Sarex

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Saraquest

Exclusive Insight

Contents

CHLOROX FASTNESS IMPROVER FOR POLYAMIDE

Color is an important characteristic of a textile product and is often one of the important factor considered by a consumer. The skill of dyer to reproduce gradation of the color as requested by customer. The art of finisher to fix it permanently with high level of fastness.

In recent years, Polyamide has steadily increased in consumption, because of its vividness in shade and good wet fastness properties and durability. However, polyamide dyed with acid dyes the drawback of being poor in color fastness to chlorinated water and there are many cases where polyamide material dyed with reactive dyes are faded or discolored due to oxidation of the dyes by the action of a trace amount of active chlorine in chlorinated water of city or pool water.

Also, normally swimming suits are made up of polyamide fabrics which are prone to fading when exposed to the chlorinated pool water. Chlorine liquors are used all over the places viz swimming pool, hospitals, hotels and houses; including bathroom, kitchen and floor washing.

Chlorine kills most of the bacteria and germs that causes illness thus makes home cleaner and healthier. Accidental spillage of such liquors on the surface of fabric, garment, towels and rugs lead to undesirable bleach spots.

Also, chlorine-based disinfectants are among the most frequently applied disinfectants and oxidizers for swimming pool treatment. Lowering the chlorine concentration is undesirable, because this increases the risk of waterborne diseases.

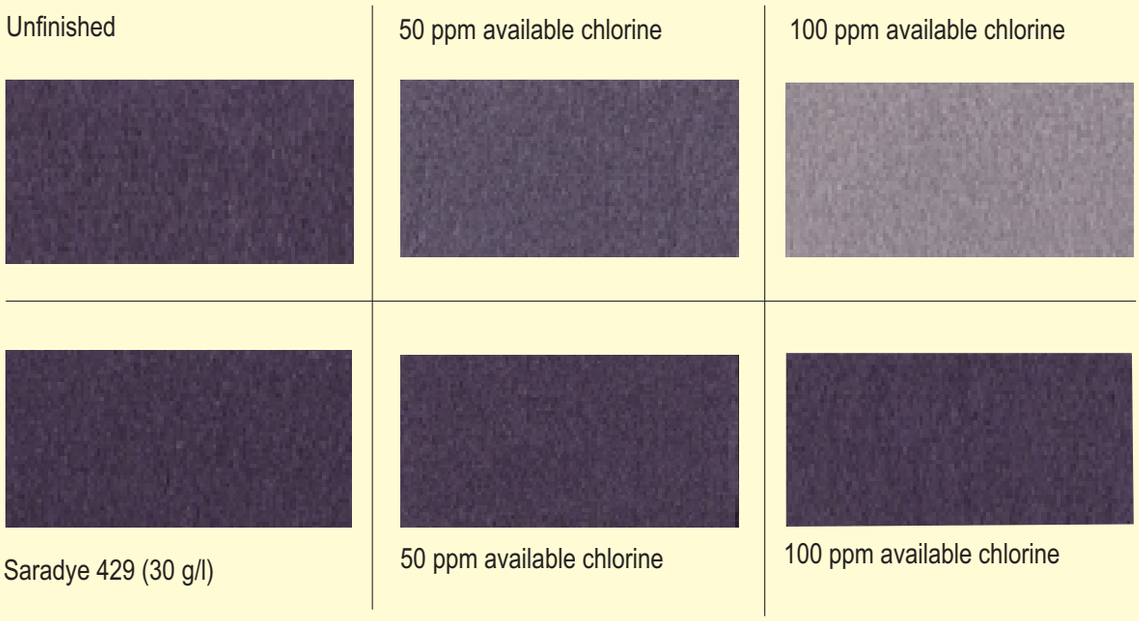
Alternative disinfectants can be used as well, these decreases the required amount of chlorine or cause chlorine addition to be irrelevant.

Beach towels, swimming suits made of polyamide are dyed or printed with dyes which are sensitive to high chlorine content of pool water and laundry wash liquors. Hence it is essential to confirm the fastness to chlorinated pool water of such garments or to be finished with finishing agent to improve chlorox fastness.

