

Levelling Agent for Reactive Dyes

- Placebo or Medicine?

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SARAKOL-RDL

**Sarakol-RDL does not have any retarding affect.
You can get better colour yield with level dyeing**



Dyeing with 2 g/l Sarakol-RDL.



Dyeing with 2 g/l Competition Product

Sarakol-RDL works under adverse conditions



Dyed with 2 g/l Sarakol-RDL
in 250 ppm hard water



Dyed with 2 g/l Sarakol-RDL
in 500 ppm hard water

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

In the exhaust dyeing segment of cotton, reactives rule the roost. 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, and large machines of one ton or more capacity per batch. Dyestuff manufacturers have also developed compatible dyes, giving reproducible results and the required fastness properties.

In spite of such developments, there are still instances of unlevel dyeing, batch-to-batch variation, dye specks etc. To guard against such accidents, dyers religiously use 'levelling agents'. Sometimes they are lucky and sometimes they are not! If the required performance is not obtained with a given chemical, the easiest way is to replace it with a 'better', 'modified', 'new-generation' levelling agent from another supplier. Some suppliers also insist on providing a total package, i.e. their dyes and their 'special' levelling agent.

Before we look for the solution, let us look at the problem more carefully. Unlevel dyeing in exhaust dyeing of reactives can occur due to one or more of the following reasons.

- Uneven pretreatment leading to uneven basic whiteness and/or absorbency
- Improper rinsing leading to residues of pretreatment chemicals in the dye bath
- Uneven neutralisation due to inadequate quantity of acid or too short a time for neutralisation

- Residues of peroxide due to an incorrect process of peroxide elimination
- Temperature islands within the batch due to improper cooling after scouring/rinsing
- Incompatible dyes due to cost consideration, availability or other monetary considerations
- 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 demineralisation 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 batch operation, unfortunately, pretreatment is carried out by the dyer himself and he therefore cannot blame the bleaching department. With a stronger emphasis on pretreatment and etching ('A good pretreatment is half of dyeing') in the mind of the dyer, most of the problems of unlevel dyeing arising due to bad pretreatment could be eliminated.

However the problem still persisted historically, even when pretreatment was as good as necessary. Particularly in the case of package dyeing of cotton yarn, with yarn packages of more than 1.2kg and MLR 1:7, dyers used to observe precipitation of dyes on the inner and outer surfaces of the packages. When this phenomenon was studied in detail, it was shown that the precipitation of dyestuffs was due to poor solubility in the presence of salt and alkali. Further work also showed that the presence of calcium in the dyebath, either from the substrate or from water, or hardness of salt leads to precipitation.

To overcome this problem, the first generation of levelling agents was introduced by auxiliary manufacturers, based on polyacrylic acid for co-polymers. These are also called dyebath conditioners. These products have a preferential sequestering action on calcium under reactive dyeing conditions, do not have any demetalising action on metal-containing dyes and have very good dispersing action to prevent precipitation of dyestuffs, particularly in package

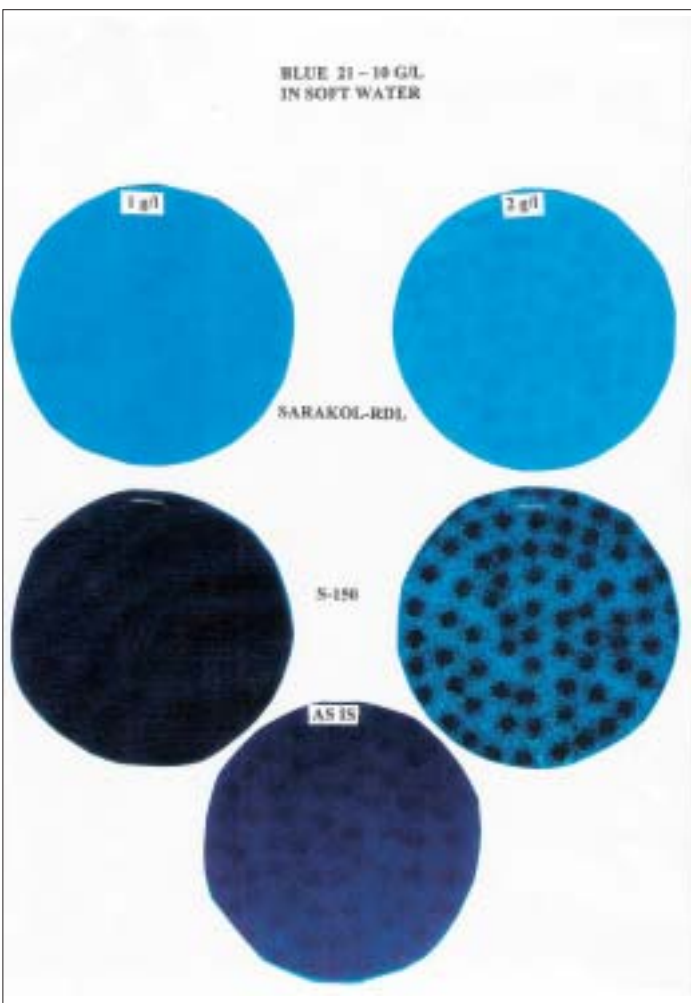
dyeing. These products also do not have any affinity for dyes or fibre and do not affect yield, tone or fastness properties. However, these products do not reduce the high strike rate in the exhaustion or fixation phases.

