

# Concentrating on Concentrates – Part III

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THE TECHNOLOGY to concentrate textile chemicals has been available for more than a decade, but was little used due to lack of interest in commercialisation. Looking at the overwhelming response to our range of concentrated products in domestic and international markets (as published in our earlier articles in *International Dyer*, January and June 2006) and partnering closely with our consumers, Sarex has made the decision to offer more concentrated chemicals, leaving less capacity for old-fashioned textile chemicals with high water content.

Many of the products we buy are composed of just a handful of chemicals, mixed with water. As a result, many of the textile chemicals in the list can be bought in concentrated form, which are much more efficient to manufacture and more environmentally friendly. Also, purchasing products from concentrate prevents extra waste of packaging and water.

Recently, Wal-Mart announced that it will now sell only concentrated laundry detergent in its stores, which will save approximately 125 million pounds of cardboard, 95 million pounds of plastic, and 400 million gallons of water. Considering that Wal-Mart sells 25% of all laundry detergent used in the United States, this is a major step forward towards saving vast amounts of natural resources.

Concentrated chemicals are just as effective as standard chemicals, but require less quantity per batch, leading to smaller plastic containers and less water mixed with the chemicals. Similarly, buying one package of concentrated chemical can provide just as much, with the same result as a regular diluted one, but using much less water and packaging. Also, you can dilute the concentrated, powdery or viscous chemicals with the exact amount of water that you need, therefore eliminating wasted water.

In addition, using concentrates:

- eliminates the inconvenience and safety hazards associated with handling heavy drums
- reduces the need for chemical drums, drum

storage, disposal and landfill issues

- save space or frees-up space for alternative purposes
- reduces warehousing, handling and transportation costs
- minimises waste and improves environmental performance

Concentrated products are simply non-watered or less-watered-down versions of the product, giving you more of what you are paying for and less water, and using less packaging. If you 'concentrate' a little more on what you buy, our environment will be much healthier.

## Pretreatment

### Sequestering Agent

Due to the deteriorating quality of surface water available for textile processing, the presence of unwanted metal salts available in the process water leads to the deposition of insoluble salts on the substrate, leading to a harsh feel or resist mark in the scouring process. When bleaching with peroxide, problems such as pinholes (Fig. 1) and a lowering in tensile strength and DP value are often observed, due to the presence of water impurities such as iron, copper and calcium. So, with the focus on minimising costs and maximising efficiency, consistency and quality, every processor has to use sequestering and water-softening agents in every process.

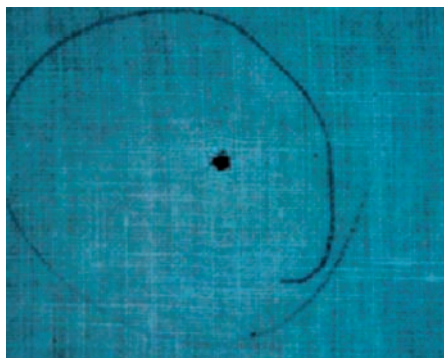


Fig 1: Pin hole

Looking at the high consumption of sequestering agents, Sarex has developed Saraquest-W (Conc), a high-power sequestering agent, specially developed for use during scouring and bleaching of cellulosic and polyester/cellulosic blends. It is available in 100% active, powder form. A suitable dilution of 25% can be made. It has a high chelation power of 650 for calcium, and more than 400 for copper and iron under alkaline conditions and at high temperature. This high sequestration power prevents precipitation of insoluble hydroxides and carbonates, formed due to alkali used in scouring and bleaching, and also chelates iron/copper impurities, thereby preventing catalytic damage and pin-holes during peroxide bleaching.

Its high sequestering action over a wide pH and temperature range makes Saraquest W (conc) suitable for scouring, bleaching and washing-off processes. Saraquest-W (Conc) can also be used for dyeing of reactives, vats and sulphur dyes, combined scouring and bleaching, and in bioscouring of cotton.

