Sarex

Vol. 19, Issue 67, Jan 2025

Saraquest

Exclusive Insight



CHEMISTRY BEHIND
GOOD FEELINGS

www.sarex.com

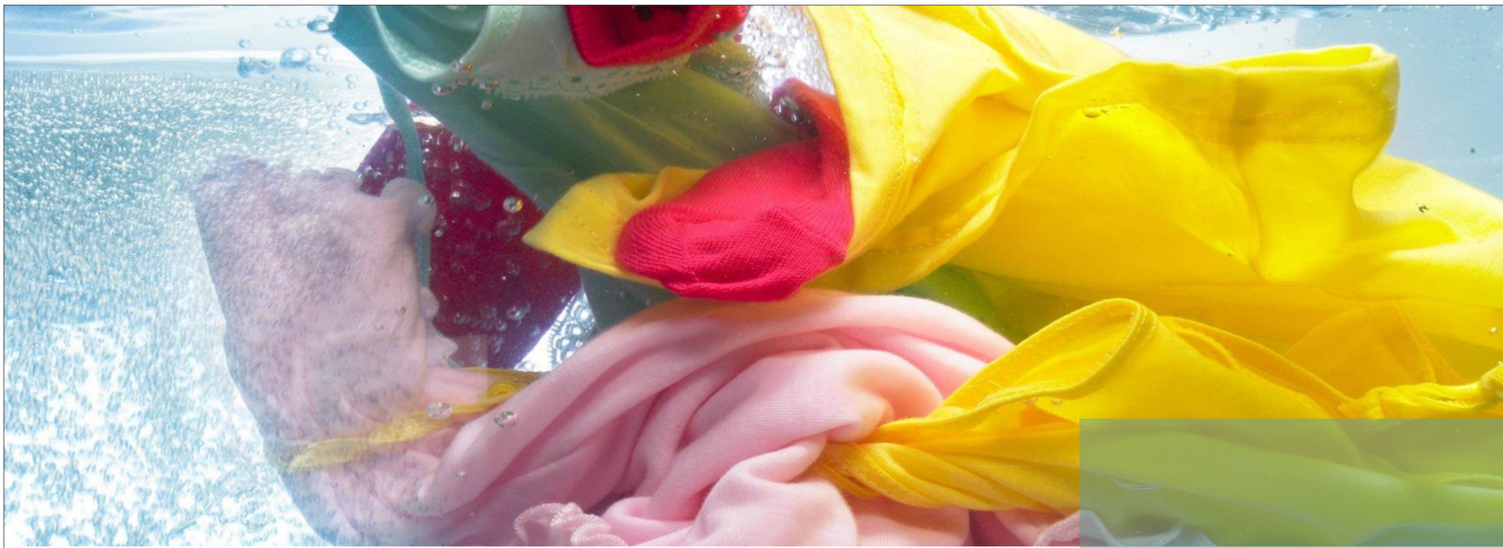
TEXTILE CHEMICAL MANUFACTURING

"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



PARAKOL-LTW (LIQ)

Low Temperature Reactive Washing Off Agent In Liquid Form

Reactive dyestuff belongs to the group of dyestuffs widely used for dyeing and printing of cellulosic fibre. Reactive dyes are extensively used for coloration of cellulosic fibres because of their excellent wash fastness which arises from covalent bond formation between dye and fibre. Due to the strong bonds between dyes and fibres, reactive dyeing's show particularly good fastness properties. Reactive dye contain reactive groups which react with the hydroxyl groups in cellulose under alkaline condition to form covalent bonds. However, this alkaline condition also facilitates the reaction of reactive group with the water, resulting in the hydrolysis of dye. The hydrolysed dyes adhere only superficially to the fibres and need to be removed from the goods after dyeing. Otherwise, dyestuff hydrolysate which is not removed from the dyed fabrics keep on getting removed during washing treatments causing poor wash fastness. So, besides taking steps to reduce the hydrolysis as much as possible, this hydrolysed dye must be removed by rinsing and using an appropriate washing-off agent in order to retain the fastness properties. Deficient soaping often leads to the staining of white ground and re-deposition, resulting in insufficient wet and washing fastness. What is required in soaping after reactive dyeing, therefore, is powerful soaping properties that can strike a balance between the removal of unfixed dyestuff and prevention of re-deposition.