Water in swimming pool contain upto 5 ppm activated chlorine and a tap water contain about 1-2 ppm activated chlorine, which is used for killing bacteria for disinfection. It causes discoloration and fading of dyed material.

Sarex has an unique solution by offering a specialty finishing agent SaraDye 429 for Polyamide to meets the requisite of customers. Fabrics, garments, home textile and medical textile finished with Saradye-429 exhibits excellent resistance to bleaching and fading due to exposure of chlorine liquors.

POLYAMIDE FABRIC



Unique Features of Saradye 429

1. Special formulation to improve contact water fastness and chlorine fastness of Polyamide substrate.
2. Improves fastness to commercial laundering and domestic washing
3. None or minimum shade change and light fastness
4. Finish does not affect handle and absorbency
5. Saradye 429 is formaldehyde free and passes Oekotex standard 100

Application Condition

Padding:
Concentration: 20-60 gpl
pH : 5-6
pad- dry at 140-160^{0}C

Exhaust :
Concentration: 3-5 % owf
pH : 5-6
Temperature : 50^{0}C
Time : 15-20 minutes.

Test Methods

AATCC 162-1997
The test specimen is treated in a 5 ppm active chlorine containing liquor at neutral pH for 60 minutes at 21^{0}C in tumble wash machine.

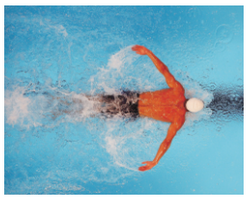
ISO 105/EO3
The test specimen is treated with50 ppm and 100 ppm active chlorine for home textiles such as towels at pH 7.5 for 1 hour at 27± 2^{0}C in launder-o-meter.

Customer,s Method:

42.5 gm of 6% Chlorox solution (35 ppm) + 42.6 gm of Tide washing condition as per AATCC 135
The rating is given on the basis of change in shade. Grade 5 being the best grading of 4 for color change is generally acceptable.

Quick Methods for Colorfastness to Chlorine:

One drop of chlorine bleach solution is placed on the sample and dabbed after 1 minute and color change of the sample is evaluated. A color fastness grading is of 4 which is normally acceptable.

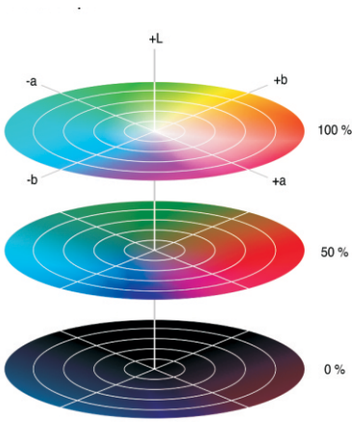





COLOUR DEEPENING AGENT : Sarabloom 881(New)

A serious drawback of synthetic fibers, especially polyester fibers, is the poor depth or sharpness of the color of dyed fibre or fabric, in comparison to natural fibers, such as wool and silk fibers. Large amount of work has been carried out to improve the depth or sharpness of the color of dyed substrate.

The color of a dyed fabric is be deep and sharp when it is wetted with water (as refractive index decreases from 1.77 to 1.33). Reflection of light occurs when the waves encounter a surface or other boundary that dose not absorb the energy of the radiation and bounce the waves away from the surface.



The amount of light reflected by an object and how it is reflected is highly dependent upon the degree of smoothness or texture of the surface, As a result wet surface decrease the refection of light and hence looks darker.

If a dyed fabric is treated with a agent having a low refractive index, a color deepening effect can be obtained which is similar to that attained by wetting the dyed fabric with.

In order to enhance the coloring effect by reducing the reflection of the surface layer and thereby increasing the quantity of light that is transmitted into the interiors of fibers of dyed textile, the formation of a layer having an appropriate refractive index on the fiber surface is effective and this results in a decrease in the lightness value (L value) which helps the textile dyer to increase the depth of the shade.

The deepening agent is a production which can make the reflectance spectroscopy of the dyestuff moving to the long-wave, and can raise the absorption intensity of the dyestuff to arise hyperchromic effect.