## Detergent and Wetting Agent

Success in textile processing depends on the complete removal of impurities present in cotton, and hence on the pretreatment that makes the textile substrate absorbent, clean and suitable for further processing such as dyeing and finishing. In all the pretreatment processes, ie. desizing, scouring, bleaching and mercerising, wetting agents and detergents play a pivotal role and their efficiency depends on various properties, such as wetting, emulsification, detergency, alkali stability, foaming characteristics, compatibility with bath additives, etc.

Conventionally, wetting agents and detergents are available as 30-40% actives. Sarex has developed highly concentrated 80-100%-strength, nonionic/anionic-formulated, transparent to translucent viscous detergents. Celldet R is a powerful emulsifier/dispersant for excellent removal of fats, waxes and oils, ensuring optimum absorbency. Celldet R can be readily diluted by plain water addition to stable

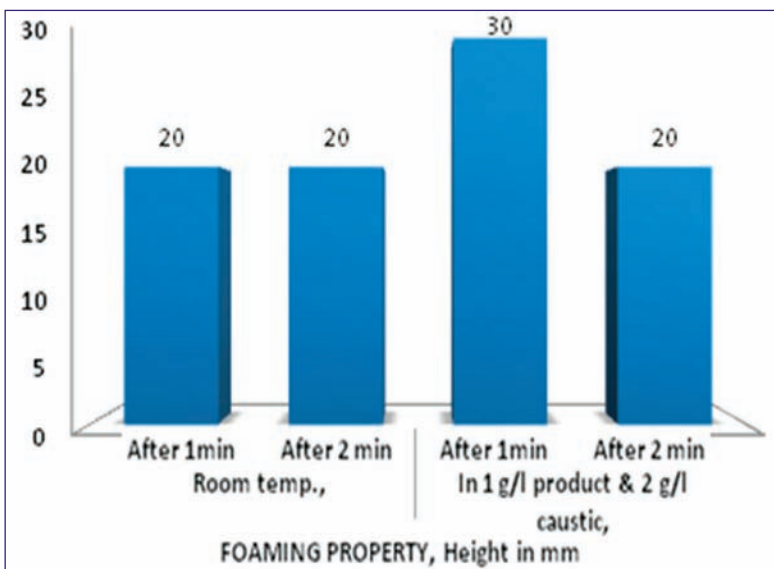


Fig 2: Graph of foaming behaviour of Celldet R

solutions of required strength, while conventional low-foam detergents with high strength need to be formulated by incorporating a co-surfactant or solvent for stable stock solutions.

Celldet R is a low-foam, high-temperature and pH-stable, solvent-free detergent and scouring agent in concentrate form, for scouring of cotton yarn, knits, terry towels, fabric and cotton blends. Its low-foaming characteristics make the product suitable for jet and soft-flow dyeing machines, even at low liquor ratio.

The foaming behaviour of Celldet R in pretreatment conditions is shown graphically in Fig. 2. Further, fabrics treated with Celldet R exhibit excellent absorbency and rewetting properties as compared to the conventional wetting agents.

## Optical Brightener

Carewhite-BBU 250% is low-affinity optical brightener, available in powder form, for cellulosic fibres and their blends. Easily dilutable, it shows slightly bluish to neutral white tone to treated fabric. It is suitable for continuous process and no tailing is observed. It is also suitable for cold-pad-batch and pad-steam bleaching. However, Carewhite-BBU 250% is not suitable for use with cross-linking agents.

Carewhite-NW (Conc) is an optical brightening agent, available in powder form, for polyamide, silk, cellulosic fibres and their blends. Fabric treated with Carewhite-NW (Conc) offers a slightly violet tone. It has high affinity for polyamide, wool and silk, and excellent build-up of brilliant white is observed in weakly acidic pH. Carewhite-MW (Conc) shows low to moderate affinity for cellulosic fibre. It is suitable for both exhaust and continuous application. In the case of cellulosic fibre treated by exhaust application,

the addition of salt is recommended for better exhaustion. It shows good levelness and no tailing is observed in continuous process. It is stable to highly acidic to alkaline pH.