Despite the fact that reactive dyes have attracted enormous scientific interest since their commercial introduction for the dyeing and printing of cellulosic fibres some 40 years ago, little published work has attended their wash-off. As mentioned, variety of methods can be used for the wash-off of reactive dyeing's., the temperature, duration and the nature of the wash-off process depends on several factors including, for example, the depth of shade applied, the type of dye used, the type and construction of the substrate, etc. Since the purpose of washing-off is to remove either all the unfixed dye or at least a sufficient proportion of the unfixed dye such that the washed-off dyeing displays the desired, typically very good fastness to wet treatments, it is important that wash-off is as effective as possible. Also, owing to the demands for increased productivity and reduced cost of dyeing, the wash-off process should be as efficient as possible, using a minimum of energy, water, chemicals and detergents.

With this background, Sarex has developed a product **Parakol-LTW (LIQ)**, a low temperature washing off agent which enables washing off of Reactive dyed at 70°C. Parakol-LTW (LIQ) is an excellent, highly efficient washing off agent in liquid form enabling dosing flexibility. Normally, the washing off process is carried out at 98°C. In contrast, when using Parakol-LTW (LIQ), washing off can be carried out at lower temperatures. Excellent wet fastness properties are achieved on cotton fibre/fabrics after soaping with Parakol-LTW (LIQ).

UNIQUE FEATURES

- Low temperature (70°C) washing off agent in liquid form.
- It is suitable for cotton substrates dyed with reactive dyestuff.
- Significant savings in energy.
- Available in liquid form enabling dosing flexibility.
- Suitable in soft flow machine (low liquor machines), package dyeing machine, cabinet dyeing machine, jigger and other garment dyeing machines.
- Ensures easy removal of hydrolysed reactive dyes and prevents re-deposition thereby improving overall fastness properties.
- As the product does not possess any sequestering property, it does not complex with the dyestuff.
- Product is non-ionic in nature hence does not interfere in the subsequent processing and does not affect the hand feel of the treated substrates.
- Product complies with stringent ecological parameters and certified with ZDHC at Level 3, Version 3.1.

APPLICATION PROCESS

Reactive dyeing of cotton fabric was carried out with the below given recipe:

Sample Name	Red Shade
Reactive Crimson Red CGB	3.5%
C.I. Reactive Yellow 145	2.5%
Glauber Salt	60 g/l
Soda ash	20 g/l
Sarakol-RDL	1 g/l
Saracrease (Conc) (1.0%)	1 g/l
Sarawet-NF	1 g/l

Dyeing was carried out at 60°C for 30 min. keeping the MLR of 1:8. After adding 20 g/l soda ash, dyeing was further continued for 90 min. at 60°C followed by drain. Below after treatment steps were followed after draining the dye bath:

- Cold wash for 10 min. Drain.
- Warm wash at 50°C for 10 min. Drain.
- Neutralize with Acetic acid. Make bath pH 6-7, 60°C, 10 min. Drain.
- Treat with 1.5% Parakol-LTW (LIQ) at 70°C, 15-20 min. Drain.
- Treat with 1.5% Parakol-LTW (LIQ) at 70°C, 15-20 min. Drain. (For medium and very dark shades)
- Warm wash at 60°C for 10 min. and Drain.
- Cold wash for 10 min. and Drain.
- Cold wash for 10 min. and Drain.

- **For Light and Medium shades**

% Shade	Recommended dosage of Parakol-LTW (LIQ)
Up to 1.5%	Single soaping : 1%
1.5-3%	1st Soaping : 1.25%
	2nd Soaping : 1%
3-4%	1st Soaping : 1.5%
	2nd Soaping : 1%
4-6%	1st Soaping : 1.5%
	2nd Soaping : 1.25%
Above 6%	1st Soaping : 1.5%
	2nd Soaping : 1.5%

For Dark shades (above 4% shade) of Reactive dyes viz., Dark Red, Maroon, Orange, Turquoise Blue etc., twice soaping with 1.5% Parakol-LTW (LIQ) is recommended.

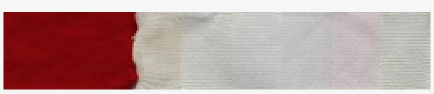
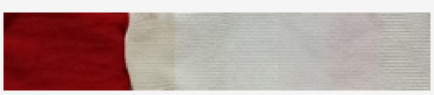
Note: For package dyeing, the soaping should be carried out for minimum two cycles (02 in-out cycles and 02 out-in cycles).

