



**Sarex**

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# Saraquest

Exclusive Insight

**CHEMISTRY BEHIND  
GOOD FEELINGS**



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## 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. Most of the products offered by Sarex are REACH Pre-Registered and more than 100 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**

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## NYLOFIX-9176

### Phenol Free Nylon Dye Fixing Agent

**A**cid dye fixing agents are mainly used for improving the wet fastness properties of acid dyes for dyeing nylon and nylon/spandex fabrics. Acid dyeing is mainly carried out in acidic condition. Under the acidic condition, the terminal amino groups of the nylon fibres absorb hydrogen ions. The acid dye being anionic in nature, is absorbed on cationically charged amino end groups of the nylon and the nylon/spandex fabrics and hence the dyeing takes place. The acid dye absorbed on the fabrics through anion-cation bonds has poor wet fastness, and the dye is easily eluted from the fabrics through soaping and other modes. In particular to nylon/spandex woven elastic fabric, because spandex is difficult to color and has poor binding force, acid dye is only adhered to the surface of spandex fibre, and is easier to fall off, the color fastness of the nylon/spandex woven elastic fabric dyed by the acid dye is poorer. In order to improve the color fastness of the nylon and nylon/spandex dyed fabric, the dyed fabric is treated with an acid color fixing agent to perform color fixing treatment after dyeing is finished, so that the wet fastness of the dyed fabric is improved. These dye fixing agents are typically compounds of low molecular weight polymers with anionic groups which can associate with the nitrogen containing groups of polyamide polymer and form a surface layer that reduces the diffusion of the dye out of the treated fibre.

At present, the acid dye fixing agents available in the market are based on product mainly formed by the condensation reaction of 4,4'-dihydroxy diphenyl sulfone, 4-hydroxy benzene sulfonic acid and formaldehyde under alkaline conditions; or 4,4'-dihydroxy diphenyl sulfone, acetic anhydride, concentrated sulfuric acid and formaldehyde under acidic conditions. The chemicals in this group are polymers with monomer that contains Phenol (CAS no. 108-95-2) and Bisphenol-S (4,4'-sulfonyl diphenol, CAS No. 80-09-1). Bisphenol-S is an endocrine disruptor and has comparable health risks to that of Bisphenol A. Additionally, Bisphenol-S exposure has been linked to impaired neural function. The substance, Phenol, 4,4'-sulfonyl diphenol or Bisphenol-S is identified as a high priority for assessment of human health risk because it is considered to present great potential for human exposure and had been classified by agencies on the basis of reproductive toxicity. Also the chemical authorizing bodies has revamped the safety guidelines for chemicals used in textiles. The annual revision of chemical substance restrictions has incorporated new legal classification of chemical substances, new legal consumer safety limits and revised risk assessments. New limits for Bisphenol S, Bisphenol F, and Bisphenol AF limits are defined.

Considering the revised guidelines, legal consumer safety limits and restriction on Phenol and Bisphenol-S content in the product, Sarex has developed a product **Nylofix-9176**, a nylon dye fixing agent which is completely Phenol free, Bisphenol-A, Bisphenol-F and Bisphenol-AF free with trace quantity of Bisphenol-S. Following mentioned are the unique features of this product.

