Creating sustainable fashion Designs treated with soil release finishing via used household textiles

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Abstract:
Fashion is a collective cultural phenomenon generated by the individual but linked to actions of a very large number of garment designers aiming to create distinctive but similar clothes. Awareness of what clothes are common, contemporary, appropriate, is a universal part of human experience The sustainable design approach adds the ethical and social dimensions to the product, in its manufacturing, use and disposal phases it was achieved to a certain extent by using available materials to its ultimate usage, using waste material, recycling of the products, planning second life for the fashion product, slowing down the fashion etc. Different finishing treatments are available to get various effects, which add value to the basic textile material, which can be better solutions for sustainable fashion. Textiles and apparel is a term that encompasses a plethora of items from the apparel worn for protection to self-expression, items in the home including linens and upholstery. The main idea is to develop more sustainable and responsible designs. This paper is not just about recycled textiles but about fashion, recycling, upcycling, adding value and uniqueness by the resulting one-of-a-kind design available to purchase in any retail store. Create six draping designs treated with soil release finishing usage as sea side clothes.

Keywords:
sustainable fashion
soil release finishing
Up-cycling.

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I. Introduction:
Fashion is socially, economically, and environmentally significant. As a material form of expression, fashion apparel is important to our personal and social relationships, linked to how we live and see ourselves within society.[1] "Fast fashion" characterizes the speed of today's clothing production and consumption: clothing is designed to be cheap, easy, and rapid to produce, and is created to be distributed, sold, and consumed in ever-increasing quantities.[2]
With the increasing attention on sustainability within consumer culture, fast production movements are criticized for undermining sustainability, and therefore the slow trend has emerged in various areas such as slow food and slow life.[3,4] In this vein, slow fashion emerged as the antithesis of the current fast fashion system, which expedites manufacturing speed and shortens the lifespan of clothing items. Against the unsustainable consequences of the fast-moving fashion cycle, slow fashion emphasizes quality and calls for increased consciousness from producers and consumers while slowing down the production and consumption cycle.[5,6] Current thinking on recycling and sustainability, however, encourages the use of one material or fiber for a whole garment and so perhaps these early investigations into moldable fashion have come of age.[7,8,9]
Recycle - best out of waste: Re-cut and sew vintage clothing, or use unusual materials to create truly different fashions, recycled clothing is the greenest option. Re-Construction - second life: For achieving the psychological and functional utility of a fashion product, the design process was modified to design two life cycles for one fashion product. Also, the transformation of one life to the other was planned in the design process itself. A thorough research about long term fashion trends is important in designing the extended life cycle of the product. A designer can incorporate simple and convenient methods to transform a product from its first life to its second life.[10,11,12]

Upcycled garments can have that independent appeal. No matter who the designer is or what styling options designers choose, these upcycled fashion garments and accessories are by nature one-of-a kind So, if one can add value – economic, intellectual, emotional, material – to a product through the process of reuse, it can be called 'upcycled". The forward to the book, upcycle, speaks of upcycling in general terms: ''The goal of the upcycle is a delightfully diverse, safe, healthy, and just world with clean air, water, soil, and power - economically, equitable, ecologically, and elegantly enjoyed".[13,14,15]

Textile finishing involves treating a textile material in such a way that the product has the desired aesthetic and functional properties required for its intended use.[16,17] All Finishing processes serve the following purposes:

- To enhance the appearance of the fabric.
- To improve the texture or weight.
- To increase flexibility, durability, or ease of care.[18]

Soil-release finishes on textiles facilitate the removal of soils during laundering under common household conditions. Fabrics treated with soil-release finishes are particularly suited to active wear and leisure wear.[19, 20] All fibers get soiled but most of them can be washed clean because of soap, water or the detergent penetrates the fiber; but this is not so with polyester or polyester blended cotton, they are hydrophobic and often oleophilic or oil attracting.[18,21) Soils can be defined as unwanted substances at the wrong place. The textile industry is searching for innovative production techniques to improve the product quality, as well as society requires new finishing techniques working in environmental respect.[22,18,] Softener as a soil release agent: Textiles can achieve an agreeable, soft hand some smoothness, more flexibility and better drape and pliability. Other properties improved by softeners include the feeling of added fullness, antistatic properties and sew ability. Softeners provide their main effects on the surface of the fibers.[18,21,23] The distinctive physicochemical properties of silicone polymers and the ability to tailor their architecture and functionality can bring a variety of consumer relevant benefits when correctly formulated. Softness improvements, ease of ironing, water absorbency and to a lesser extent, antiwrinkle characteristics, have been demonstrated and commercially implemented. Silicone softeners are widely used in the textile industry because of their great performance in fabric softness, smoothness, etc. They not only impact fabric surface properties, but also mechanical and physical properties, providing fabrics with the desired hand feel.[24] For instance, due to the ability to form specific interactions at the fibers silicone interface, the fabrics treated with the amino modified silicones have excellent softening.[24,25,26,27,28]