EVALUATION METHODS

The efficacy of the soaping agent is evaluated by performing washing fastness of the soaped fabric. The washing fastness was performed by using standard test method ISO 105 C10.

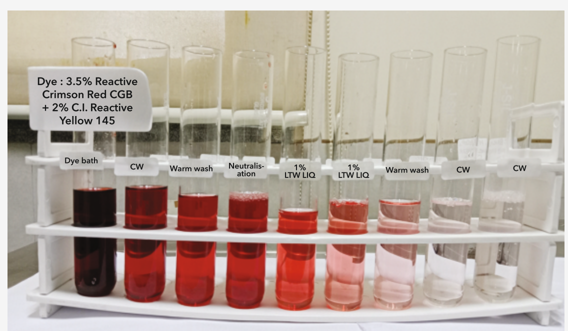
RESULTS

Washing fastness of the soaped fabric - ISO 105 C10 - 60°C

Dye : 3.5% Reactive Crimson Red CGB + 2% C.I. Reactive Yellow 145	
	**Blank**
	**1% Parakol-LTW (LIQ) 70°C (Twice soaping)**
	**Conventional, 95°C (Twice soaping)**

Drain bath images after each rinse

Dye : 3.5% Reactive Crimson Red CGB + 2% C.I. Reactive Yellow 145



From the photograph it could be seen that the performance of Parakol-LTW (LIQ) at 70°C is excellent and is comparable with the Conventional washing off process which is carried out at 98°C proving its efficiency as a low temperature washing off agent.

DUSTFREE-CPP

Pollen and Dry Dust Releasing Agent

Pollen deposition on fabric is a common issue in many countries, particularly those with high levels of pollen production and distribution. Some of the countries that face significant pollen deposition on fabric includes., United States, Canada, United Kingdom, Australia, India, China, Japan, Germany, France, Italy. These countries are not the only ones affected by pollen deposition on fabric, but they are among the most notable ones. The issue can be mitigated by using fabric protectors, washing fabrics regularly, and using air purifiers to reduce pollen counts indoors.

Pollen deposition on fabric is an issue for several reasons. The primary reason is the Pollen allergies and respiratory problems. Pollen allergies, also known as Hay fever, occur when the body's immune system overreacts to pollen from trees, grasses, and weeds. This leads to symptoms such as congestion, runny nose, sneezing, itchy eyes, and fatigue. Pollen allergies can be triggered by outdoor activities during peak pollen hours, and can also be exacerbated by indoor pollen accumulation. While there is no cure, symptoms can be managed with medications, immunotherapy, and lifestyle changes, such as monitoring pollen counts and keeping environments clean. Other issues related to pollen deposition on fabric includes following:

Fabric damage: Pollen can damage fabric by causing discoloration, staining, and weakening of the fibres. This can lead to a reduction in the fabric's lifespan and require costly cleaning or replacement.

Unpleasant odours and stains: Pollen can leave behind unpleasant odours and stains on fabric, which can be difficult to remove.

Reduced fabric performance: Pollen deposition on fabric can reduce its performance by affecting its breathability, moisture-wicking properties, and insulation. This can impact the comfort and functionality of clothing, bedding, and other textile products.

Increased cleaning and maintenance: Pollen deposition on fabric requires regular cleaning and maintenance to prevent build-up and damage. This can be time-consuming and costly, especially for industries that rely heavily on textile products, such as healthcare and hospitality.

Economic implications: Pollen deposition on fabric can have significant economic implications, particularly for industries that rely on textile products. The costs of cleaning, maintenance, and replacement can add up quickly, affecting businesses' bottom lines.

Overall, pollen deposition on fabric is an issue that affects not only the performance and longevity of textile products but also human health, indoor air quality, and the economy. This issue can be further extrapolated to the deposition of dust on the fabrics. Certain textile substrates are more prone to dust attraction due to their fibre properties, texture, and electrostatic charges. Some of the textile substrates that tend to attract dust more easily are Synthetic fibres viz., Polyester, nylon, and acrylic fibres, Velvet and velour, Fleece and faux fur, Wool and silk, Cotton and linen blends increase their dust attraction, Terry cloth and toweling, Faux suede and microfiber, Acrylic and polyester blends. To reduce pollen and dust attraction on these textile substrates, Sarex has introduced a new product **Dustfree-CPP**. This product eases the cleaning of dry dust and pollens from the fabric. It also enable easy vacuum cleaning of the carpets. It is highly effective in keeping the shoe uppers dust free.

