Sarex

Vol. 20, Issue 70, Jan 2026

Saraquest

Exclusive Insight

TEXTILE CHEMICAL MANUFACTURING

"Customer Delight" is the key strategy of **Sarex Chemicals** as its main motto is to provide solutions to the customers rather than selling products.

Sarex Chemicals is a bluesign® system partner, Oekotex Ecopassport certified and an official contributor of the ZDHC (Zero Discharge of Hazardous Chemicals) program. Most of the products offered by Sarex are REACH Pre-Registered and more than 180 products are GOTS certified. Moreover, Sarex also has been accredited by :

- **ISO 17025 : 2017** (NABL Certified Laboratory)
- **ISO 45001 : 2018**
- **ISO 14001 : 2015**
- **ISO 9001 : 2015**

TABLE OF CONTENTS

1. SARAKOL-RDL **03-05**
Dye Bath Conditioner For Reactive Dyeing

2. ESTOFEEL (CONC)-481 ... **06-08**
Moisture Management Finishing Agent

3. BIOPOL-PLUS **09-11**
Bio-polishing In Textile

SARAKOL-RDL

Dye Bath Conditioner For Reactive Dyeing

Reactive dyes are a major class of dyestuffs used for the dyeing of cellulosic materials such as cotton and viscose. As the name implies, these dyes have the tendency to chemically react with hydroxyl group of cellulosic materials and form covalent bond, thereby producing good fastness properties to the dyed materials. These dyes produce brilliant colours with reasonable fastness properties, and for that reason they are the most preferred dye for dyeing of cellulosic materials.

With growing demand for high-fashion knitwear for branded garments, dyestuff manufacturers and machine manufacturers have concentrated on developments for dyeing of cotton yarn in package form and dyeing of cotton knits. Such developments include short-liquor ratio dyeing machines, machines with high liquor circulation, sophisticated controls for liquor ratios, dosing, temperature control, etc.. In spite of such developments, there are still instances of unlevel dyeing, batch-to batch variation, dye specks etc. Unlevelness in exhaust dyeing of reactive's can occur due to one or more of the following reasons. Due to these reasons, sometimes there is presence of unfixed dye which leads to poor fastness and lowering of depth of shade.

- Poor solubility of dyes in the presence of salt and alkali.
- Calcium hardness in water due to hardness of process water, hardness from salt or improper demineralization of cotton prior to dyeing.
- Too rapid dosing of dyes, salt and alkali, leading to uneven exhaustion in salt phase and uneven fixation in fixation phase.
- Too strong alkali for fixation, rapidly changing fixation pH.

In textile wet processing, the most substantial and influential role is played by water, so the quality of colouration is vastly dependent on quality of water. "Right First Time" dyeing hugely depends on the quality of water. Water contains hardness in the form of Ca and Mg salts, alkalinity, turbidity etc., which leads to dye precipitation and the precipitates can further promote dye aggregations, which results in colour specks and loss of depth. The other problem in reactive dyeing is hydrolysis of the dyestuff in the water due to sudden change in pH of the dye bath to alkaline. This leads to lower depth of shade and poor washing and rubbing fastness. As reactive dyes have very high affinity towards the cellulosic fabric in alkaline pH and in presence of salt, the strike rate of the dye towards the fabric is very high leading to patchy dyeing.

To overcome the above problems and to achieve "Right First Time" dyeing, Sarex has developed a product, **Sarakol-RDL**, which can be used during reactive dyeing. Sarakol-RDL will help in improving the solubility of the dyestuff in presence of calcium ions thereby preventing precipitation of dyestuffs during package dyeing and dyeing at low liquor ratio. It will also help in reducing the strike rate in salt phase and also due to its buffering action it will lead to gradual increase in pH leading to even dyeing.

UNIQUE FEATURES

- Sarakol-RDL is a dye bath conditioner for Reactive dyeing. It is a solubilising cum dispersing cum leveling agent for Reactive dyes.
- Improves the solubility of reactive dyes under adverse conditions of dyeing's such as low liquor ratio, poor quality of salt, hardness in water, poor solubility of dyestuff.
- Prevents dye agglomeration resulting in leveling dyeing.
- Use of urea can be eliminated by addition of Sarakol-RDL hence BOD values of the effluent can be reduced considerably.
- Ideal for sensitive shades like turquoise blue.
- It does not affect colour value or tone and hence recipe correction not required.
- It is low foaming and suitable in Soft flow, Jet and package dyeing machines.
- Can also be added in print paste to obtain brighter and uniform print.