Garment materials art recreation is related to one design of garment materials. It is to promote aesthetic artistic effect of clothing and used fabric. It combines with the characters of clothing style and utilizes new design thought and craft to further change available fabric appearance style and improve existing fabric quality and artistic effect, which would make the potential aesthetic perception which fabric has obtain the best development.[29,30,31]

The aim of this paper is about upcycling to add value and uniqueness resulting one-of-a-kind design available for women to purchase in any retail store .Creating six designs utilizing waste used households treated via soil release finishing as a source of sustainable fashionable seaside designs.

II. EXPERIMENTAL WORK

2.1. Materials:

Different used Household 100% cotton, cotton blends, and decorative thread.

2.2. Chemicals:

STRUKTOL VP 5417 a concentrated (micro emulsion) of quaternary siloxane compound kindly provided by Dahab Trade, New Maadi, Cairo distrusted from Schill + Seilacher "Struktol" GmbH, Hamburg, Germany.

2.2.1 Dyes:

C.I Reactive 19 dyes and C.I disperse 7 dye were kindly supplied from dystar company, Egypt

2.3. Methods:

2.3.1 Soil release treatment

The fabric was weighted and padded through two dips and two nips in the solution containing STRUKTOL VP 5417 factors studied were (3-6 % o.w.f) at pH (5-8) and pick up/ (100 %), then drying at 80°C Cured at (100-130°C) for (1- 4) min. The fabrics then washed with 2 g/l nonionic detergent at 60°C for 15 min. rinsed with hot then with tape water and air dried.

2.3.2 Dyeing of cotton and cotton / polyester fabrics with reactive and disperse dyes:

Both untreated and treated cotton and cotton blend fabrics were dyed with reactive and disperse dyes by exhaustion method.

2.4. Soil release evaluation:

For soiling release testing the fabric were tested according to AATCC 130.[32]

2.5. Antibacterial Evaluation

The antibacterial activities of the samples were

determined according to the AATCC test method 100, 2004.[33]

2.6 Physico-mechanical measurements

2.6.1. Breathability:

Water vapor transmission rate, "WVTR", is often based on the wet cup method described by ASTM E-96.[34]

2.6.2 The crease recovery angles (°)

The crease recovery angles (CRA) in the warp and weft direction were measured according to AATCC 66-2000 test method.[35]

2.6.3. The evaluation of wettability

Wettability of fabrics before and after treatment was measured according to ISO 4920-1981.[36]

2.6.4 Durability test

The durability of the treated fabric against repeated laundering was evaluated according to AATCC 124-1992 test method subjected to 10-30 washing cycle in the presence of the nonionic detergent (Ariel washing detergents).[37]

2.7. Color strength (K/S)

Color strength (K/S) of the dyed samples was measured on Mini Scan XE spectrophotometer using Hunter lab universal software, which based on Kubelka – Munk equation.[38]

2.8 Color fastness properties

2.8.1. Light fastness The light fastness of dyed fabrics was determined according to ISO 105-BO2-2014 test method Colour fastness to artificial light Xenon arc fading lamp test. [39]

2.8.2. Wash fastness The wash fastness of dyed fabrics was determined according to ISO 105-C0 6 test method. [40]

2.9. Application in the clothing field:

Sustainable clothes with added value:

The main idea is to develop more sustainable and responsible designs.

Six designs were created using household treated by soil release finishing agent as a source for sustainable fashionable designs and fashion design for women as summer sea side clothes.

2.9.1 Technique:

All designs were applied using draping technique.

The following are samples of the used household fabrics before alteration: towels and bed linens.

Fig. (1) Used Towel and bed Linens.