## Dyeing

### Dyefixing Agent

Today, among the all classes of dyes, reactive dyes are mostly widely used for dyeing cellulose substrates. As we know, the post-dyeing operation is one of the most important steps to achieve the required fastness properties. In order to achieve the required wet, dry and wash fastness properties, the substrate should be freed from unfixed or hydrolysed dyestuff. To avoid the additional soaping/rinsing/washing operations and in order to achieve the required wet fastness with optimum use of water, dyefixing agents are used to 'fix' unwashed hydrolysed dyestuff.

To achieve the desired wet-fastness properties, Sarex has developed an 'eco-friendly' dyefixing agent for reactive dyes/direct dyes. Fixanol (Conc) is a new formulation – a cationic, formaldehyde-free dyefixing agent, based on polyamine chemistry. It is offered with 80% content. Its unique chemistry improves wash fastness as well as perspiration and contact-water fastness, without any staining on multifibre.

Fixanol (Conc) does not affect either light fastness or the tone of the treated material. It can be applied by exhaust as well as pad application. Due to its formaldehyde-free properties Fixanol Conc meets Oeko-Tex requirements and is suitable for babywear.

Sarafix NY (Conc) is a new 100%-concentrated wet-fastness improver and reserving

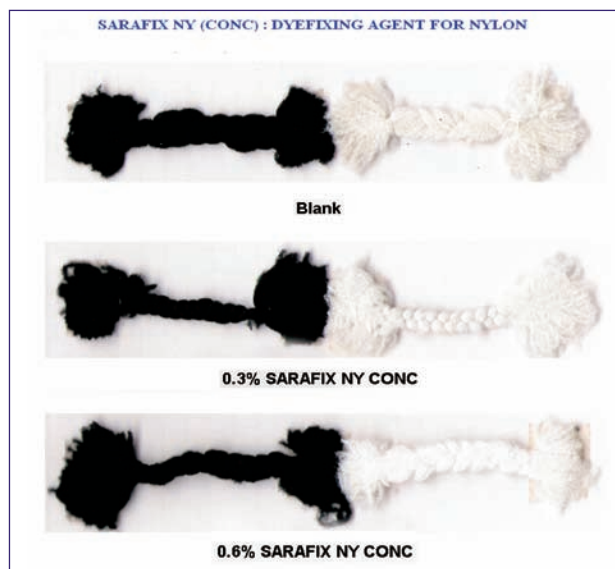


Fig 3: Dyefixing with Sarafix (Conc) on Nylon Muff

agent for dyed and printed polyamide and blends, available in a powder form. Sarafix NY (Conc) is a strong fixing agent for acid and metal-complex dyes and reserving agent for dyeing polyamide/cellulosic blends.

The performance of Sarafix NY (Conc) was assessed on Nylon muff by subjecting it to wash-fastness testing under ideal conditions. With untreated muff, staining on the undyed nylon muff was observed. However, it was observed that treating the nylon muff with Sarafix NY (Conc) completely prevented the cross-staining on undyed muff during the washing stage (Fig. 3). In addition, the low-foaming property of Sarafix NY (Conc) made it suitable for use in soft-flow machines.

### Dispersing and Levelling Agent

Dispersing agents are used to maintain dispersion stability (ie. prevent agglomeration of dye particles) during polyester dyeing. This property is of prime importance in exhaust dyeing, as failure to achieve adequate dispersion results in precipitation of dye particles and unlevel dyeing. The propensity for poor dispersion is most relevant in HT dyeing and additional dispersing agents are required in the dyebath to maintain the dispersion stability.

Few anionic dispersing agents are stable to HT conditions. We, at Sarex, have developed a concentrated, anionic, high-performance, non-staining dispersing agent,

Metanol-DL (Conc), which is low foaming and highly effective, even at low concentration. It maintains a stable dispersion in the presence of high electrolyte concentration and hence can be used in a one-bath dyeing processes for polyester/ cotton and polyester/viscose blends.

### Wetting and Deaerating Agent

Sarakol-NF (Conc) is a low-foam, highly concentrated (98%), wetter and deaerater, in the form of an alkali and electrolyte-stable viscous liquid, designed for exhaust and pad application – especially for continuous dyeing by pad and for exhaust dyeing of yarn packages. It exhibits excellent wetting and deaerating action, allowing a thorough and uniform contact between the liquor and the substrate in a very short time, and thus ensuring uniform and core dyeing. In exhaust application, it rapidly removes entrapped air, resulting in uniform wetting.