MECHANISM

Dye molecules need to be dispersed in water before they are adsorbed onto or react with textile fibres. However, their low aqueous solubility and self-aggregation make this dispersion into water problematic. Furthermore, low dye solubility leads to self-aggregation in water, which becomes more prominent as the concentration of the dye increases. Solubilizing agent like Sarakol-RDL, enhance solubility and prevent aggregation through mechanisms involving the disruption of intermolecular forces and the promotion of solvation.

APPLICATION PROCESS

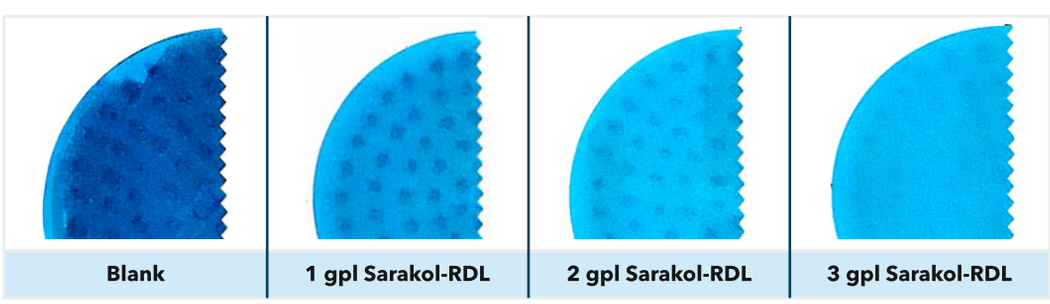
Process	Recommended Dosage
Continuous process	3-6 gpl
Exhaust method	0.5-2 gpl

PRODUCT PERFORMANCE DATA

Solubilizing / Dispersing action in hard water

Solution of Reactive dye (6 gpl C.I. Reactive Blue 21) alongwith 80 gpl salt is prepared in 300 ppm hard water in presence and absence of sequestering agent. The solution is heated at 60°C for 60 min. and after cooling, the dye solution is passed through a Whatmann filter paper.

Formation of dye precipitate indicates the salting out of reactive dyes because of calcium salts present in hard water. If no precipitation observed, it indicates that reactive dye molecules are in active form.



Leveling efficiency of Sarakol-RDL in adverse condition

Dyeing with
2 gpl Sarakol-RDL

Dyeing with
2 gpl Competition Product

Sarakol-RDL does not have any retarding effect. Better colour yield is achieved with level dyeing.

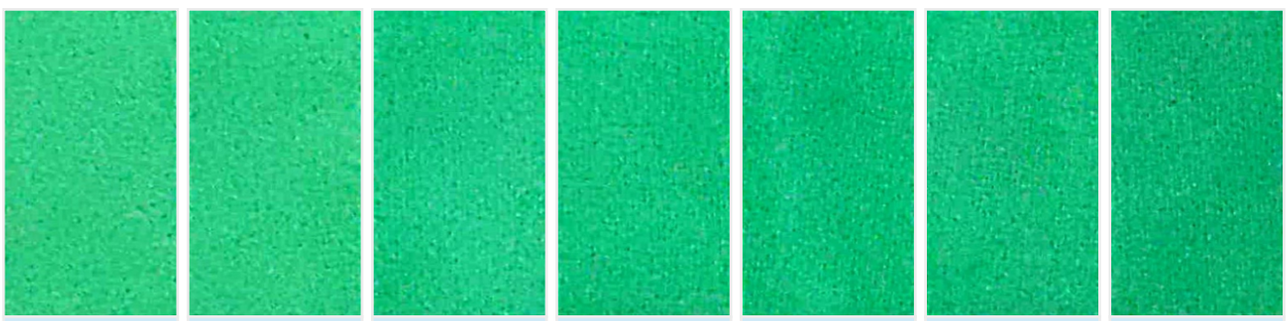
Dyed with 2 gpl Sarakol-RDL
in 250 ppm hard water

Dyed with 2 gpl Sarakol-RDL
in 500 ppm hard water

Sarakol-RDL works under adverse condition.