UNIQUE FEATURES

- Specially developed finishing agent for cotton, polyester, polyester blends, nylon etc. to impart anti-pollen and anti-dust properties to the treated fabrics.
- Minimises pollen and dry dust deposition in the fabric interstices and allows easy removal of dust from the fabric.
- Enables easy vacuum cleaning of the carpets.
- Highly effective in keeping the shoe uppers dust free.

APPLICATION PROCESS

- **Padding Application**

Dosage	: 50-100 g/l
Pick-up	: 65-70 %
Bath pH	: 5.5-6.0
Drying	: 120°C, 2 min.
Curing	: 170°C, 1 min.

- **Exhaust Application**

Dosage	: 5-10% owf
Bath pH	: 5.5-6.0
Bath Temp.	: 130°C
Time	: 30-45 min.

PERFORMANCE DATA

The performance efficiency of Dustfree-CPP was studied on 100% Polyester fabric, Heavy GSM quality. The fabric was treated with 50 g/l Dustfree-CPP as per the padding application process and taken further for the study.

- **Efficiency of Dustfree-CPP in resisting Dry Dust deposition**

Treated and untreated fabric samples were placed in a Plastic bottle containing 1 gm of a mixture of Dry dust and shaken vigorously for 20 times. The fabric samples were removed from the plastic bottle and tapped twice. The level of soiling on the fabrics was evaluated with the naked eye.

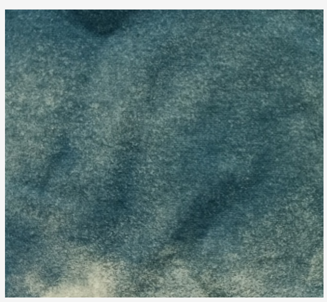
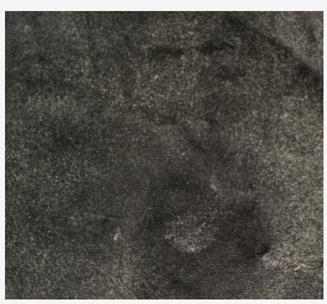
- **Efficiency of Dustfree-CPP in resisting Pollen deposition**

Treated and untreated fabric samples were placed in a Plastic bottle containing 1 gm of Lycopodium powder and shaken vigorously for 20 times. The fabric samples were removed from the plastic bottle and tapped twice. The level of pollen deposition on the fabrics was evaluated with the naked eye.

Efficiency of Dustfree-CPP in resisting Dry Dust deposition

Unfinished (Exposed to Mixture of Dry dust)	50 g/l Dustfree-CPP (Exposed to Mixture of Dry dust)	50 g/l Dustfree-CPP - 10 HL (Exposed to Mixture of Dry dust)
		

Efficiency of Dustfree-CPP in resisting Pollen deposition

	Unfinished (Exposed to Lycopodium powder)	50 g/l Dustfree-CPP (Exposed to Lycopodium powder)
On 100% Dyed Polyester fabric (Heavy GSM)		
On 100% Dyed Cotton fabric (Heavy GSM)		
On 100% Dyed Cotton fabric (Heavy GSM)		

UV ABSORBERS

Triazine based UV Absorber Emulsions for Textile Industry

With the intensification of human activities leading to the depletion of ozone layer, more ultraviolet (UV) radiation is penetrating the atmosphere and reaching the Earth's surface, posing serious threats to both, living organisms and the environment. Over exposure to UV radiation has been linked to various health issues, including skin aging, damage, cancer, and eye diseases, collectively posing a significant threat to public health. The ultraviolet radiation range from 100-400nm band consists of three regions., UV-A (320-400 nm), UV-B (290-320 nm) and UV-C (200-290 nm). Although the intensity of UV radiation is much less than visible or infra-red radiation, the energy per photon is significantly higher. The very high energy of UV-C photons is absorbed by the ozone in higher regions of the atmosphere, decreasing their relative intensity on the earth's surface to almost zero however the energies of UV-A and UV-B photons that reach the earth's surface exceed the carbon-carbon single bond energy of 335 kJ mol^{-1}. UV-A causes little visible reaction on the skin and it has been shown to decrease the immunological response of skin cells. UV-B is most responsible for the development of skin cancers.