Sarakol-NF (Conc) may be added in textile pretreatment and dyeing applications. When added in desizing by the pad-batch method, it improves liquor pick-up. Further, Sarakol-NF (Conc) is free rinsing and can be readily washed off from the substrates without any influence to subsequent waterproofing or water-repellent application.

### Acidic Reduction Clearing Agent

Conventionally, caustic soda and hydrosulphite are used for a reduction-clearing treatment of disperse-dyed polyester, to remove the surface disperse dyes and achieve the required fastness properties. The purpose of using caustic along

with hydrosulphite is in order to achieve the optimum reduction potential of hydrosulphite to attain reduction clearing. The use of the caustic/hydros system is conventionally done post-dyeing and involves the following steps:

- dyeing of polyester
- draining the bath
- preparing a fresh bath with caustic/hydros, where the actual reduction clearing occurs, and then draining the bath, followed by washing and neutralising.

In order to minimise the wastage of energy, time and natural resource such as water, Sarex has developed Reducon ACD (Conc), which achieves the required reduction potential at acidic pH, negating the need for alkali. It is a 100%-concentrated reduction-clearing agent in powder form, for the removal of unfixed disperse dyes from dyed polyester fabrics and prints on polyester.

The main advantage is that Reducon-ACD (Conc) can be applied in the cooling dyebath at acidic pH, ie. one-bath dyeing and reduction clearing can be carried out, which results in a shortening of process

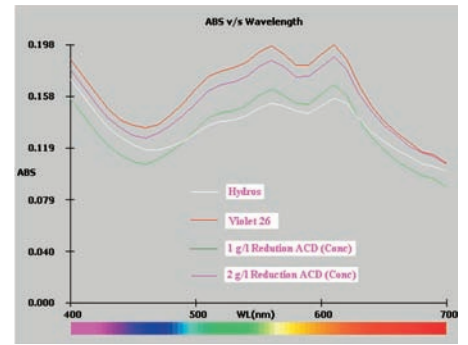


Fig. 4: Sarasperse Red Violet FBL (Violet 26)

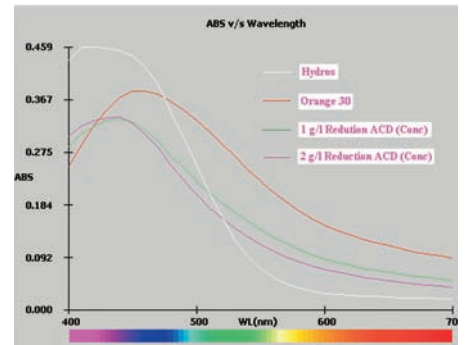


Fig. 5: Sarasperse Yellow Brown 2RF (Orange 30)

time and reduces costs by lower water and energy consumption.

A study to compare reduction clearing using Reduction ACD (Conc) with the

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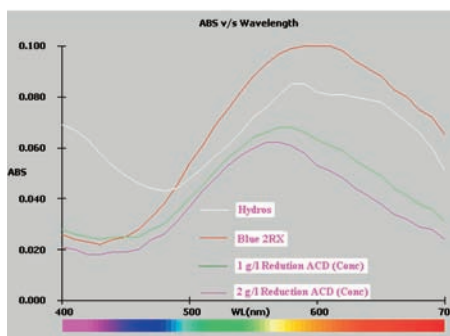


Fig. 6: Sarasperse Blue 2 RX (Blue 56)

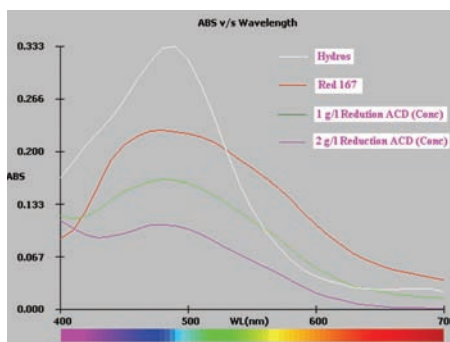


Fig. 7: Sarasperse Red conc. (Red 167)

conventional process was carried out for different disperse dyes and the performance was evaluated using a spectrophotometer (Figs. 4-7). From the results it was observed that the absorbance values of all the dye solutions treated with 1 and 2 g/l Reduction ACD (Conc) were lower, and  $\lambda$  maxima of the dye solution changes, or  $\lambda$  maxima reduces, or the colour of the dye solution changes, indicating that dye gets reduced. Similar behaviour is observed with conventionally used caustic+hydros.