On-tone build-up in exhaustion

Sarakol-RDL helps to maintain on-tone build-up in exhaustion and fixation phase thus making it easier to follow the progress of dyeing.



15 min. in Salt	30 min. in Salt	5 min. in Salt + Soda	15 min. in Salt + Soda	30 min. in Salt + Soda	45 min. in Salt + Soda	60 min. in Salt + Soda

CONCLUSION

Sarakol-RDL, a chemical additive that stabilizes the dye bath, prevents dye precipitation (especially with hard water or high salt/alkali), disperses dyes evenly, and helps remove unfixed dyes, leading to brighter, level, and reproducible colours by managing metal ions and dye solubility during dyeing and washing ensuring a smoother process and better final fabric quality.

ESTOFEEL (CONC)-481

Moisture Management Finishing Agent

Moisture management is defined as the controlled movement of water vapour and liquid water (perspiration) from the surface of the skin to the atmosphere through the fabric/garment. This process of managing the environment between the skin and the fabric surface enables heat and moisture to be buffered to acceptable levels, providing a micro-climate for the body. The ability of a garment to adjust the moisture gradient between the wearer's skin surface and the external environment is a key factor in the provision of wearer comfort, and can have a direct impact on wearer performance. It is one of the key performance criteria in today's apparel industry. It is a category of apparel that has been dominated over the past two decades by companies like Nike (dry fit), Adidas (climacool) and Under Armour who have manufactured athletic wear that purport to keep athletes dry during periods of intense competition.

The ability of a textile to manage moisture is an important factor in enhancing wearer comfort and physical performance. Wetting, wicking, and moisture vapour transmission (MVT) properties are critical aspects for evaluating the comfort performance of textiles with moisture management finishes. The action of moisture management prevents perspiration from remaining next to the skin. In hot conditions, trapped moisture may heat up and lead to fatigue and in cold conditions, trapped moisture will drop in temperature and cause chilling and hypothermia. Excess moisture may also cause the garment to become heavy, as well as cause damage to the skin from chafing. The heat- and moisture- transmitting properties of a fabric are the key factors that affect textile and clothing comfort and decide the handle quality of some special functional clothing. Moisture transmission through textiles has a great influence on the thermo-physiological comfort of the human body. While the body has an extremely efficient moisture management system, this can be severely impacted if the garment system does not work in synergy with the body. Therefore, it is extremely important for a garment system to be capable of actively managing moisture in a way that is complementary to the body. The higher the rate of wicking and evaporation, the better is the fabric performance.

Fabrics made from natural fibres such as cotton are considered comfortable for use under normal conditions; their properties make them unsuitable for use during strenuous activity. Cotton fibres absorb high levels of moisture, leading to a feeling of wetness and cling. It has a very slow wicking rate from inner garment to the outer garments. This makes cotton fibres unsuitable for use against the skin during strenuous activity, as in the case of sportswear.

Polyester has a low moisture regain (0.4%) compared to cotton (8%) therefore synthetic fabrics will not absorb and wick water. This drawback of hydrophobicity can be overcome by the use of a hydrophilic polymer. When applied on polyester this forms a durable polymer film that interacts readily with water, imparting a hydrophilic finish which is imparted by amino-silicone softeners. It increases the moisture absorbency of polyester fabrics

and also remains durable to repeated home launderings. This durable treatment enhances wearer comfort and improves the wetting action of polyester fibres, fabrics and garments. Polyester microfibres have excellent resistance to dirt, alkalis, decay, moulds and most common organic solvents. It is the fibre used most commonly in base fabrics for sportswear and active wear because of its low moisture absorption and easy care properties. Micro-denier polyester fabrics used in base layer clothing has to be chemically treated so that they are able to wick moisture. This can be done by coating the fabrics with a hydrophilic finish using amino-silicone softeners. These treated fabrics are able to provide a good combination of moisture management, softness and insulation.

With this background, Sarex has developed a product **Estofeel (Conc)-481**, a moisture management finishing agent in powder form. When a synthetic material is subjected to this moisture management treatment, it develops improved hydrophilicity followed by very fast drying behaviour. In the case of synthetic blends subjected to this treatment, their drying rate becomes much faster. In the case of natural fibres it is the reverse - very good absorbency and slow drying rate. The drying rate of treated polyester is four times higher than treated cotton. Polyester/Cotton blends subjected to moisture management treatment will have increased absorbency. The polyester will dry more quickly than cotton and while it dries it keeps on absorbing from the cotton and quickens the drying process.

