Concentrating on *more* Concentrates

By Dr Naresh M. Saraf and Deepak V Alat, of Sarex Overseas, India

Looking at the overwhelming response and the tremendous amount of interest evoked by our earlier article (*International Dyer*, January 2006), we were encouraged to work further on this concept and to concentrate more and more products for the textile-processing field (pun intended). Also, a large number of technicians and purchasers, who found that by using concentrated products for captive consumption, their costs could be reduced, have started hounding us to offer concentrated products wherever possible. Some even jokingly said that if we can offer salt and water in concentrated form, they are ready to buy it.

Human need or greed is really insatiable! The faith of this tribe, as well as new business opportunities, has forced us to sharpen our technical skills to add some more concentrated products to our portfolio.

Pretreatment

Sarapol-AIO (Conc) is a unique all-in-one speciality product for pretreatment of cotton yarn, knits, terry towels and fabrics, having multifaceted properties of wetting, peroxide stabilization, detergency; allowing combined scouring and bleaching to take place in discontinuous machines. This product is now available in 70% strength, which not only offers a cost advantage but also ease of operation with dosing equipments as well as with unskilled workers.

Silicone-based defoamers have been always treated with a jaundiced view due to the continuous fear of the emulsion splitting and creating silicone oil spots. Sarex has developed two very robust silicone defoamers, which can take care of foam control in all types of textile-processing operations, such as sizing, scouring, dyeing, etc. Sarasil-D (Conc) is available as a 70% concentrate emulsion (Fig.1). This product is applicable in neutral to acidic pH on jet and overflow machines for dyeing of polyester, wool, nylon and their blends.

In order to overcome the limitation of pH

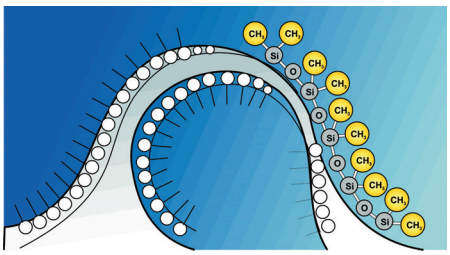


Fig 1: Defoaming action of Sarasil-D (Conc)

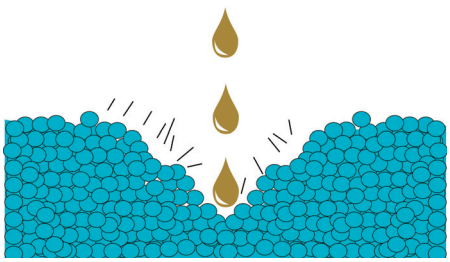


Fig 2: Action of alkaline stable defoamer Sarasil-JS (Conc)

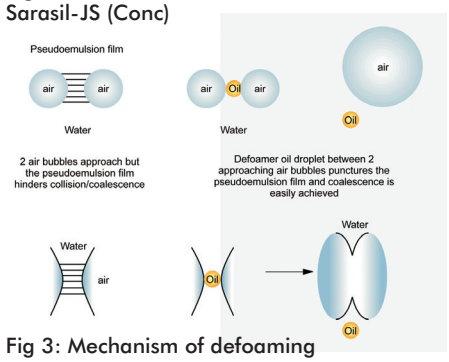


Fig 3: Mechanism of defoaming

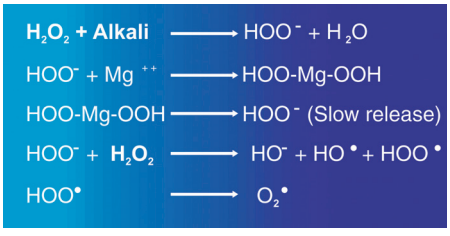


Fig 4: Mechanism of Peroxide Bleaching

suitability, Sarex has also developed a jet-stable, pH-stable, high-temperature-stable silicone defoamer, Sarasil-JS (Conc) (Fig.2). This product is available in 40% strength and can be diluted with the help of Xanthane gum as a viscosity modifier for easy use as a stock solution to avoid losses due to overweighing or spillage. The 100% active is ready in the lab and awaiting bulk trials.