The research of deepening agent was attended more and more to resolve the phenomena of “lost color” and improve colour. Some dyestuffs can complex with multivalent metal ions, so that it can not only make the hyperchromic effect, but also generate slightly water complex in the surface of fiber to reduce the water-soluble of dyestuff and improve their fastness of wet and color fastness to sunlight.

Looking at the market demand to achieve the deeper blacks, Sarex has developed colour deepening product Sarabloom 881 (New) for polyester , cotton and their blends.

Sarabloom 881 (New) also gives good results on synthetic as well as natural fibres other than polyester or cotton.

Features of Sarabloom 881 (New):

1. It is used for all kinds of dyed and printed materials.
2. It is effective for increasing colour value of woven cloth, velvet or fleece fabrics.
3. Faulty dyed/printed fabric correction can easily be made.
4. Compatible with finishing agents.
5. Deeper shades with good durability to multiple home laundering.
6. Imparts outstanding colour deepening effects.

7. The colour depth of black and dark dyed fabric can be increased by 20-50 % depending on the type of dyed fabric as compared to the untreated fabric.

Application

Sarabloom 881 (New) was applied by padding on five different varieties of substrates as mentioned below :

1. F-2282 (100% cotton knit black),
2. F-2513 (100% PES black),
3. F-1186 (Black P/W fabric),
4. F- 2939 (Black micro PES),
5. F-3182 (Micro PES)

pH – 5.0-5.5, fabric was padded with 70% expression and dried at 90^{0}C for 2 min and cotton fabric was cured at 160^{0}C for 2 min and PES, P/W fabric was cured at 170^{0}C for 1 min.

The finished fabric was studied for various tests which are given belowto the different testings as mentioned below:

1. Colorant Strength
2. L- Value
3. Rubbing fastness ISO 105 Part X12
4. Chalk marks
5. HL-durability to finishing by AATCC- 135

Results

- Fabric finished with 20 - 30 g/l Sarabloom 881 (New) shows good colourant strength.
- The wet and Dry rubbing fastness is not impaired.
- Nail marks are not found on any of the finished fabric.
- Finished fabric is reasonably durable.

Colourant strength, shade changes and rubbing fastness of finished Cotton knitted fabric

Finishing agents	Colourant strength	dE	Da	Db	L	Rubbing fastness Dry	Wet
Initial							
Unfinished	100	-	-	-	13.768	4-5	2
20g/l Sarabloom 881 New	157	3.904	1.569	0.641	10.251	4	2
30g/l Sarabloom 881 New	163	4.095	0.599	0.944	9.829	4	2
After one home laundering							
Unfinished	100	-	-	-	13.768	4-5	2
20g/l Sarabloom 881 New	138	3.029	1.257	0.569	11.071	4	2
30g/l Sarabloom 881 New	149	3.380	0.697	0.073	10.461	4	2

Fabric finished with 20 and 30 g/l Sarabloom 881 New shows improvement in colourant strength in the range of 57 to 63 %. Also, the wet and Dry rubbing fastness is not much affected to most of the fabrics.

Colourant strength, shade changes and rubbing fastness of finished PES fabric

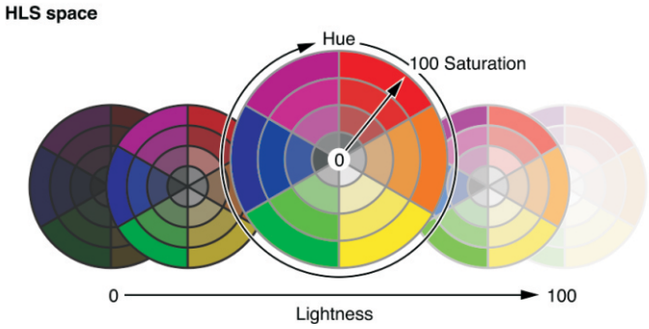
Finishing agents	Colourant strength	dE	Da	Db	L	Rubbing fastness Dry	Wet
Initial							
Unfinished	100	-	-	-	13.508	3-4	3
20g/l Sarabloom 881New	130	2.407	-0.073	0.861	11.261	3-4	4-5
30g/l Sarabloom 881New	132	2.600	0.182	0.908	11.078	3-4	4-5
After one home laundering							
Unfinished	100	-	-	-	13.508	3-4	3
20g/l Sarabloom 881New	111	1.015	-0.174	0.472	12.627	4-5	4-5
30g/l Sarabloom 881New	115	1.297	-0.173	0.440	12.300	3-4	4-5

Fabric finished with 20 and 30 g/l Sarabloom 881 New shows improvement in colourant strength in the range of 30 to 32 %. Also, the wet and Dry rubbing fastness is not much affected to most of the fabrics.