Wicking, wetting and drying rate are test methods through which the moisture management efficiency can be determined.

UNIQUE FEATURES

- Imparts hydrophilic and thereby comfort properties on polyester and polyester rich blends.
- Concentrated and economical.
- Available in powder form and can be easily diluted up to 20%.
- Compatible with dyeing recipe by exhaust process.
- Applicable by padding as well as by exhaust method.

DILUTION

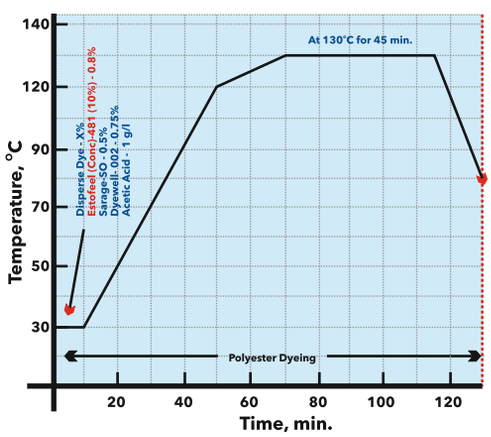
Procedure to prepare 20% Estofeel(Conc)-481

- Take 80 parts of DM water of 60-70°C.
- To this, gradually add 20 parts of Estofeel (Conc)-481 with constant stirring using paddle stirrer (50-100 rpm).
- Continue stirring at 60-70°C for 60-90 mins. to get homogenous product.
- Lower down the temperature to 40°C under constant stirring.
- Filter/Strain the finished product to remove un-dissolved particles/lumps if any.

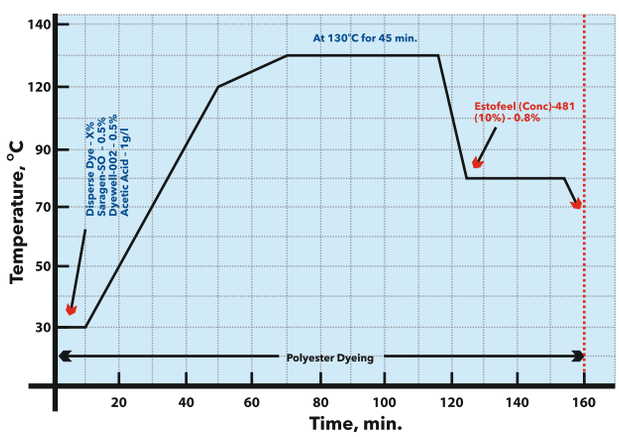
APPLICATION

Estofeel (Conc)-481 Application on Polyester Fabric

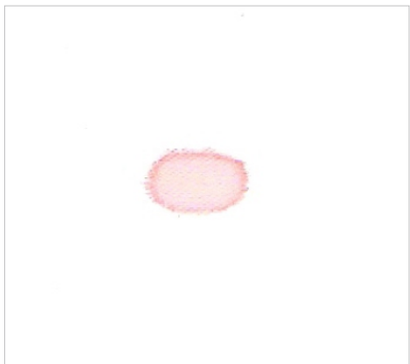
Estofeel (Conc)-481 at Start



Estofeel (Conc)-481 after Dyeing

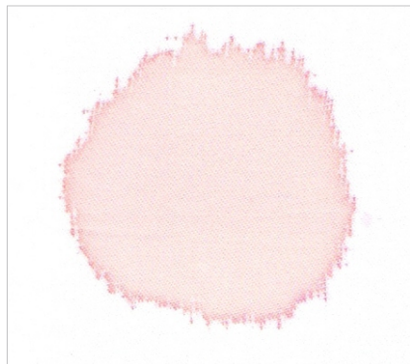


RESULTS



Untreated

Estofeel (Conc)-481 shows excellent improvement in the wicking property of the fabric which is clearly visible from the spreading behavior of the drop.



Treated with Estofeel (Conc)-481

CONCLUSION

Estofeel (Conc)-481, developed in powder form demonstrates excellent potential for enhancing textile performance. Its ease of dilution, coupled with superior wicking and hydrophilic properties, makes it a viable option for industries seeking efficient moisture management solutions.