III. Results and discussions:

3.1. Soil release treatment results:

3.1.1. Effect of STRUKTOL VP 5417 Concentration:

Table (1): Effect of STRUKTOL VP 5417 Concentration.

	Tea stain				Oil stain				Roselle stain			
Concentration	3%	4%	5%	6%	3%	4%	5%	6%	3%	4%	5%	6%
100% Cotton	4	4	4	5	5	5	5	5	5	5	5	5
65-35 % Cotton /polyester	4	4	4	4	4	4	5	5	4	4	5	5

Treatment condition:

Treatment condition: STRUKTOL VP 5417 concentration (3-6%), pH 6, Wet pick up 100%, then dried for 2 min at80^{O}C, and cured at 130 for 3 min. Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

From the table (1) it concluded that the 100 % cotton tea stain are completely removed at concentration 6 % while the Oil and the Roselle stain shows completely removal and recorded grade 5 with all the different concentration and a small amount of the STRUKTOL VP 5417 are able to remove the stains. Cotton/polyester blend also shows improvement of the stains removal at concentration 5 with oil stain and Roselle completely removed at concentration 5% and 6 %while the tea stain need further studying of the STRUKTOL VP 5417 other factors. The smallest amount of concentration showed very good performance.

STRUKTOL VP 5417 leaves many hydrophilic (OH) groups on the fabric surface, making the fabric more hydrophilic. Based on the fundamental laundry principles, a hydrophilic fabric surface promotes fabric wetting, and promotes accessibility of the detergent between stains and the fabric surface, resulting in better stain removal.[41,42]

3.1.2. Effect of pH on soil release :

Table (2): Effect of pH on soil release.

	Tea stain				Oil stain				Roselle stain			
pH	5	6	7	8	5	6	7	8	5	6	7	8
100% Cotton	4	4	5	5	4	5	5	5	4	5	5	5
65- 35 % Cotton /polyester	4	4	4	5	4	5	5	5	4	5	5	5

Treatment condition:

Treatment condition: STRUKTOL VP 5417 concentration (5%), pH (5-8), Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130^{o} C for 3 min.Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

The table (2) shows that 100 % cotton fabrics with tea stain are completely removed at pH 7 and pH 8 while the oil and Roselle are removed at pH 6, 7 and pH 8. Cotton / polyester stains shows tea stains removed at pH 8 while oil and Roselle removed at pH 6, 7 and pH 8.

STRUKTOL VP 5417 shows a very high substantivety when applied in aqueous solutions. The stain removal performance is related to the hydrophilic lipophilic balance (HLB) of modified silicones. The higher the hydrophilic lipophilic balance (HLB), the better the stain removal performance, making fabrics more hydrophilic leading to useful tool for fabric cleaning performance.[43,44]

3.1.3. Effect of curing temperature and time on soil release:

Table (3): Effect of curing temperature on soil release.

	Tea stain				Oil stain				Roselle stain			
Temperature ^{o}C	100	110	120	130	100	110	120	130	100	110	120	130
100% Cotton	4	5	5	5	4	5	5	5	4	5	5	5
65- 35 % Cotton /polyester	4	4	4	5	4	4	5	5	4	4	4	5

Treatment condition:

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at (110-130 ^{o}C) for 3 min.Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min

Shown in table (3) 100 % cotton fabric treated with STRUKTOL VP 5417 shows completely removal of all the stains at curing temperature 110, 120 and 130 ^{o} c while with the cotton / polyester blend with the tea and the Roselle shows grade 5 only with curing temperature 130 ^{o} c and the oil stains removal at 120 and 130 ^{o} c .The STRUKTOL VP 5417 orients itself on the surface of the fabric and wicks water. It also provides for the resistance to oily soil. this due to the withstand of modified silicone to high temp. Which ease the combination of hydrophilic and hydrophobic parts to reduce the surface tension of the stains.[45,46,47]

Table (4): Effect of curing time on soil release.