According to the report released by the World Health Organization (WHO), 60,000 people die from skin cancer every year, mainly because of their overexposure to ultraviolet radiation from sunlight. The United States Environmental Protection Agency estimates that ozone depletion will lead to between three and fifteen million new cases of skin cancer in the United States by the year 2075. Due to this phenomenon, the demands for UV-protective clothing in the market is growing.

The main role of UV protective clothing is to protect the skin against the harmful effects of sun. UV protection properties often make use of a transparent layer of UV-absorbent materials on the surface of the fabric. In other words, UV absorbers, with strong absorption in the UV range of 290–360 nm, applied on textile fabrics to improve UV protection factor (UPF) and Sun protection factor (SPF).

Ultraviolet protection factor (UPF) measures the amount of UV radiation that penetrates a fabric and reaches the skin. UPF measures the blocking of both the UV-A and UV-B radiation. Fabric with a UPF 15 allows only $1/15^{th}$ (6.66%) of the UV radiation to penetrate the skin compared to uncovered skin. Solar Protection Factor (SPF) stands for sun/solar protection factor and is the rating used for sunscreens and other sun-protective products. SPF is a measurement of UV-B radiation only.

EXISTING UV ABSORBERS AND THEIR DRAWBACKS

At present, the UV absorbers used in polymer materials mainly include Benzotriazoles, Benzophenones, Salicylates and Triazines. Among them, the amount of benzotriazole UV absorbers is the largest and the application range is the widest however on 18 January 2024, ECHA published a screening report to assess whether the use of these four benzotriazoles in articles, including UV-328, UV 327, UV-350, and UV-320, should be restricted in accordance with REACH Article 69(2).

Global concerns about persistent organic pollutants (POPs) have continued to grow because they are highly toxic and do not readily degrade via photolytic, chemical or biological pathways. Recently, the benzotriazole-based ultraviolet (UV) light stabilizer, UV-328 (2-(2H-benzotriazol-2-yl)-4,6-di-tert-pentylphenol; CAS no. 25973-55-1), has been designated as a POP in Annex A of the Stockholm Convention, with calls for a global ban on its production and use. Given these concerns, benzotriazoles based UV absorbers have been added to the SVHC (Substances of Very High Concern) list, prompting people to seek greener alternatives. Since triazine UV absorbers are also highly effective in the UVA spectrum, they have undoubtedly became the preferred choice for high-end projects.

Compared to Benzotriazoles, Triazines are carefully monitored and restricted, ensuring broader applicability. Triazines are generally considered less toxic to aquatic organisms and have a lower environmental impact. Triazine UV absorbers offer better overall performance and are more suited for high-end applications with rigorous testing standards. They have a high thermal degradation temperature, making them stable during high-temperature processing and less prone to migration or leaching. Additionally, they exhibit excellent light resistance, with lower degradation under prolonged sunlight exposure. Triazine UV absorbers also show excellent chemical resistance, without interacting with metals or strong bases.

Sarex being at the forefront in the development of UV absorbers, offers various grades of triazine based UV absorbers in powder form. For easy and trouble free application on textiles, Sarex have now developed following range of Triazine UV emulsions which are easily dispersible in water and can be applied on textile substrate by padding, exhaust, spray and by coating process.

- **Sarafast-P**
- **Sarafast-HLF NEW (MOD)**
- **Sarafast-AS NEW LIQ**

These are triazine based emulsions suitable for high temperature exhaust application, printing and continuous pad-thermosol application. They are suitable for dyeing and printing of polyester fibres, modified polyester fibres and their blends.

MECHANISM OF TRIAZINE UV ABSORBERS

The triazine UV absorber molecule contains an intramolecular hydrogen bond involving a hydroxyl group. It forms a six-membered ring with Nitrogen atom. This six-membered ring and the surrounding structure, form a conjugate system, and the optical band gap of the conjugate system is exactly similar to the UV energy in the UVA and UVB range. The N-H bond in this conjugated system is the weakest and most easily broken. When the molecule itself absorbs UV light, the molecular energy rises and the N-H bond breaks. The structure is unstable after the hydrogen bond is broken. It is easy to release the absorbed energy in the form of heat, fluorescence or phosphorescence, which are not harmful to the polymer or fabric material, and the molecular structure is restored to the original structure. So on and so forth, to achieve the role of UV absorption, the specific process is shown in Figure 1.