Colourant strength, shade changes and rubbing fastness of finished Black Micro PES fabric

Finishing agents	Colourant strength	dE	Da	Db	L	Rubbing fastness Dry	Wet
Initial							
Unfinished	100	-	-	-	13.543	4-5	4-5
20g/l Sarabloom 881New	117	1.835	0.105	1.315	12.267	4-5	4-5
30g/l Sarabloom 881New	126	2.327	0.504	1.454	11.797	4-5	4-5
After one home laundering							
Unfinished	100	-	-	-	13.768	4-5	4-5
20g/l Sarabloom 881New	116	1.511	0.156	0.715	12.221	4-5	4-5
30g/l Sarabloom 881New	124	2.014	0.353	0.394	11.600	4-5	4-5

Fabric finished Fabric finished with 20 and 30 g/l Sarabloom 881 New shows improvement in colourant strength in the range of 17 to 26 %. Also, the wet and Dry rubbing fastness is not much affected to most of the fabrics.



Colourant strength, shade changes and rubbing fastness of finished P/W fabric

Finishing agents	Colourant strength	dE	Da	Db	L	Rubbing fastness	
						Dry	Wet
Initial							
Unfinished	100	-	-	-	15.932	4-5	4-5
20g/l Sarabloom 881New	122	2.119	0.019	1.083	14.111	4-5	4-5
30g/l Sarabloom 881New	133	2.824	0.094	0.980	13.285	4-5	4-5
After one home laundering							
Unfinished	100	-	-	-	15.932	4-5	4-5
20g/l Sarabloom 881New	119	1.798	0.299	0.499	14.231	4-5	4-5
30g/l Sarabloom 881New	125	2.220	0.199	0.695	13.835	4-5	4-5

Fabric finished with 20 and 30 g/l Sarabloom 881 New shows improvement in colourant strength in the range of 22 to 33%. Also, the wet and Dry rubbing fastness is not much affected to most of the fabrics.

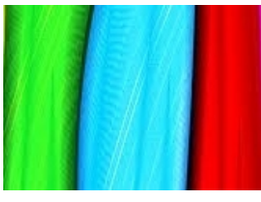
Colourant strength, shade changes and rubbing fastness of finished Micro PES fabric

Finishing agents	Colourant strength	dE	Da	Db	L	Rubbing fastness	
						Dry	Wet
Initial							
Unfinished	100	-	-	-	15.099	3	3
20g/l Sarabloom 881New	139	3.148	0.400	0.757	12.049	3	3
30g/l Sarabloom 881New	147	3.647	0.522	0.501	11.525	3	3-4
After one home laundering							
Unfinished	100	-	-	-	15.099	3	3
20g/l Sarabloom 881New	117	1.621	0.481	0.260	13.573	3	4-5
30g/l Sarabloom 881New	126	2.303	0.574	0.487	12.922	3	4-5

Fabric finished with 20 and 30 g/l Sarabloom 881 New shows improvement in colourant strength in the range of 39 to 47 %. Also, the wet and Dry rubbing fastness is not much affected to most of the fabrics.