	Tea stain				Oil stain				Roselle stain			
Time /min.	1 min.	2 min.	3 min.	4 min.	1 min.	2 min.	3 min.	4 min.	1 min.	2 min.	3 min.	4 min.
100% Cotton	4	4	5	5	5	5	5	5	5	5	5	5
65- 35 % Cotton /polyester	4	4	5	5	4	4	5	5	4	4	5	5

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 1 30 ^{o} C for (1-3 min.).Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

Shown in table (4) 100 % cotton fabric treated with STRUKTOL VP 5417 shows completely removal of the tea stain at curing time 3 and 4 min. while oil and Roselle changing curing time has no effect on the stain removal as it recorded grade 5 with all the curing time. Cotton / polyester blend treated with STRUKTOL VP 5417 recorded grade 5 with all the stains at3 and 4 min. curing time. Hydrophilic modified silicone. Improves softness and can be used to improve soil-release properties, antistatic properties and water-absorbency. From the previous tables we conclude that the concentration plays Avery important role in the removing of the stains also it depends on the stains type, oil base, water base, dry base, and composite base. PH of the treatment also should be carefully handled STRUKTOL VP 5417 works in mild base medium. A higher HLB (hydrophilic lipophilic balance) leads to a shorter wetting time, indicating that the fabric is more hydrophilic. Generally, silicone finishes often aggregate and form a thin layer on the interfaces

between fabric and stain, which will influence the interactions with both fabrics and stains.[48,49]

3.2. Antibacterial effect of STRUKTOL VP 5417 on cotton and Cotton/ polyester

The growth reduction % of gram negative Escherichia coli (E. coli) and gram-positive Staphylococcus aureus (Staph) bacteria was shown in the table (5).

Table (5): Antibacterial effect of STRUKTOL VP 5417 on cotton and Cotton/ polyester.

Treated fabric	Blank		100% Cotton treated		65-35 % Cotton /polyester treated	
Bacteria	E. Coli	Staph	E. Coli	Staph	E. Coli	Staph
Reduction %	0%	0%	98%	95%	95%	97%

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130 ^{o} C for 3 min. Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

It was observed in table (5) treatment has a positive effect on the bacteria growth, Cotton and cotton/ polyester fabrics treated via STRUKTOL VP 5417shows a good reduction % growth of both grams positive and gram-negative bacteria. This may be due to STRUKTOL VP 5417contains Quaternary ammonium compounds belong to the class of cationic disinfectants and have been widely used for half a century. The method of biocidal activity involves an electrostatic interaction with constituents of the cell wall, followed by destabilization of the cytoplasmic membrane via the lipophilic moiety present in the Quaternary ammonium compounds. Because of the very high osmotic pressure, this destabilization leads to a loss of cytoplasmic constituents, resulting in subsequent cell death. [48, 50,51,52]

3.3. Physico mechanical properties of treated cotton and cotton/ polyester fabrics:

Table (6): Physico mechanical properties of treated cotton and cotton/ polyester fabrics.

		100% Cotton Blank	100% Cotton treated	65-35%blank Cotton /polyester	65-35%treated Cotton /polyester
Breathability (%)		5%	9%	2.6%	3.2%
Wettability (sec.)		10 sec.	0 sec.	15 sec.	5 sec.
Crease recovery angle degree (^{o})	Weft direction	113	140	100	142
	Warp direction	106	145	105	150

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130 ^{o} C for 3 min. Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

Shown in table (6) the fabric treated with STRUKTOL VP 5417 showed enhancement of the breathability from 5% to 9% with 100% Cotton fabric and from 2.6%to 3.2% with65-35%Cotton /polyesterthis may be due to the STRUKTOL VP 5417content which increase the hydrophilic lipophilic balance (HLB). Silicones are based on a chemically bonded backbone of siloxane bonds (Si-O-Si). Silicones have a higher intermolecular binding energy compared to typical organic resins, which are composed of C-C-C bonds, which gives silicones their excellent weather and heat resistance.[41,45,52,53]

Treatment of the 100% cotton and 65-35%Cotton /polyester fabric with STRUKTOL VP 5417 increases the fabric absorbency in a dramatic way as the fabric readily absorb the water in no time this is due to the increasing of the hydrophilicity, STRUKTOL VP 5417make the fabric more negative and leaves many hydrophilic OH group on the fabric surface rendering the fabric more hydrophilic and more wettable.[44,53]

Both treated fabric with STRUKTOL VP 5417showed improvement in crease recovery angle in all direction. Modified Silicone softener acts as lubricating agent between the yarns of the fabric imparting softness to the material, silicone capability comes from the flexibility and freedom of rotation along the Si-o bonds this freedom rotation leads to unique flexibility of the siloxane molecules. [43,44,49]

3.4. Evaluation of Durability:

Table (7): Evaluation of Durability.