■ **UNIQUE FEATURES**

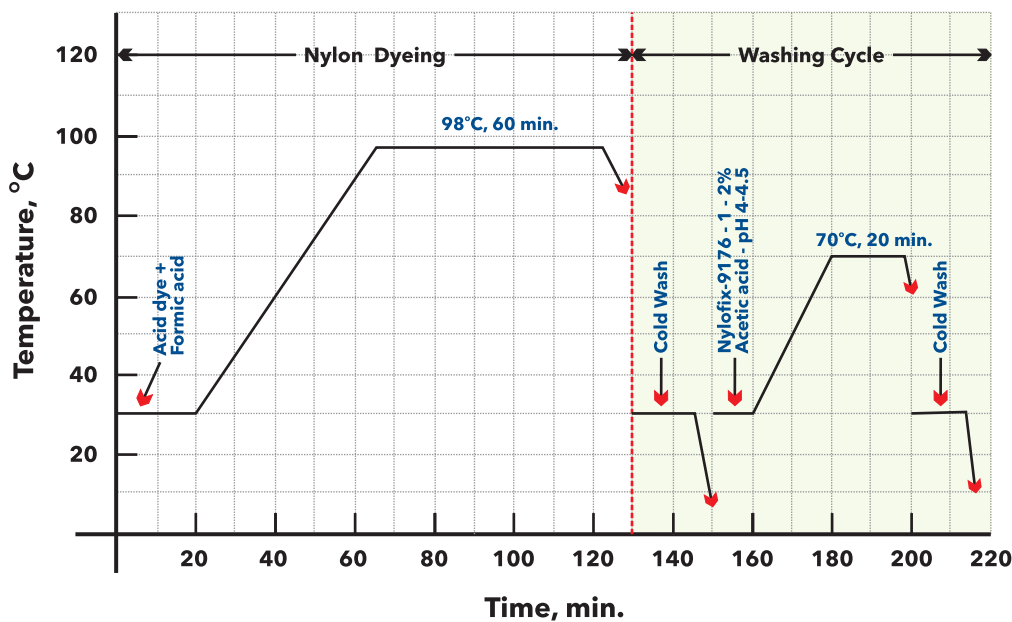
- PHENOL FREE Dye fixing agent for Nylon and Wool fabric dyed with Acid dyestuffs.
- Available in powder form.
- Meets the stringent ecological criteria.
- Dye fixing performance is equivalent with the Conventional phenol based nylon dye fixing agents.

■ **MECHANISM OF ACTION**

Nylofix-9176 is an anionic product and has the capacity to block the cationic sites of the fabric hence during laundering, the unfixed acid or metal complex dye are unable to tint the adjacent fabric.

■ **APPLICATION**

**Nylofix-9176 - Dye fixing of Acid / Metal complex dyes - Exhaust Process**


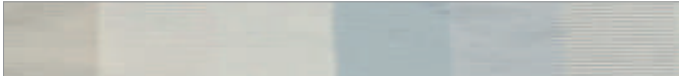
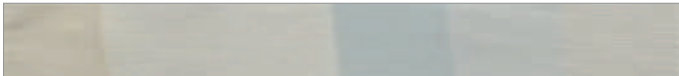
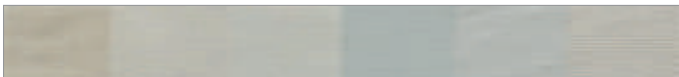


Dyefixing was carried out by Exhaust application:  
Nylofix-9176 : 1-2%

pH 4.0-4.5, M:L - 1:10,  
70°C, 30 min. → Squeeze → Dry

## ■ RESULTS

### Colour fastness to Washing - ISO 105 C10 - 60°C

		WO	PAN	PES	PA	CO	ACE
 3% C.I. Acid Blue 113	Blank						
	1-2% Nylofix-9176						
	1-2% Conventional						

ACE : Acetate, CO : Cotton, PA : Nylon, PES : Polyester, PAN : Acrylic, WO : Wool

## ■ PHENOL AND BISPHENOL-S CONTENT IN THE PRODUCT

Phenol	(CAS no.108-95-2)	= Not detected (HPLC-MS)
Bisphenol-S	(CAS no.80-09-1)	= 57.3 ppm (LC-MS)



#### TEST REPORT

Report No. : CH:TX:1442053047

ISSUE DATE : 21/11/2023



#### NON ACCREDITED TEST(S)

#### R E S U L T S

#### REQ

#### FREE PHENOL CONTENT

Solvent extraction / Analysis by HPLC-MS

	Result (mg/kg)
<u>1</u>	
Phenol Content (CAS NO.108-95-2)	ND
ND - Not Detected	
mg/kg = ppm	
Reporting limit : 20 mg/kg	



#### TEST REPORT

Report No. : CH:TX:1442053048

ISSUE DATE : 22/11/2023



#### NON ACCREDITED TEST(S)

#### R E S U L T S

#### REQ

#### BISPHENOLS

THF extraction. Analysis was conducted by LC-MS.