BIOPOL-PLUS

Bio-polishing In Textiles

In the recent years, enzymes have found a variety of uses in textile applications. Popular uses are stone washing of denims and surface modification of cellulosic fabrics to improve their appearance and handle. In case of denims, one can get stone-wash effect without using pumice stones by using enzymes. Surface cleaning of cellulosic can be achieved with Cellulase enzyme.

Another advantage of using enzymes is that, these are environmental friendly, as they are readily biodegradable. Besides, they will not leave chemical residue on the processed materials and the colour change on the dyed goods is very less.

Cellulase is the most popular and versatile enzyme used in textile wet processing for bio-preparation, bio-polishing and softening of cellulosic fibres. The process of treating the fabric with cellulases is termed as bio-polishing.

Bio-polishing is an environmentally friendly process which uses enzyme to extend the lifetime of the fabric. It is a process in which the cellulase enzyme acts on the surface of the cellulosic materials. The cellulase enzyme remove the protruding fibres from the fabric surface leaving the fabric surface clean. Bio-polishing enhances the fabric quality by decreasing the pilling tendency and fuzziness of (cellulose) knitted fabrics possibly due to the fact that there is fewer protruding fibre ends from the yarns on the fabric surface.

Objective of Bio-polishing in Textile

- To remove protruding fibres, hairiness, fluffs and pills.
- To soften the fabric hand and improved handle.
- To achieve clean and smooth surface
- To improve material texture relaxation and increased flexibility.

The process employs the same cellulase action i.e., cleavage 1-4 β glucosidic linkage of cellobiose chain to remove fine surface fibrils and micro fibrils from cellulose. The presence of fibrils on the fabric surface may result in the pill formation and a faded or dull appearance due to an apparent loss of colour and increased diffuse reflection of white light on fabric surface which ultimately reduces the value of final articles. The hydrolysis action of the cellulase enzyme weakens the protruding fibres to the extent that a small physical abrasion force is sufficient to break and remove them. The enzymatic removal of fibrils results in softer and cleaner articles which are free from surface hairiness and neps with much improved handle and flexibility and which retain the original colour of the fabric. The fabric surface becomes smoother and more lustrous. Again, bio-polishing is a sustainable process as enzymes are sustainable alternative to the use of harsh chemicals in industry and reduce energy and water consumption, as well as chemical waste production during manufacturing processes.

Cellulases are high molecular colloidal protein bio-catalyst in metabolite form. Enzymes or cellulases have a

protein like structure with primary, secondary, tertiary and quaternary structures and that are susceptible to degradation due to temperature, ionizing radiation, light, acids, alkali, and biological effect factors. They are usually classified by the pH range in which they are more effective and, accordingly, acid cellulase, neutral cellulase and alkaline cellulase.

Sarex have an enzyme **Biopol-PLUS**, a neutral cellulase, multicomponent enzyme which is effective for bio-polishing and peroxide killing in one stage operation. Biopol-PLUS can be used for cellulosic fabric and its blends. Biopol-PLUS does not show strength loss or shade changes. Since it is a neutral cellulase enzyme, it will ensure a higher degree of whiteness than expected acid cellulases for full white fabric. It can be used in soft flow machine and garment dyeing machine.

Mechanism of Bio-polishing with Biopol-PLUS

When cotton fabric is treated with Biopol-PLUS, under optimum condition, the cellulase enzyme hydrolyze the cellulose by reaching to the 1-4 β glucoside bond of the cellulosic molecule. Cellulase enzymes selectively attack and weaken the surface micro-fibrils (short, loose fibers) on the fabric. Cellulases enzymes are large molecular complex and can't penetrate into the interior of fabric, hence enzyme action takes place preferentially on the surface. As a result of which the fabric surface becomes smooth with the loss of surface fibres and the handle becomes soft. Though the effects of cellulase hydrolysis remain as the surface phenomena, changes in many physical aspects as well as mechanical properties of fabrics take place during the processing. Improvement in the handle value is obtained on account of the changes that take place during the reaction. An important aspect of cellulase for textile application is their relatively slow kinetics which allows the modification of cellulosic fibres in a controlled manner without excessive damage.