Wash cycle	Stains	Blank 100%cotton	100%cotton treated	Blank 65%-35% Cotton/ polyester	65%-35% Cotton/ polyester treated
10 wash cycle	Oil	1	5	1	5
	Tea	3	5	2	5

	Roselle	2	5	2	5
20 wash cycle	Oil	1	5	1	5
	Tea	3	5	1	5
	Roselle	2	5	1	5
30 wash cycle	Oil	1	5	1	5
	Tea	3	5	1	5
	Roselle	2	5	1	5

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130 ^{o}C for 3 min. Washing condition: 2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

In the table (7) treatment of 100%cotton and 65-35% Cotton / polyester fabric with the STRUKTOL VP 5417 quaternary siloxane shows effective treatment up to 30 wash cycle as it recorded grade 5 after 30 with all the stains . This may be due to the increasing of wettability of the treated fabric and hence increasing the soil release property .Silicones form a flexible Coating on fiber surfaces, thereby improving the fabric's durability against washing and dry cleaning. The durability increases due to replacement of some methyl groups by other functional groups which increase attraction to the fabrics. this may be attributed to the type of silicone present in STRUKTOL VP 5417 which is extremely stable under conditions required to washing.[42, 53,54]

3.5. Effect of STRUKTOL VP 5417 treatment of 100%cotton and 65%-35% Cotton / polyester fabric on color strength (K/S):

Table (8): Effect of STRUKTOL VP 5417 treatment of 100%cotton and 65%-35% Cotton / polyester fabric on color strength (K/S).

Fabric	100%Cotton		65%-35% Cotton / polyester	
Dyeing sequence	Dyeing then finished	Finished then dyed	Dyeing then finished	Finished then dyed
Blank	1.795		5.03	
Treated with STRUKTOL	1.618	4.848	6.060	8.449

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130 ^{o}C for 3 min. Dyeing condition: M: L 1: 50 and dye shade (3% o.w.f.) C.I. Reactive Blue 19 dye: 50g/l Nacl, 13-15g/l Na_2CO_3. (o.w.f) and M: L 1: 50 and dye shade (3% o.w.f.) C.I. disperse red 7 dye: 2g/l carrier, pH 4.5, Washing conditions:2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

Treatment of 100% Cotton fabric with STRUKTOL VP 5417 showed in table (8) an improvement in color strength values (K/S) from 1.795to 4.848and 1.618 and it's recommended to treat the fabric and then dye it . Silicone softeners contain reactive sites which contribute to the hydrophilicity and increase the color intensities. It's clear that there is a significant increase in the color strength values (K/S) of 65%-35% Cotton / polyester finished with STRUKTOL VP 5417 from 5.03 to 6.060and 8.449and so it is recommended to treatment then dyed the fabric. Silicones form a transparent coating on fiber surfaces, for enhanced deep coloring and Fastness.[46,54,56,57]

3.6. Fastness properties:

Table (9): Fastness properties.

	Dyed blank 100%cotton	100%cotton Treated	Dyed blank65-35%cotton/polyester	65-35% cotton/polyester treated
Wash fastness	2	5	1	5
Light fastness	3	7	3	7

Treatment condition: STRUKTOL VP 5417 concentration 5%, pH 8, Wet pick up 100%, then dried for 2 min at80 ^{O}C, and cured at 130 ^{o}C for 3 min. Dyeing condition: M: L 1: 50 and dye shade (3% o.w.f.) C.I. Reactive Blue 19 dye: 50g/l Nacl, 13-15g/l Na_2CO_3. (o.w.f) and M: L 1: 50 and dye shade (3% o.w.f.) C.I. disperse red 7 dye: 2g/l carrier, pH 4.5, Washing conditions:2% nonionic detergent (Ariel washing detergent) at 60^{0}C for 15min.