<u>1</u>	
Bisphenol S (BPS) (CAS NO.80-09-1)	57.3 mg/kg
Note : Reporting limit : 1 mg/kg	

Dye fixing performance of Nylofix-9176 is found to be comparable with Conventional phenol based nylon dye fixing agents. Also as per the SGS test reports, the product is free from Phenol, with Bisphenol-S content 57.3 ppm which is well within various MRSL limits complying with new legal classification of chemical substances and legal consumer safety limits making it an ideal choice for the consumers.





# POLYLEV-869

## Shade it with Green Chemistry !!! Level Dyeing's

**D**isperse dyeing of hydrophobic synthetic fibres is done by the immersion of material to be dyed into an aqueous dye bath which contains the dyestuff and various additives and auxiliaries. In this procedure it is important to obtain a reproducible exhaustion of dye from the bath to the material and to obtain a uniform distribution of the dye on the material. This can be done by dyeing at temperatures typically 125-135°C for polyesters. Naturally, such dyeing must be done in pressurized equipment. Alternatively the dyeing can be done at or near the boil, i.e. about 100°C, if large amounts of suitable additives called carriers, are added to the dye bath. These additives accelerate the exhaustion or adsorption of the dye from the bath and at the maximum dyeing temperature promote the uniform distribution of the dye, or levelness. The acceleration feature is necessary in this process because at temperatures near the boil, the exhaustion of the dye would be inadequate under acceptable commercial conditions.

For economic reasons, the high temperature dyeing procedure has come to be preferred and is largely the method of choice. However, levelness was found to be a recurrent problem. Attempts were made to solve this problem by the addition of small amounts of traditional carriers. While these additives did promote dye

migration which is important in achieving levelness however they had an undesirable side effect in this process. They prematurely fix the dye during the heat-up phase resulting in un-levelness. To avoid this effect it was necessary to either slow down the rate of heating the dye bath or to spend excessively long times at elevated temperatures to allow the necessary migration of unevenly fixed dye. Thus the acceleration feature of these carriers which was important in the "at the boil" dyeing procedure was an undesirable property in the pressurized higher temperature dyeing procedure. An additive which would promote dye migration without accelerating the exhaustion of the dye onto the material being dyed would be of interest as a leveling agent.

Leveling Agents for Polyester have a unique composition that allows them to interact effectively with the polyester fibres, facilitating better dye uptake and distribution. The addition of leveling agents improves the leveling properties of disperse dyes, which are independent of their ability to cover variations in texturized polyester materials. Leveling agents are a type of textile auxiliary. They are chemical formulations that aid in the dyeing process. They are used to ensure the even distribution of dyes on textile fibres, essentially leveling out the dye across the fabric.

In recent years, the textile industry has been grappling with a pressing need to reduce its environmental impact. With a focus on sustainability and green manufacturing, the industry has begun to pivot towards eco-friendly alternatives in various stages of textile production. In the dyeing process, one such innovation has been the emergence and rise of eco-friendly leveling agents. Leveling Agents for polyester have become particularly critical in the sustainability narrative, given polyester’s prominence in the textile industry. Increasing environmental consciousness, advancements in green chemistry and regulatory push has necessitated the use of eco-friendly alternatives thus driving the adoption of eco-friendly leveling agents in the textile industry.

With this background, Sarex has developed a product **Polylev-869**, a polyester leveling agent based on green chemistry. This product ensures uniform and level dyeing with improved dye uptake across all colours. It is cost effective and economical polyester dyeing auxiliary. It is readily biodegradable and also meets the stringent eco norms. It is designed to be less harmful to the environment and to the human health. It is readily biodegradable and considerably reduces the load of TDS, COD and BOD in the effluent.

