, Hot plate, Thermometer, Stop watch, Steel balls (10), and Grey scale.

Methodology:Preparation of Soap Solution

5g and 2g of soap and soda ash were weighed out using the Analytical weighing balance (Saronus Max. 320 g) and dissolved in 100 cm^3 of water. The mixture was slightly warmed to give a homogeneous soap solution.

Preparation of Detergent Solution

10 and 2 g of detergent and soda ash were weighed out using the Analytical weighing balance (Saronus Max. 320 g) and dissolved in 100 cm^3 of water. The mixture was slightly agitated to obtain a homogeneous detergent solution.

Preparation of Bleach solution

5% stock solution of the household bleach(es) was prepared by adding 1ml of the household bleach in 95 mls of water.

Method used to determine wrapper selection

Five (5) different types of commercial household bleaches was applied on the ten (10) wrappers (- the wrappers were selected based on their level of patronage and to some extent the price of the wrappers which was determined by one on one random interview with ten (10) users/buyers and sellers of these wrappers.

Application method

One (1) drop of the prepared stock solution of the household bleaches (which is equivalent to one laundry cycle) was applied on the 5cm x 4cm fabric and allowed it to saturate the fabric. The sample was allowed to stand for one minute, then rinse and blot dry. The sample was then visually evaluated for colour change.

Evaluation of the Samples

The evaluation was carried out by comparing the tested sample to the samples laundered in water alone, soap and solutions respectively. If there is no change in colour, if the amount of colour change is acceptable, the household bleach will be graded safe to use otherwise it is not safe to use but on white fabric(s).

Wash Fastness Treatment

The printed fabrics (wrappers) were subjected to ISO_3 and ISO_4 wash fastness treatment as follows:

International Standard Organization Test 3 (ISO3) Treatment

The ISO_3 treatment involves the preparation of soap and detergent solution using 5g/l soap/detergent and 2g/l soda ash (Na_2CO_3) in a liquor ratio of 50:1 for 30minutes at a temperature of 60ºC (140ºF)

Assessment of Change in Colour

The specimen to be tested was stitched with an undyed cloth measuring 5cm x 4cm as the composite sample. The composite test specimen was agitated in a washing wheel machine containing 5g/ soap solution with other additives under specified condition of liquor ratio, temperature and time. The test was conducted for 45mins at a temperature of 50ºC±2ºC as specified under the ISO test 3. The composite specimen was then removed, rinsed and dried. The change in colour of the tested specimen and the staining of the adjacent undyed cloth were assessed using the 1 – 5 scale for specifying fastness as indicated in all the tables.

Assessment of staining

The staining was assessed using the grey scale for assessing stain (BS1006:978). This scale consist of nine (9) pairs of pieces of cards numbered 5,4-5,4,3-4,3,2-3,2,1-2,1 where 5 is a pair of white and the other consist of a grey, giving series of contrast increasing in geometric progression. No. 1 shows the highest contrast 36.2 CIELAB units of colour difference.

RESULTS

The results of the experimental work for the fastness properties of the wrappers to some selected household bleaches are show on Tables 1- 4 below.

Table 1: Colour fastness of the selected wrappers to household bleach (B1)

Fabric Colour Change	Samples (W)	Staining
W1	3	2
W2	4	4
W3	5	5
W4	5	5
W5	5	5
W6	5	5
W7	5	5
W8	5	5
W9	5	5
W10	5	5

W =Wrapper, B =Household bleach,
Number 5 and 4=acceptable while 3, 2, 1 =unacceptable.

Table 2: Colour fastness of the selected wrappers to household bleach (B2)

Fabric Samples (W)	Colour Change	Staining
W1	5	5
W2	5	5
W3	3	2
W4	5	5
W5	5	5
W6	5	5
W7	5	5
W8	5	5
W9	5	5
W10	5	3

W =Wrapper, B =Household bleach
Number 5 and 4=acceptable while 3, 2, 1 =unacceptable.

Table 3: Colour fastness of the selected wrappers to household bleach (B3)

Fabric Samples (W)	Colour Change	Staining
W1	5	4
W2	5	4
W3	5	5
W4	5	5
W5	5	5
W6	5	5
W7	5	5
W8	5	5
W9	5	5
W10	5	4

W =Wrapper, B =Household bleach
Number 5 and 4=acceptable while 3, 2, 1 =unacceptable.

Table 4: Colour fastness of the selected wrappers to household bleach (B4)

Fabric Samples (W)	Colour Change	Staining
W1	5	5
W2	5	5
W3	5	5
W4	5	5
W5	5	5
W6	5	5
W7	5	5
W8	5	5
W9	5	5
W10	5	5

W =Wrapper, B =Household bleach
Number 5 and 4=acceptable while 3, 2, 1 =unacceptable.

DISCUSSION

The resistance of a dyed material (substrate) to any treatment e.g. household bleaches is called fastness. This is of great importance to the consumer, and there are several household bleaches test treatments that are applied according to the purpose for which the material is intended. However, factors that can affect fastness properties are fabric bonding, dyeing conditions and dyeing type, amount of colourant on the fibre, state of the colourant inside the fibre, chemical structure of the colourant and presence of 'foreign' substances

Table 1, W3 to W10 have the best wash fastness values with a change in colour rating of 5 and staining rating of 5 and W2 and W1 with change in colour rating of 4and 3 and staining rating of 4 and 4 and 2 respectively. The results on Table 2 shows that W1, W2, W5to W10 have the best wash fastness properties with a change in colour rating of 5 each and staining rating of 5 but W10 have stain rating of 3. However, W3and W4, have a moderate fastness with a change in colour rating of 4 and 3 and staining rating of 2 and 4 - 5 respectively. Table 3 indicated that W1 to W10 excellent fastness properties to household bleach B3 with a change in colour rating of 5 and staining rating of 5 except W1and W10 with stain rating of 4 respectively. This implies that household bleach B3 is very safe for all the wrappers. From Table 4, W1 to W10 shows all round excellent fastness properties toward the household bleach B4 with a change in colour rating of 5 each and staining rating of 5 respectively. This is an indication that household bleach B4 is very safe with the treated wrappers. However, the excellent fastness properties displayed by W1, W2, W3 and W10 may be due to the amount of colourant on the fibre, the chemical structure of the colourant and the type of fibre. This will go a long in determining the affinity as well as the chemical reaction that will occur between the colourant and fibre. The fastness properties of W1, W2, W3 and W10 because there is strong bond formed between the fibres that make up those fabrics and the colourants that make up the printing paste (Oforghor, 2011).

CONCLUSION

The results from the experimental work indicated that all the household bleaches used in the study can be used for washing wrappers. This is because the value of change in colour and staining were within the accepted standard which means there will be no bleeding of colour.

From the results W1, W2, W3 and W10 shows all round excellent fastness properties toward the household bleach B4 with a change in colour rating of 5 each and staining rating of 5 respectively. This is an indication that household bleach B4 is very safe with the treated wrappers. However, the excellent fastness properties displayed by W1, W2, W3 and W10 may be due to the amount of colourant on the fibre, the chemical structure of the colourant and the type of fibre. This will go a long in determining the affinity as well as the chemical reaction that will occur between the colourant and fibre. The fastness properties of W1, W2, W3 and W10 because there is strong bond formed between the fibres that make up those fabrics and the colourants that make up the printing paste. Generally, however, the house bleaches used in the study can be applied since they are safe and within the standards.

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