It was observed from table (9) that the STRUKTOL VP 5417 100% dyed cotton fabric and 65-35%cotton/polyester fabrics shows good wash fastness as it recorded grade 5. due to increasing the hydrophilic lipophilic balance (HLB) which leads good wash fastness. also STRUKTOL VP 5417 100% dyed cotton fabric and 65-35% cotton/polyester dyed fabrics shows very slight fading when exposed to the day light as it recorded light fastness grade 7. The slight

bleeding of the dyed sample may be due to oxidation of the dye on the surface of the fabric and the absence of resonance as a reduction or oxidation of the double bonds present in the structure of the treatment materials and dye stuff used. [49, 50, 52, 55]

IV. Applied Sustainable Designs:

Sea side area clothes are a good environment for stains and bacteria, according to the repeated uses ,kept dump, projected to food while eating ,so we believed that it will represent a good integrated application to our sustainable concept .

All the following designs fabrics are treated with STRUKTOL VP 5417 soil release / antibacterial finishing creating seaside outfits.

Six designs created by draping on manniquien technique .

Draping Design (1)

Functional Design: 100% cotton simple weave in skirt in upper part treated by soil release agent, dyed with tie-dye technique designed as sea side cover up outfit.

Structural Design: Upper part halter neck, and unbalance long flare skirt with thin belt.

Decorative Design: Complementary colors in design made much attractive by usage red orange color mixed with olive-green in upper part and light olive green in skirt. Goldenrod Yellow belt moved the eye in all skirt and linked by upper part.

Soil Release Grade: 4/5

Antibacterial Activity: 95%

Draping Design (2)

Functional Design: 100% cotton simple weave in skirt & 100% cotton towel weave in halter blouse treated by soil release agent, dyed with tie-dye technique designed for sea side cover up outfit.

Structural Design: Halter blouse covered till hip and short from front, and micro skirt wrapped in front for easy wearing.

Decorative Design: Crimson, magenta and plum colors graduation in halter blouse ,made good rhythm with pineapple marry gold yellow skirt. Usage colors cords decorated the blouse by circles and roses shapes to produce a feeling of easy movement.

Soil Release Grade: 5/5

Antibacterial Activity: 96%

Draping Design (3)

Functional Design: : 100% cotton simple weave in upper part, and in skirt treated by soil release agent, dyed with tie-dye technique designed for sea side cover up outfit.

Structural Design: off shoulder rose like top easy wearing for sea side. Unbalance wrapped skirt closed easily by yellow long belt.

Decorative Design: Draw by pineapple marry gold yellow fabric rose on chest as top, and navy blue skirt like stem of rose to imagine natural shape in all outfit . All design made feeling of natural look on seaside for showing unlikeness.

Soil Release Grade: 4/5

Antibacterial Activity: 96%

Draping Design (4)

Functional Design: cotton polyester dress treated by soil release agent, dyed with tie-dye technique designed for sea side cover up outfit.

Structural Design: The dress consists of upper part gathered in center point by belt to around neck for wearing. Dress skirt start from under chest to covered the knee.

Decorative Design: Usage transition from light purple to dark purple in dip dye lead the eye to change direction gradually.

Soil Release Grade: 4/5

Antibacterial Activity: 95%

Draping Design (5)

Functional Design: cotton polyester treated by soil release agent, dyed with tie-dye technique designed for sea side cover up outfit.

Structural Design: one piece over knee length beach wear cover-up, with sharp edges around neck and triangle sharp edges in hem, sleeveless, and used orange belt under chest, sunny yellow wrapped scarf .

Decorative Design: Broken liens in neck open and hem made feeling of dominance for spotlight around neck and the dress end. The angles repetition in dress increased interest although formal balance, using the baby blue in dress mixed with sunny butterscotch yellow belt and scarf reflect the nature of sun and sea.

Soil Release Grade: 4/5

Antibacterial Activity :95%

Draping Design (6)

Functional Design: 100% cotton towel fabric treated by soil release agent, dyed with tie-dye technique designed for sea side cover up outfit.

Structural Design: strapless 2 in 1 towel and cover up belt cross from side to side; drape little rose on front, and finished the dress hem by yellow over lock stitches in cutting straight lines. And, yellow scarf to cover shoulder and arm from Sun on the beach.

Decorative Design: Contrast colors, dark magenta, purple and sunny gold yellow feeling difference and pleasing combination. The sunny gold yellow belt in upper dress made informal balance to eye travel in all dress without interruption.