- **UNIQUE FEATURES**
- Green chemistry based product hence meets the stringent eco norms.
  - Very good dispersion property which ensures uniform and level dyeing.
  - It slows down the rate of dye absorption allowing even distribution of dye with minimum dye retardation.
  - Sustainable product with excellent biodegradability.

Recipe No.	% Colour strength	L	a	b	C	H	dE*	K/S
Blank	100	42.249	0.928	-54.084	54.092	271.019	-	111.492
0.5% Polylev-869	98	42.469	0.482	-53.733	53.735	270.55	0.609	109.381
0.5% Conventional	95	42.718	0.45	-53.618	53.62	270.517	0.816	105.977

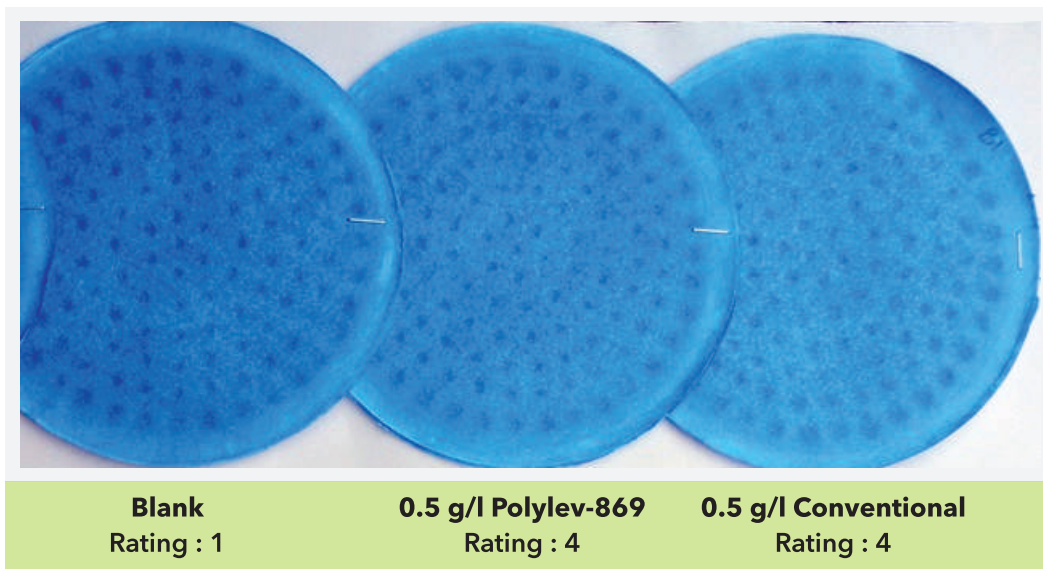
Dyeing levelness indicates the efficiency of dye absorption in the process. All measurements performed on the dyed samples showed dE\* below 1, indicating that the dyeing is even.

- **APPLICATION**
- **Dyeing :** Dyeing test was performed in a Laboratory Dyeing Machine. The dyeing process was started at room temperature, with 1% shade with C.I. Disperse Blue 354 keeping the material-to-liquor ratio of 1:10. The dyeing was carried out with 0.5g/l leveling agents (Polylev-869 and Conventional). The dyeing was carried out at 130°C for 30 min. After the completion of dyeing, the dyed samples were reduction cleared, given hot wash and cold wash and then taken for colour value determination.
  - **Dispersion study :** Comparison analysis was also carried out between Polylev-869 and Conventional leveling agents through filtration dispersion tests. The dispersion test was based on the test method AATCC-146-2001 (dispersibility of dispersed dyes: Filter Test) and evaluated the residues present on the filter paper.