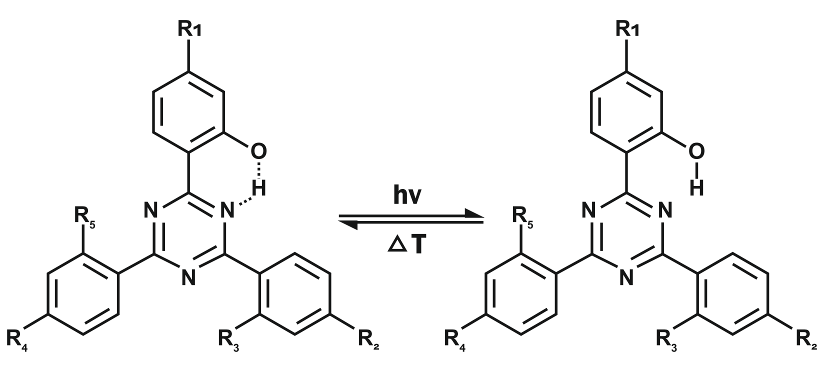
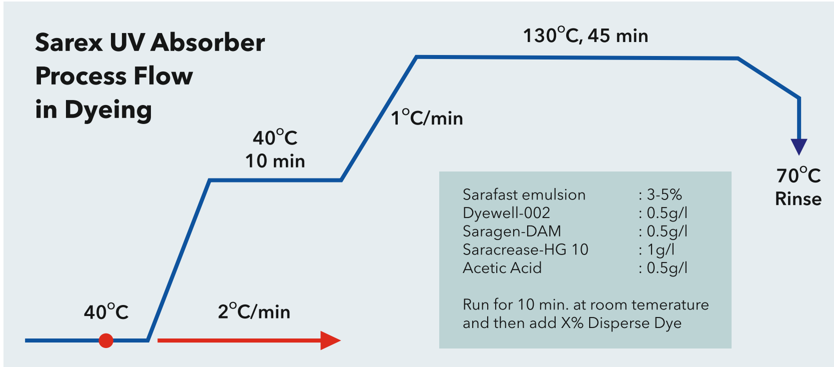


Figure 1. The working principle of Triazine UV absorbers

APPLICATION PROCESS



PERFORMANCE DATA

Testing as per - SAE J2412-2004.
For Light Fastness and UPF as per Australian / New Zealand Standard (AS/NZS 4399:1996)

100% Polyester Fabric				Transmission (%)		Cut (%)		Light Fastness
		Color Change	UPF	UVA AV	UVB AV	UVA AV	UVB AV	20 AFU
Blank		△E	57.476	9.40	0.86	90.60	99.14	1
Market Std.*	2%	2.06	65.080	7.20	0.870	93.06	99.354	2
Sarafast-P	1.3%	0.74	132.451	6.84	0.29	93.16	99.71	1.5
	2%	0.99	159.260	6.16	0.25	93.84	99.75	2
Sarafast-HLF NEW (MOD)	1.4%	0.33	64.684	7.039	0.767	92.961	99.233	1.5
	2%	0.53	75.788	6.794	0.769	93.206	99.231	2
Sarafast-AS NEW-LIQ	1.1%	0.72	84.163	6.372	0.645	93.628	99.355	1.5
	2%	0.98	100.774	5.469	0.669	94.531	99.331	2

*Based on Benzotriazole and are under SVHC

- **Automotive Light Fastness Tests**

	SAE J 1885 225 kJ*	SAE J 1885/ 225 kJ	SAE J 1885 488 kJ*	SAE J 1885/ 488 kJ	VDA 75202 3xFAKRA**	3 x FAKRA	VDA 75202 5xFAKRA**	5 x FAKRA
Without UV Absorber		2		2		2-3		1-2
3% Sarafast P		3		2-3		3-4		2-3

- **SAE J 1885 : Automotive Light Fastness**: Testing includes light and dark phases / High share of UV light / Temperature lower compared to FAKRA Test / 65±3°C sample chamber temperature / 89±2°C black board temperature / 50±10% Relative humidity / Example : Chrysler is testing according to SAE J 1885

- **FAKRA: Automotive Light Fastness:** 65±3°C chamber temperature / 100±3°C black board temperature / 20±5% Relative humidity / All German automotive producer (VW; BMW etc.) are testing according to FAKRA / EN ISO 105-B06 or DIN 75202 is also referred as FAKRA test

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

CERTIFICATIONS

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