Formulators of textile auxiliaries forever have a challenge to incorporate defoamers in their detergents to provide foam-free detergents used in high-turbulence equipment (Fig3). Conventional foam-control agents tend to be incompatible with surfactant-rich systems, leading to turbid appearance and phase separation. Our Sarasil-DET (Conc), on the other hand, allows formulation of highly concentrated detergents to be uniform and clear in appearance and exhibit excellent storage stability. This allows a formulator to develop 80-90% active detergent systems with 10-20% max. water content. Sarasil-DET (Conc) is available as a 100% active, jet-stable, pH-stable, surfactant-stable, high efficiency anti-foaming agent.

Organic Peroxide Stabilizer: Conventionally available in 20-30% aqueous formulation, based on mixtures of sequestrants (ex-amino polycarboxylic acids), iron chelating agents (ex-phosphonates), dispersants and peroxide activators (Fig4). We have developed a 100% active product in a stable powder form, ie. Sarastabil (Conc). This product can be readily diluted to make a stock solution for use in textile processing.

Dyeing

Lubricating Agents: Friction marks or crease marks constantly plague processors in all wet processing machines. The role of lubricant is to reduce the extent of friction encountered by the fabric when processed in rope form in high-turbulence equipment. This mechanism leads to reduction in running creases in natural and manmade fabrics during the wet processing.

Three categories of lubricants are available: (a) self-dispersible oils or fats; (b) surfactant-based; and (c) polymers.

Self Dispersible Oils or Fats:
Sarex has developed two unique lubricants, viz. Saracrease-HG (Conc) and Saracrease-AS (Conc).

Saracrease-HG (Conc): A sulphonated triglyceride available in an 80% active, slightly viscous, anionic, pourable paste. It

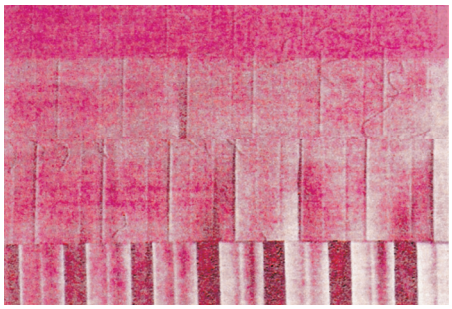


Fig.5: Crease prevention by lubricants like Saracrease HG (Conc)

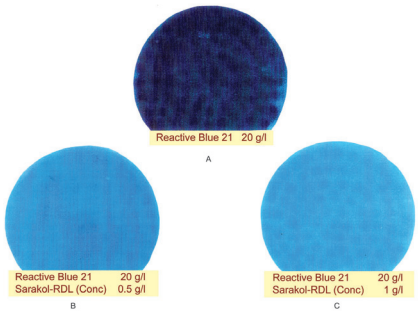


Fig. 6: Effect of Sarakol-RDL (Conc) on the solubility of reactive dyes

prevents the formation of running creases during pretreatment and dyeing and in the after-soaping of knitted and woven goods in rope form (Fig.5). It is used for cellulosics, wool, polyamide, polyester and blends of these fibres.

Saracrease-AS (Conc): A nonionic, self-dispersible, fatty acid ester, available in 100% active, viscous liquid. It resists the formation of creases in natural and man-made fibres during wet processing of woven and knitted fabrics in rope form. It can be applied on high-turbulence equipment. This product, being nonionic, is suitable for dyeing of cationic dyeable polyester/polyester, polyester/polyacrylonitrile and polyacrylic, since it does not interact with cationic dyes.

Both Saracrease-HG (Conc) and Saracrease-AS (Conc) can be used for correction to minimise creases formed earlier due to poor working conditions.

Polymers: We have already described these in our last article. Saracrease (Conc) is a 100% product made up of polyacrylates. From 1 kg Saracrease (Conc), the end user can make 50-60 kg of ready-to-use product, offering substantial saving of money and space.

Multifunctional Dye Bath Auxiliary: One of the main problems faced by a dyer is batch-to-batch variation and, in the case of package dyeing, variation in the large packages (> 1.2 kg) or MIMO differences. The variations are associated with poor solubility of dyestuffs in the presence of salt, alkali and hardness, high strike rate and poor dye-bath stability.

Traditionally urea is used as a solublising aid but it increases BOD value. Normal polymeric dye-bath conditioners are not much help in controlling strike rate. To overcome this problem, we have developed Sarakol-RDL, which increases the solubility of dyestuffs under adverse dyeing conditions, maintains dye-bath stability throughout dyeing and prevents precipitation, particularly in package dyeing. It has a sequestering action on calcium but does not have a demetalising action on metal-containing reactive dyes and reduces strike rate, leading to a level dyeing (Fig.6). Unfortunately the product has no comparison!