■ **RESULTS**

The colour measurements of the dyed polyester fabric was carried out by determining the K/S values using a Computer Colour Matching System (Spectra Scan 5100H, Premier Colour Scan), Reflectance spectrophotometer according to the CIE Lab colour difference concept at standard illuminant D65. Readings were taken at four different points of the sample, from which an average value was determined. Table 1 shows the CIE colour coordinates L a b C H, dE\*, K/S and % Colour strength values of the dyed samples.

Regarding Dispersion study, the control sample presented a score of 1 (poor), where a large presence of dye particles on the filter is verified. On the other hand, the filter with 0.5 g/l Polylev-869 and 0.5g/l Conventional leveling agents presented a score of 4 (good) indicating lesser presence of dye particles on the filter.



## CONCLUSION

For the dyeing tests at 130°C, all measurements performed on dyed samples showed  $dE^*$  below 1, indicating good evenness. Moreover, higher K/S values were obtained with Polylev-869 compared to Conventional leveling agent under a given condition. With these results, it is possible to state that the Polylev-869 has a satisfactory dispersing and leveling power and could be a renewable and sustainable option for Conventional leveling agents.





# CELLEDET-R (CONC)

## Low Foaming, Concentrated and Dilutable Wetting Agent

**W**ater, the liquid commonly used for cleaning, has a property called surface tension. This surface tension causes water to bead-up on surfaces (glass, fabric), which slows the wetting of surface and inhibits the cleaning process. In the cleaning process, surface tension must be reduced so that water can spread and wet the surfaces. Chemicals that are able to do this effectively are called surface-active agents or surfactants or wetting agents. They are said to make water 'wetter'. Wetting agents perform other important functions in cleaning, such as loosening, emulsifying (dispersing in water) and holding soil in suspension until it can be rinsed away. Wetting agents are auxiliaries which helps in wetting the fibre surface by reducing its surface tension and help water or chemicals penetrate the fibre surface and thus help in wet processing. Wetting agents are used by the textile industry in various wet processes such as desizing, bleaching, mercerizing, dyeing and finishing. These chemicals promote fast wetting of the textile as it passes through various application baths.

In the textile wet processing operations, the formation of foam can become a serious problem since in many cases the volume of foam exceeds the capacity of the treating vessel. Moreover, in the case of dyeing operations, if foam is present, it will contain undissolved

dye particles which cause specking of the dyed textile. In finishing operations, the presence of foam causes pre-wetting of the textile which results in uneven application of the finishing agent. Thus it is desirable to use wetting agents which are essentially non-foaming or low foaming. Also, most of the wetting agents available in the market are concentrated however they are not dilutable and hence not suitable for co-formulators. With this background, Sarex has developed a concentrated wetting agent, **Celldet-R (Conc)**.