WRINKLE- FREE FINISHING

Cellulosic fibre is still polpular due to its advantages. However, one of the main disadvantages is wrinkling after washing This can overcome by special kind of finish term resin finish. It is difficult to find the one best term to describe this class of finishes. Resin finishing quite often called

- " Wash & wear finish"
- " Anti crease finish"
- " Crease resistant finish"
- " Durable press finish"
- " wrinkle free finish

The wrinkle free treatment package comprises of a low formaldehyde resin, silicones and polyethylene emulsion. This treatment prevents the formation of creases and wrinkles which result in easy to iron fabric. Resins reduces the (tear) strength of cotton. The extent of the loss in tear strength depends on various factors such as:

- Concentration and type of resin
- Amount and type of catalyst;
- Curing conditions;
- Quality of cotton;

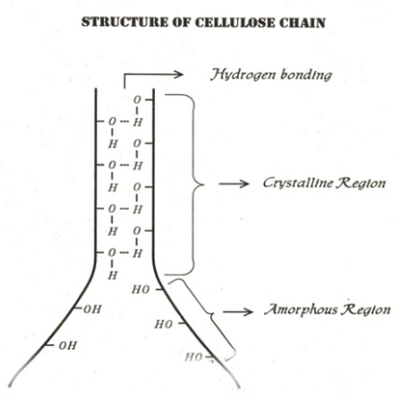
When a moisture absorbed cellulosic fiber is stressed, the internal polymer chains of amorphous areas and are free to move. Hydrogen bonds can reform between the polymer chains in their sifted position. With no restoring forces available, a newly formed wrinkle or crease will remain until additional processes (ironing for example) apply adequate moisture and mechanical forces to overcome the internal forces

Mechanism of crease formation

The primary cause of shrinkage of cellulosic fibers is the fact that these fibers can readily absorb moisture. This absorbed moisture facilitates internal polymer chain movements in the amorphous region and it disrupts the internal hydrogen bonding amongst these polymer chains.

How to prevent crease formation

The method of minimizing the formation of creases involves the reaction of the –OH groups of adjacent cellulose



macromolecules with some linking agents. The introduction of cross-linking imparts dimensional stability and elasticity to the fibrous material and makes it crease resistant and crease recoverable.

The most commonly used cross linking agents are nothing but Resins. The resins react with the –OH groups of cellulose forming Cross links which is durable and hence increases the Crease Recovery thereby dimensional stability of the fabric.

The recipe for Resin Finishing Recipe

Crosslinking agent-
Resin finishing is carried out with products known as crosslinking agents. These changes cellulosic fibres and their blends to crease resistant.

Catalyst-
Another essential component of the resin-finishing recipe is the catalyst. It allows the reaction to be carried out within the 130 –180 °C temperature range usually employed in the textile industry, and within the usual curingtimes .

Additives-
The purpose of the additives is to offset partly or completely the adverse effects

of the crosslinking agent. Thus softening and smoothing agents are applied not only to improve the handle, but also to compensate as much as possible for losses in tear strength and abrasion resistance.

Other additives serve to impart a special character to the fabric. Examples are stiffening and filling agents, water-repellents, hydrophilizing agents, etc

Surfactants-
Every resin-finishing recipe contains surfactants as emulsifiers, wetting agents and stabilizers. These surface-active substances are necessary to ensure that the fabric is wet rapidly and uniform

Resins mainly fall into following two groups

1. Deposition type resins

This type of resins is deposited on the fabric as surface coating. No reaction will take place between the fiber and resin. They include

- Phenol-Formaldehyde resins
- Urea formaldehyde resin
- Alkyd resins
- Ketone resins
- Vinyl resins

2. Cross Linking type Resins

These types of resins chemically react with the fiber and crosslink the fiber molecules. The type of finish obtained is durable and much better than deposition type.

They are also known as N–Methylol compounds as the Methylol groups ($-CH_2OH$) are attached to the nitrogen. The cross linking compounds are commonly called resins. The pre condensates further polymerize to form resins.

The following are some of the cross linking agents mostly used for crease resistant finishing:

- DMU (Di methylol Urea)
- DMEU (Di methylol Ethylene Urea)
- DMDHEU (Di methylol Di hydroxy Ethylene Urea)
- DMPU (Di methylol Propylene Urea)
- Tri methylol melamine/Melamine formaldehyde)

Catalysts for easy-care and durable press finishes

- The reaction of DMDHEU with cellulose requires an acid catalyst for acceptable yields under conditions suitable for textile processing.
- The most common catalysts are Lewis acids such as magnesium chloride and zinc nitrate that generate acid conditions during curing process, thus providing neutral liquors & good finish bath stability.
- Sulfuric and hydrochloric acids and their ammonium salts serve as excellent catalysts but also lead to undesirable fiber degradation.
- Often citric acid is combined with Lewis acid to provide additional boost to reactions especially for short shock condensation.