Soil Release Grade: 5/5

Antibacterial Activity: 96%

References

1. H. Ulasewicz, C. Sustainable fashion: why now? Fairchild, New York. 2008
2. C. H. Slow Fashion: an oxymoron or a promise for the future? Fashion Theory: The Journal of Dress, Body & Culture 12:427-446. 2008
3. Nilsson, J.H.; Svärd,A.; Widarsson, A.; Wirell,T. Cittásloweco-gastronomic heritageas a toolfor destination development. Current Issues Tourism, 14, 373–386. 2011.
4. Tencati, A.; Zsolnai, L. Collaborative enterprise and sustainability: The case of slow food. J. Bus. Ethics, 110, 345–354. 2012
5. Fletcher, K. Slow fashion. Ecologist, 37, 61. 2007
6. ,Businesses :Customer Value Approach http://www.mdpi.com/journal/sustainability Sustainability, 8, 540; 2016
7. J. Welch. Living in the hood, Blueprint, Chelmsford, UK: September (211), 2008.
8. . Lee. Fashioning the Future Tomorrow's Wardrobe, Thames & Hudson, 2010.
9. M. M.T.Eladwi1, R. N. Shaker2, A. S. Mahmoud3, H. H. Fathy3 and S. M. Sharaf, Utilize Trash Materials as a Source of Extreme Fashionable Designs, Elixir Fashion Design 98, 42662-42666. 2016
10. N.L.Sharda, and M.Kumar VK. Multifarious Approaches to Attain Sustainable Fashion, The Nordic textile journal, special edition, p. 30-37, 7,2012.
11. Sh. Wen1. The Effect of Clothing Material Art Recreation on Children's Wear Design. International Conference on Education Technology and Economic Management, .ICETEM, 2015.
12. M. M.T.Eladwi1, R. N. Shaker2, A. S. Mahmoud3, H. H. Fathy3 and S. M. Sharaf

Recreating Garments Designs Waste as a New Fashion Trend , Elixir Fashion Design 95 40601-40605, 2016.
13. W. McDonough and M. Braungart. The upcycle: Beyond sustainability-designing for abundance, New York, North Point Press, 2013.
14. C. Andrews. If it's cool, creative and different, it's indie, CNN inside the Indie Scene, 2006.
15. M. M.T.Eladwi1, R. N. Shaker, Sh. H.Abdelrahman, Upcycling Used Garments to Recreate Sustainable Fashion Designs Treated by Soil Release Finishing, International Journal of Advanced Engineering, Management and Science (IJAEMS ,Vol-2, Issue-8, Aug- 2016.
16. D. Heywood. Textile Finishing, the Society of Dyers and Colorists, 2003.
17. P. Bellini; F. Bonetti; E. Franzetti; G. Rosace and S. Vagotextile.Reference book for finishing,the ACIMIT Foundation, 2002.
18. Schindler and Hauser. Chemical Finishing of Textiles, Woodhead Publishing ,2004.
19. E.Bittner, Basic Textile Care: Structure, Storage, and Display,http://webspace.utexas.edu/ecb82/textile_care.doc, 2004
20. . M.Lewin. Handbook of Fiber Chemistry, Taylor and Francis Group LLC, London, New York, 2007.
21. M. M. T. El adwi and R. M. Kotb.Minimalism as a concept for textiles finishing and fashion design, International Journal of Textile and Fashion Technology (IJTFT), Vol. 5, Aug 2015.
22. . F. Vazquez . Silicone softener for stain repellent and stain release fabric finishing. Dow Corning Corporation Greensboro, N.C., USA, Number vol.26-1277-01, 2004.
23. . D. S. Murphy. Fabric Softener Technology: A Review, J SurfactDeterg vol. 18:199–204, 2014.
24. Ir. Benoit Hénault, Russ A. Elms Silicone: Expanding Opportunities for a Performance-Enhancing Material in the Detergent Industry, © Dow Corning Corporation. 2004.
25. Standardization Administration of the People's Republic of China GB/T3174-2008 (Appendix B). JB-01 (The preparation of carbon black oil). Standards Press, China,2008.
26. Pei LJ, Ge HY, An YY, Wang JP) Effect of silicone softeners on fabric detergency performance. China Surfactant Deterg Cosmet 100:30–34. 2013.
27. HJ Kobus, S Edmund, S Jordana, Improving the effectiveness of fluorescence for the detection of semen stains on fabrics. J Forensic Sci 47:1–5, 2002.
28. L Pei, H Ge, D Wang, Qi Zhong, J Wang, The Influence of Silicone Softeners on Fabric Stain Removal and Whiteness Maintenance During Home Laundry, J Surfactant Detergent 17:331–339, 2014.
29. L. Xu. The application of clothing material recreation on costume designing, J. Art & Design, (12), p. 66-67. 2007.
30. Z.Q. Huang and H. Wu. Clothing material recreation-new direction of 21th century costume designing development, J. Sichuan Textile Technology, (2), p. 59-60. 2005.
31. Sh Wen1, The Effect of Clothing Material Art Recreation on Children's Wear Design, International Conference on Education Technology and Economic Management (ICETEM) 677-679. 2015.
32. .AATCC 130. Soil Release: Oily Stain Release Method; 2000.
33. AATCC 100. Evaluation of antimicrobial finishes on fabrics; 2004.
34. ASTM E96. Standard Test Methods for Water Vapor Transmission of Material, 2008.
35. AATCC 66. Wrinkle Recovery of Woven Fabrics, 2008.
36. ISO 4920. Determination of fabric wettability by spray method, 1981.
37. ISO 4920. Determination of fabric wettability by spray method, 1981.
38. J. E. Booth. Principles of textile testing, Newness-Butter Worths, London, 1968.
39. ISO 105- B02. colour fastness to artificial light xenon arc fading lamp test, 2014.
40. ISO 105- B02. colour fastness to artificial light xenon arc fading lamp test, 2014.
41. A.J.O'Lenick. Silicone Emulsions and Surfactants; Journal of Surfactants and Detergents. Vol. 3, No. 3 ,July 2000.
42. P. Habereder and A. Bereck. Silicone softeners part 2, Rev. Prog. Color., vol.32 pp. 125- 137, 2002.
43. M.J.Owen and P.R.Dvornic. Silicone Surface Science , Springer Science and Business Media Dordrecht, chapter 13 p 355, 2012.
44. N. Sundar. Silicone Finishes for Textiles, fibre2fashion.com, 2012.
45. A. W. Jatoi;A. W. Jatoi Z. Khatri; and M. H. Memon. Effect of Silicone Nano, Nano/Micro and Nano/Macro-Emulsion Softeners on Color Yield and Physical Characteristics of Dyed Cotton Fabric, J.SurfactDeterg, vol.18:205–211, 2015.