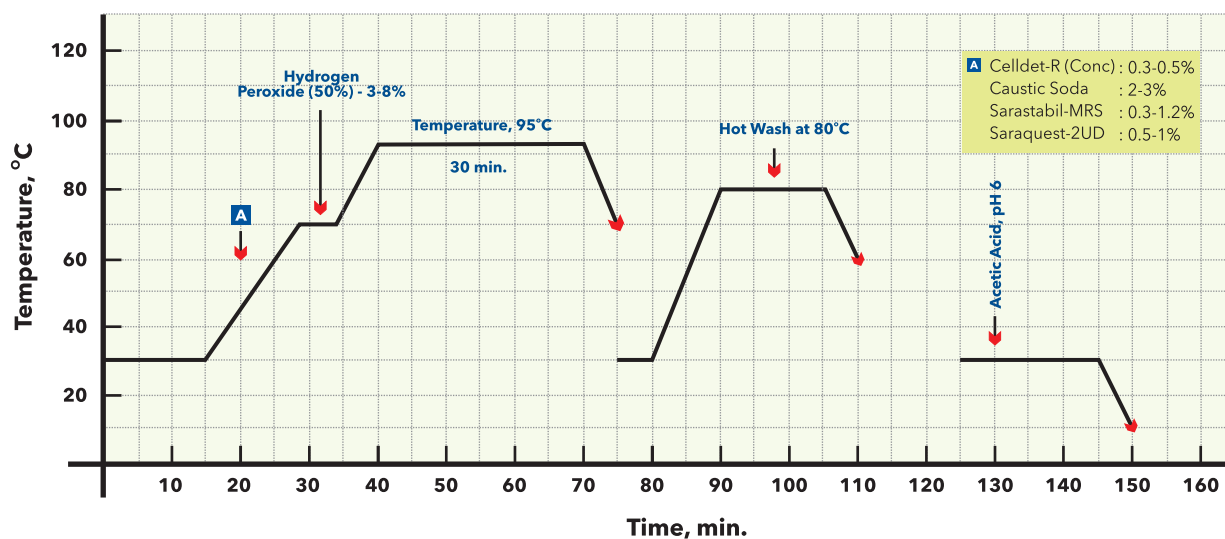
This is a low foaming, non-ionic wetting agent based on alkoxylated alcohols. It is easily dilutable with water at any given ratio thereby making it an ideal choice for co-formulators. It is effectively used in a wide variety of applications due to its fast wetting properties combined with low foam, low dynamic surface tension and excellent detergency. This low foaming, nonionic wetting agent is the perfect solution for various application in Home, Industrial and institutional Cleaning Industry. This is specially designed product which helps in achieving wetting, emulsification and dispersion properties. It is compatible with anionic, cationic and other non-ionic auxiliaries and is not affected by the hardness of the water.

## ■ UNIQUE FEATURES

- Low foaming, solvent free, APEO free wetting agent cum detergent for cellulosic's, synthetics and blends.
- Powerful emulsifying action enabling excellent removal of fats, waxes and oils ensuring uniform absorbency.
- Confers good rewetting properties to the treated fabrics.
- Suitable for high temperature scouring, bleaching and high temperature combined scouring and bleaching and for washing-off.
- Can be diluted with water at any given ratios.
- Suitable for soft flow and jet dyeing machine even at low liquor ratio.