We have successfully been able concentrate this product to 60%, called Sarakol-RDL (Conc), thus resulting in lot of saving of freight and packing cost. It was initially available as a 30% product.

Buffered Alkali: Saradye-R was introduced as a liquid buffered alkali for exhaust dyeing of cotton with reactive dyes, as it maintains the required pH during the fixation phase, thereby improving consistency and reproducibility of shade. The quantity of Saradye-R required for fixation is much less than conventional alkali and thereby reduces TDS in the effluent stream (Fig7). Also it negates the ill influences of hardness-causing substances in the dyebath.

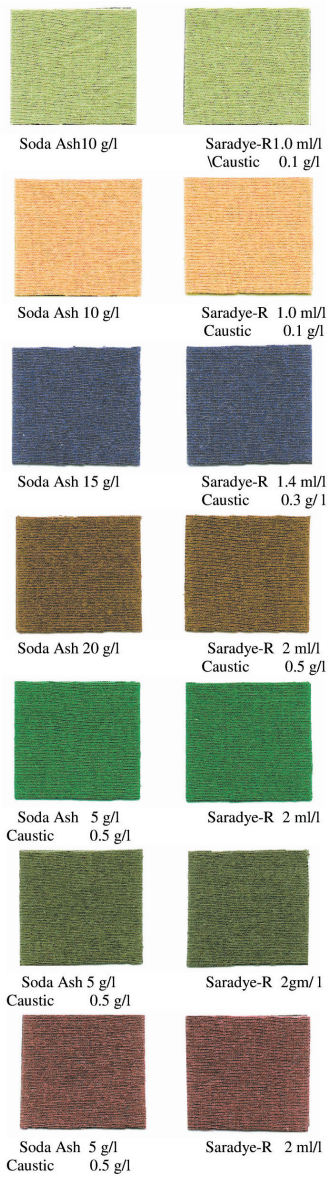
Fig.7 - Reactive dyeing using buffered alkali

SARADYE-R With Levafix

Recipe I	
Yellow CA	0.375%
Red CA	0.018%
Blue CA	0.138%
Recipe II	
Yellow CA	0.22%
Red CA	0.16%
Blue CA	0.01%
Recipe III	
Yellow CA	0.06%
Red CA	0.90%
Blue CA	2.4%
Recipe IV	
Yellow CA	2.6%
Red CA	1.7%
Blue CA	1.5%

With Sumifix Supra

Recipe I	
SFS Yellow EXF	2%
SFS Blue EXF	2.4%
Recipe II	
SF Supra Yellow EXF	2.65 %
SF Supra Red EXF	1.08 %
SF Supra Navy Blue EXF	1.95 %
Recipe III	
SFS Yellow EXF	2.35%
SFS Red EXF	4.5%
SFS Blue EXF	1.45%



It is ideally available as liquid. We had come across many situations where people would demand it in powder form, due to transportation costs and duties. Hence, we have been able to develop this product in powder form, ie. 100% Saradye-R (Conc), which can be very easily diluted and used readily.

Core Alkali Neutralizer: Conventionally, acetic acid is utilised for neutralisation of cellulosic substrates after alkaline pretreatment like bleaching, scouring, mercerising or after the dyeing stage. However, acetic acid evaporates at 100-102ºC and hence is no longer retained on the substrate to neutralise any core alkali. This leads to a shift in pH of the substrate, thereby causing rejection of the fabric due to pH of fabric extract. This shifting in pH also leads to several associated problems, such as deteriorating fastness in long storage, and skin sensitisation. To overcome the limitation of acetic acid, we have been able to successfully develop a non-volatile product in stable powder from, Saracid-DV (Conc), which can be easily diluted and used for core alkali neutralisation in batch as well as continuous operation. This is a non-corrosive neutralising agent, which does not affect shade, tone or fastness properties.

Finishing

Polyurethane: This is a new chemistry, based on blocked oligomeric isocyanate pre-polymers, which displays crease resistance, an anti-pilling effect and soft handle (Fig.8). We have developed Texpeach (Conc) at 60% strength and are also in the process of developing it in 80% strength. It gives a very good handle as the product is a pre-polymer, contains no emulsifier and forms a transparent film on the fabric finished with it. Such products are normally available in 30% strength. This product also improves the crockfastness of the fabrics finished with it and also imparts hydrophilic finish with good drape. This can be added in DP finish with resin, where resin quantity can be reduced to reduce strength loss without compromising on DP rating.