Advantages

- It improves the Crease Resistance and Crease Recovery .
- It reduces the shrinkage of the fabric during laundering.
- It imparts a smooth and quick drying .
- It improves Resilience, Handle and Draping qualities.
- It improves dimensional stability.
- It prevents the Inter molecular Slippage in the fibre core.

Disadvantages

- It decreases the Tensile and Tear strength.
- It decreases the Abrasion resistance.
- It gives unwanted Harsh and Stiff feel.

Incorporation of proper softener and catalyst in the pad bath can reduce the loss in the above mentioned properties of the fabric.

Effects influenced by the right selection of resin with finishes

- soft handle effect
- improvement of tear strength
- improvement of crease recovery angle
- improvement of wash and wear appearance (DP rate)
- wash and wear properties

The most widely used crosslinking agents in resin finish has been N-methylol agents or N-methylolamides because of their efficiency and low price. These reactants fall in the category of formaldehyde reactants and they release formaldehyde vapors at high temperature curing which is not acceptable.

The achievement of good finishes and of the very low formaldehyde release from cotton fabrics treated with formaldehyde reactants depends on the type of reactant, the catalyst, time and

New Development at Sarex

CROSSLINK 618 Conc

Unique Features:

- Crosslink-618 (Conc) is ultra low formaldehyde cross-linking agent for easy care finishing of cellulosic and its blend with synthetic fibres.
- Effective at low temperature hence very good DP rating depending on recipe.
- Saves energy.
- No influence on whiteness.
- Highly suitable for Garment finish as post-cure process.
- Effectively apply in conventional curing ovens.
- Excellent strength retention, therefore is recommended for application to knitwear and lighter cotton substrate.
- Release formaldehyde in fabric is low (below 75ppm).

Low Temperature curing resin: CROSSLINK 618 Conc

A energy-efficient route for textile finishing

temperature of cure.

To achieve the best finishes and the least formaldehyde release of N-methylol compounds, all these factors must be controlled carefully.

In the occupational Safety and Health Administration (OSHA) list formaldehyde as a hazardous and toxic substance and has set the upper limit for formaldehyde in air at 0.75 parts per million average over an eight-hour work shift.

Low Temperature resin for Easy Care finishing on cotton and cotton blended cloth, which significantly contributes to saving resources and protect climate while achieving good performance on fabric.

It can be applied in low temperature curing process . Also it saves energy than conventional process.

In order to check the performance of low temperature curing resin, Crosslink 618 Conc, finishing was carried out on 100% cotton poplin with the following recipe:

Recipe for finishing:

Recipe	: I	: II
Crosslink 618 (Conc):	70 g/l	: 80 g/l
Tearnon conc	: 15 g/l	: 15 g/l
Hydrosoft DRM(N)	: 20 g/l	: 20 g/l
$MgCl_2$	: 14 g/l	: 16 g/l
Citric acid	: To adjust pH 5-6	

Application:

The fabric was finished by padding application as follows:

Fabric was padded with 70% expression and dried at 110^{0}C for 2 min and cured at 130^{0}C for 3 min.

The finished fabrics were tested for DP rating by AATCC - 124 & Tear strength by ASTM D – 1424

Remarks:

From the results clearly indicates that Crosslink 618 Conc of 70-80 g/l gives D.P rating 3 -3.25 and loss in strength is around 2%.