46. M.Lewin. Handbook of Fiber Chemistry, Taylor and Francis Group LLC, London, New York, 2007.
47. 11.M.Parvinzadeh and R. Hajiraissi. Macro- and Microemulsion Silicone Softeners on Polyester Fibers Evaluation of Different Physical Properties, J SurfactDetergvol.11,269–273, 2008.
48. D. Perry. Silicone Surface-Active Agents, Dow Corning Corporation, 2005.
49. L.Pei ;HuayunGe; D. Wang; Q.Zhong and J. Wang. The Influence of Silicone Softeners on Fabric Stain Removaland Whiteness Maintenance During Home Laundry, J SurfactDetergvol.17:331–339, 2014 .
50. Q. Zhang, H. Liu, X. Chen, X. Zhan and F. Chen. Preparation, surface properties, and antibacterial activity of a poly(dimethyl siloxane) network containing a quaternary ammonium salt side chain, Journal of applied polymer, 2015.
51. R.R. Pant, J. L. Buckley, P. A. Fulmer, J. H. Wynne, D. M. McCluskey and J. P. Phillips. Hybrid Siloxane Epoxy Coatings Containing Quaternary Ammonium Moieties, Wiley Inter Science, 2008
52. Y. Xue, H. Xiao, and Y. Zhang. Antimicrobial Polymeric Materials with Quaternary Ammonium and Phosphonium Salts, International Journal of Molecular Sciences, 2015.
53. S. J. Kadolph. Textiles, Prentice Hall Inc, Upper Saddle River, 2007.
54. F. Case. Silicones in fabric care, September, Vol. 17., 2006.
55. D. S. Murphy. Fabric Softener Technology: A Review, J Surfactant Detergent vol. 18:199–204, 2014.
56. K. Wells. Fabric dyeing and printing, Conran Octopus Limited, London, 2000.
57. W. Ingamells. Colour for textiles A user's handbook, Society of Dyers and Colourists, 1993