Bio polishing with Biopol-PLUS can be carried out at any stage of wet processing but most conveniently performed after bleaching. In addition, this is a permanent process and it keeps the fabric in good condition after repeated washing; consequently, products become more attractive to the customer and fetch better prices. Bio-polishing of cotton fabric can also be carried out either before or after the dyeing process. The effect of cellulase treatment on colour yield of cotton is of great importance to the dyers in both cases.

UNIQUE FEATURES

- Concentrated, multi-component enzyme which enables bio-polishing and peroxide killing in the same bath (after bleaching).
- Controlled action hence no shade change in dyed material or strength loss.
- Applied at wide pH range.
- Saving in water, time and energy hence economical.
- Retain brightness of full whites.
- Eliminates residual peroxide.
- No shade changes during dyeing.
- Stable to anionic auxiliaries and salt (sodium sulphate, sodium chloride). Can be used during dyeing.

APPLICATION

Recommended Application Process

Equipment	- Jet dyeing machine or garment dyeing machine.
Biopol-PLUS	- 0.6-0.8 % (depending on requirement)
pH	- 5.0-6.5
Temperature	- 50-55°C
Treatment time	- 30-45 min.

Check residual peroxide after 15-20 min. and ensure it is absent and then follow dyeing as per customer's dyeing procedure. During exhaustion of dye, bio-polishing will also be simultaneously taking place. To prevent any damage of the fabric after the finishing operation, it is very essential that the reaction be terminated at the end of treatment by enzyme inactivation. If the enzyme is not inactivated entirely, the fibres may get damaged and even extreme cases total destruction of the material may result. The enzyme inactivation is therefore of great importance.

There are two distinct process of termination of enzyme:

- By adding alkali in the bath which will inactivate the enzyme and also promote dye fixing.
- By increasing the temperature to 80°C for 10 mins.

Bio-polishing Process in Textile

Process Sequence

Conventional Process	Biopol-PLUS Process
Pre-treatment: 110°C, 30 min. 0.8 gpl Wetting Agent 1.0 gpl Lubricating agent 0.5 gpl Stabilizer 3.0 gpl Caustic 3.0 gpl H_2O_2	**Pre-treatment: 110°C, 30 min.** 0.8 gpl Wetting Agent 1.0 gpl Lubricating agent 0.5 gpl Stabilizer 3.0 gpl Caustic 3.0 gpl H_2O_2
▼	▼
Neutralisation : Room temp., 10-15 min. 1.0 gpl Acetic Acid 0.75 gpl Core Alkali Neutralizer	**Neutralisation : Room temp., 10-15 min.** 1.0 gpl Acetic Acid 0.75 gpl Core Alkali Neutralizer
▼	▼
Peroxide Killing: Room temp., 10-15 min. 0.5 gpl Peroxide killer Run for10-15 min.	**Peroxide Killing & Bio-polishing** Check the bath pH 6-6.5. Add 0.8% Biopol-PLUS, 55°C, 30 min. Raise the temperature to 80-85°C and run for 10 min.
▼	▼
Bio-polishing 1.5% Bio-polishing enzyme, 55°C, 30 min. Raise the temperature to 80-85°C and run for 10 min.	**Dyeing** As per customers' procedure
▼	
Dyeing As per customers' procedure	

CONCLUSION

Biopol-PLUS, being an enzyme is a sustainable alternative to the harsh toxic chemicals in the textile industry. There is a wide range of applications and a multitude of prospects for the use of enzymes in textile processing, leading to a positive impact on the environment.

Sarex

Get In Touch

Corporate Office:
501 - 502, Waterford, 'C' Wing, C D Barfiwala Marg,
Juhu Lane, Andheri (W), Mumbai - 400 058, India.

Plants:
N-129, N-130, N-131, N-132 & N-232, MIDC,
Tarapur - 401 506, India.

+91 (22) 6128 5566
+91 (22) 4218 4218

+91 (22) 4218 4350

tcexn@sarex.com
tcexp@sarex.com

www.sarex.com

C E R T I F I C A T I O N S

BLUESIGN | OEKOTEX | ROADMAP TO ZERO | GOTS | M&S | ISO 9001:2015 | ISO 14001:2015 | ISO 17025:2017 | ISO 45001:2018 | THREE STAR EXPORT HOUSE