Concentration for easy to iron finish on 100% cotton or viscose/ and blend.
Crosslink-618 (Conc) 60-70 g/l
(depending on the quality of fabric)

Concentration for Non-Iron finish on 100% cotton
Crosslink-618 (Conc) : 120-160 g/l

Concentration for Wrinkle free treatment of garments :
Crosslink-618 (Conc) 6-12%

Recipe no.	DP rating	Tear strength				
		Warp, kgf	Weft, kgf	Warp, %	Weft, %	Gain/ loss,%
Unfinished	-	1.044	0.787	-	-	-
I	3.0	0.998	0.874	-4.41	11.05	+ 2
II	3.25	0.998	0.791	-4.41	0.51	-2

ESTIMATION OF FORMALDEHYDE

DETERMINATION OF FREE FORMALDEHYDE

In 250 ml conical flask take 2 ml of sample under test, add 25 ml of 6% solution of sodium sulphite, ice cubes to maintain temperature between 0-5 c, add 5 ml of 1N sulphuric acid and titrate with 0.1n caustic soda using Thymolphthalein indicator (A). Carry out blank titration, reading should be around 50 ml (B). Titrate 2 ml 0f sample in 50 ml distilled water using 0.1N caustic soda(C) .

Calculation:

Free formaldehyde content (w/v) =
{B- (A-C)}x 0.003 x100 / 2

Preparation of standard solution:

- Sodium Sulphite 0.5 M (6.3 gms in 100 ml distilled water)
- 0.1 N HCL (8.6 ML in 1000 ml distilled water)
- 0.1 N NaOH (4 GM IN 1000 ml distilled water)
- Thymolphthalein indicator

Procedure:

Solution A: Take 0.5 gm Product in a 250 ml beaker. Add 20 ml distilled water at 50°c and add 3 drop of indicator and adjust to just Blue colour with 0.1 N NaOH/ 0.1 N HCL.

Solution B : Prepare 30 ml of 0.5 M Sodium Sulphite at 50°c, add 3 drops of indicator and adjust to light blue with 0.1 N NaOH.

Mix solution A&B and titrate against 0.1 N HCL till colourless. Reading = R

Calculation:

Free Formaldehyde = (R x Normality of HCL x 3) / Wt. of sample

Standardization of Formaldehyde Stock Solution. AATCC 112

Principle:
An aliquot of the stock solution is reacted with an excess of sodium sulfite followed by a back-titration with standard acid solution in the presence of thymolphthalein as indicator.

Apparatus: 10-mL volumetric pipette, 50mL volumetric pipette, 50mL burette, 150mL Erlenmeyer flask.

Reagents: 1 M sodium sulfite (126 g Anhydrous Na2SO3/L), 0.1% Thymolphthalein Indicator in ethanol, 0.02 N sulfuric acid (can be purchased in standardized form from chemical supply companies or must be standardized from standard NaOH solution).

Do not use commercial standardized sulfuric acid that has been stabilized with formaldehyde. If there is a doubt, check with the chemical supplier.

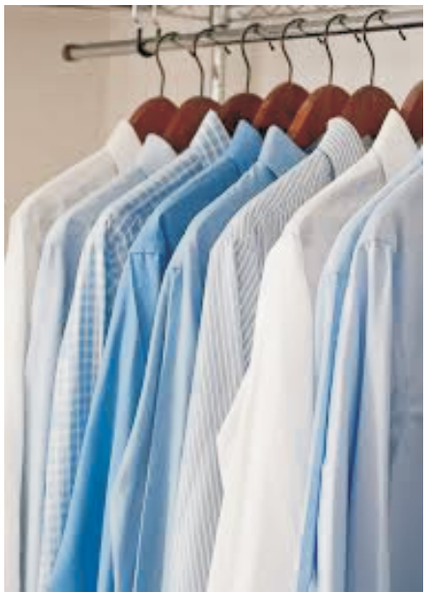
Procedure:

1. Pipette 50 mL of 1 M Na2SO3 into the Erlenmeyer flask.
2. Add 2 drops of thymolphthalein indicator.
3. Add a few drops of standard acid until blue color disappears (if necessary).
4. Pipette 10 mL of the stock formaldehyde solution to the flask(Blue color will reappear.)
5. Titrate the solution with the standard 0.02 N H2SO4 until the blue color is discharged.
6. Record the volume of acid used. (The volume of acid should be in the range of 25 mL for 0.02 N acid.)

Calculations

$C = (30{,}030)(A)(N)/10$

where:
C = Wt/Vol concentration of formaldehyde (µg/mL)
A = Vol of acid used (mL)
N = Normality of acid



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