Thus, Reduction ACD (Conc) eliminates the process of re-acidifying polyester subsequent to alkaline aftertreatment. It is also suitable for aftertreatment of dyeings on polyester, PAN and their blends.

### Wool Protecting Agent

Sarex has developed a special fibre-protecting agent, Keratino-100, for use when dyeing polyester/wool blends at high temperature. It is a 100%-active wool-protective agent in powder form and is based on eco-friendly constituents. Unlike conventional wool-protecting agents, it does not release any formaldehyde.

Keratino-100 prevents wool damage by its unique cross-linking mechanism and is effective in acidic to neutral pH conditions. It is based on complex blends of polycarboxylates. It gives excellent results when used at the required dosage. Keratino-100, being formaldehyde-free, can be used in open or closed equipment.



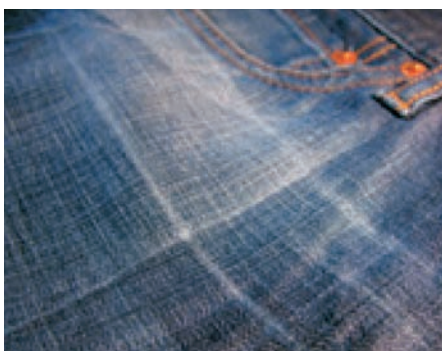
Keratino-100 needs to be prediluted and used at a liquor ratio ranging from 1:8 to 1:15. It allows dyeing on wool blends at high temperature while largely preserving the touch and wear properties to dyed fabrics.

### Anti-Back-Staining Agent

Over the last decade, India has probably seen the most dramatic and exciting changes in the washing of denim garments. As per the denim-garment export market, this high-quality garment has superior aesthetics and great value for the price. In terms of quality, prevention of back-staining plays a vital role in improving the appearance of the denim garment.

Back-staining implies soiling of the weft thread and the pocket lining by detached indigo or its reduced leuco form. It mainly occurs during desizing, stonewashing or enzyme washing.

In order to minimise back-staining, Sarex has developed a novel anti-back-staining agent, Sarakol BSI. This is a 100% powder based on oligomeric polyesters, nontoxic to enzymes and specially intended for blending with enzymes and/or for use directly by garment processors in wet processing cycles. Sarakol BSI cannot be diluted and stored but must be used as is.



## Finishing

### Hydrophilic Soft Finish

#### Terrysoft XF (Conc)



Terrysoft-XF (Conc) is a new-generation concentrated hydrophilic nano-emulsion, suitable for exhaust application as well as pad application for terry towels and cotton knits. Finishing with Terrysoft-XF (Conc) leads to a soft, hydrophilic finish, which is fast to home laundering – hence it can be used as a component in a moisture-management finish..

#### Texpeach-Conc



Sarex has developed Texpeach-Conc, a colourless to pale yellow, viscous nonionic liquid, which is available in 100% concentrated form. It is a special polyurethane to impart lofty finish with good drapability by forming a 3-dimensional film. Texpeach-Conc gives a wash-fast finish on 100% cotton, 100% polyester, polyester/cellulosic and polyester/wool blends.

Texpeach-Conc can be combined with conventional resin finishing to improve crease recovery. The quantity of resin can be optimised when Texpeach-Conc is used in the recipe. Texpeach-Conc can also be combined with formaldehyde-free cross-linking agents to improve CRA and drapability. Texpeach-Conc does not lead to a hydrophobic finish and also improves abrasion resistance and reduce the pilling tendency of the finished fabric. ID