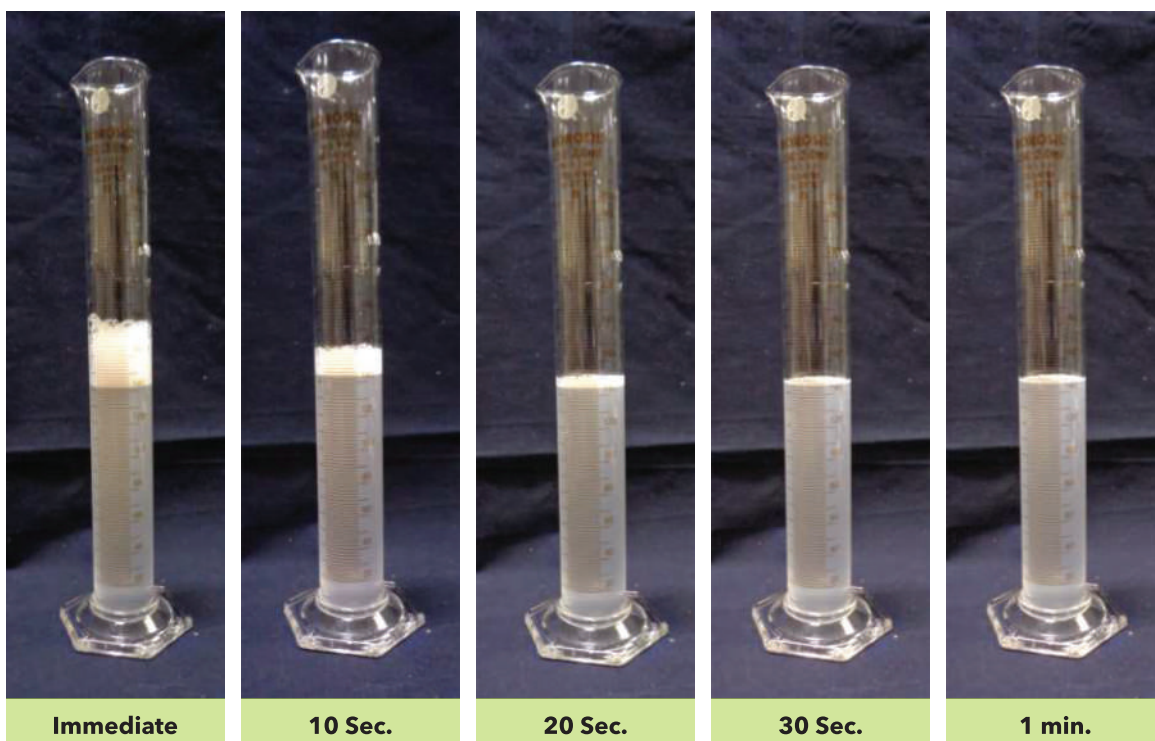
## ■ APPLICATION

### Flow Diagram for Combined Scouring and Bleaching Process



## ■ RESULTS

### Foaming behaviour of Celldet-R (Conc)



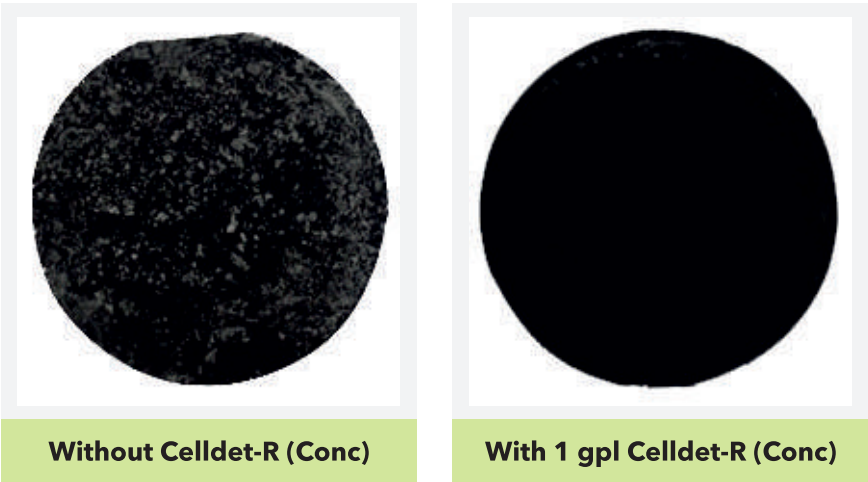
Sinking Test	Dosage	Time
A sample of 1 × 1 cm was cut from the fabric and placed onto the surface of water in a 250 ml beaker with 200ml water. The wetting time was estimated with a stop watch as the time interval between the moment of immersion and the moment when the sample sunk under the water level.	0.5 gpl	36-37 sec.
	1 gpl	20-21 sec.
	2 gpl	10-11 sec.

Absorbency - AATCC -79	Dosage	Time
A drop of water is allowed to fall from a fixed height onto the taut surface of a test specimen (grey fabric). The time required for the water drop to disappear is measured and recorded as absorbency time.	0.5 gpl	33-34 sec.
	1 gpl	11-12 sec.
	2 gpl	6-7 sec.

### ■ EMULSIFICATION PROPERTY

Emulsification efficiency was evaluated by emulsifying 1 gm of paraffin wax in 1-2 gpl of Celldet-R (Conc) at elevated temperatures. Qualitative analysis was done after filtering the emulsified solution through whatmann filter paper.



The above test results and photographs of foaming, re-wetting and emulsification proves the performance efficacy of Celldet-R (Conc). Since it is easily dilutable with water at any given ratios, Celldet-R(Conc) also becomes an ideal choice for the co-formulators.





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Sarex stands for quality products!

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



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