Hand Modifier & Sewability Improver: This is based on polyolefin chemistry to impart durable soft hand, coupled with improved sewability (Fig.9 & Fig 9(a)). Sarafinish-OE (Conc) can give open-end spun yarn the feel of ring-spun yarn (Open-end yarns are generally coarser and more hairy.) Such products are normally available as 20% emulsions, whereas Sarex has developed

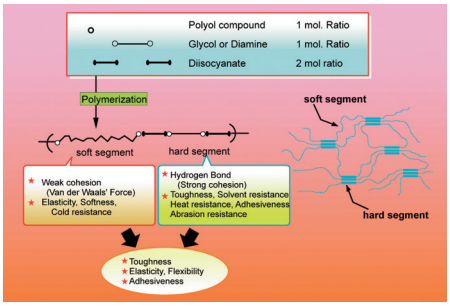


Fig. 8: General structure of a polyurethane

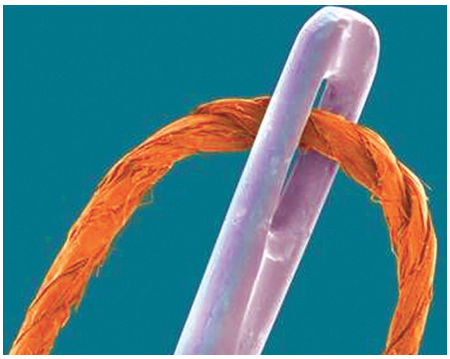


Fig.9 & Fig.9a: Performance of Sarafinish-OE (Conc) in improving sewability

Sarafinish-OE (Conc) as a 60% emulsion. This is an ideal finishing chemical for cotton, polyester and polyester/cellulosic knits, as a softener as well as a raising or napping assistant.

Water Repellents: A 100% surfactant-free hydrophobic polyolefin self-emulsifiable solid, Sarafinish-PH (Conc) imparts durable hydrophobicity on all types of substrates, showing excellent compatibility with standard fluorochemicals. This can be ideally used by formulators and processors with good dilution facilities. Sarafinish-PH (Conc) gives excellent water repellency to all substrates as it is surfactant-free (Fig.10).

Lubricant for Packages and Wet Waxing Agent for Yarns and Fibres: Generally these are emulsions of paraffin waxes, mineral oils, silicone oil and short-chain alkyl esters with nonionic or cationic emulsifiers, in the

Fig.10: Surfactant free water repellent

Fig.11: Treated Packaged yarn with Yarnsoft-FRS (Conc)

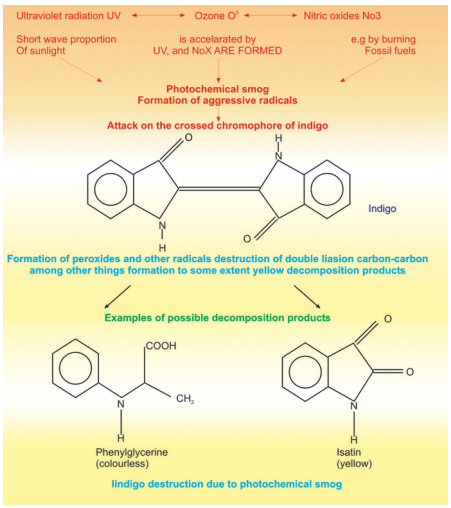


Fig.12: Mechanism of Ozone fading

form of 20-30% active emulsions. Yarnsoft-FRS (Conc) has been developed in the form of an 80% concentrate, which can be easily dispersible and can be effectively used for wet waxing of knitting, warp-knitting and weaving yarns. It can be applied by exhaust method or by the kiss-roll method (Fig.11).

Ozone Fade Inhibitor: Indigo-dyed garments are affected due to atmospheric ozone and noxious gases, leading to premature dulling or greying and yellowing of the goods, either in the warehouses or in the retail stores (Fig.12). This problem leads to a lot of rejection. Generally ozone inhibitors are available as 20-30% emulsions. We have successfully been able to develop 100% active anti-ozone fading agent and softener, Sarasoft-OZ (Conc), which can be diluted. Treated garments comply with AATCC-109 (2 cycles) standard.