Still today, various types of acrylic polymers, with varying calcium chelation values and varying dispersion properties, are available on the market and are being used as levelling agents. In fact, Supertex-Sarex has three different formulations in this category:

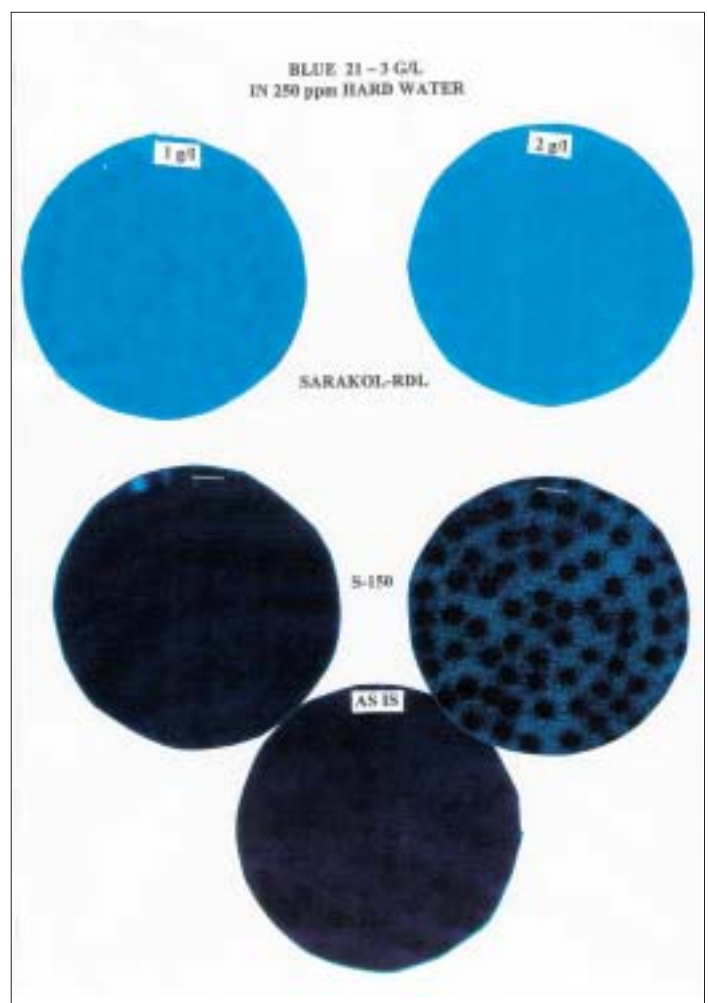
- **Sarakol-PS** Calcium chelation value around 80ppm and excellent dispersing action
- **Sarakol-1583** Calcium chelation value around 180ppm and good dispersing action
- **Sarakol-S** Calcium chelation value around 280ppm and good to medium dispersing action

These products are performing well in exhaust dyeing of cotton with reactive dyes.

Some unevenness still persisted in dyeing of cotton knits and cotton yarn. It was assumed that, while using mixed alkali, soda ash and caustic soda, pH was shifting



Solubility effect of Sarakol-RDL vs. S-150



Solubilising effect of Sarakol-RDL in presence of hard water

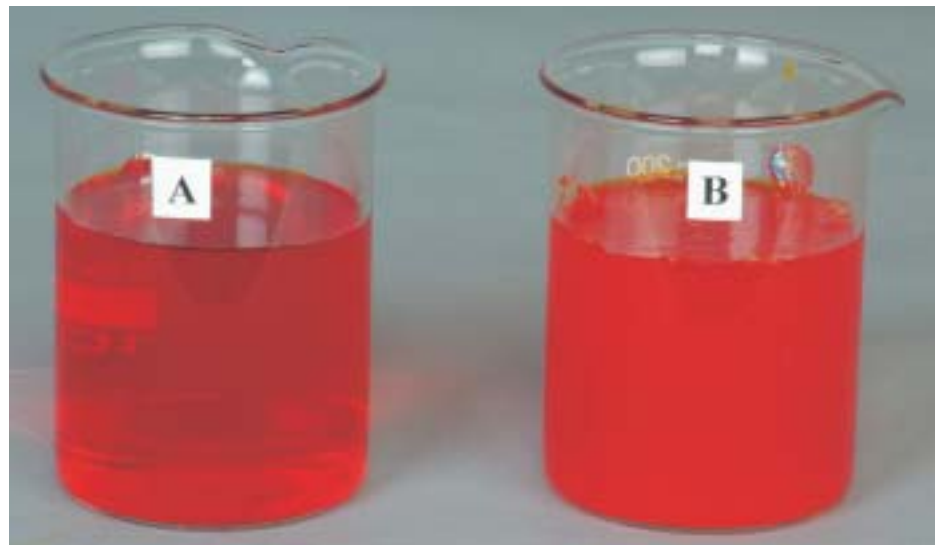
drastically and leading to uneven fixation, giving uneven dyeing.

To mitigate this situation, one chemical supplier introduced a formulation that has calcium chelation properties like acrylic polymers and, at the same time, a buffering action during the fixation phase. As a result, the pH shifted gradually during alkali addition, leading to a level dyeing. However, such a formulation has exhibited few shortcomings – the yields are lower, tone is different, usually the blue component has a much lower yield than the yellow and red components in the recipe, and this formulation cannot reduce the strike rate in the exhaustion phase.

We at Sarex tried to overcome these shortcomings and developed a product, Sarakol-RDL, which is a much better levelling agent for reactive dyes. Sarakol-RDL has following features:

- Improves solubility of dyestuffs
- Has dispersing action and sequesters calcium
- Reduces strike rate during exhaustion
- Does not affect yield or tone
- Performance not affected by mineral content of cotton.

We have carried out evaluation of Sarakol-



Solubilising effect of Sarakol-RDL.

RDL against Sarakol PS and a levelling agent from another manufacturer (S-150). Results are illustrated in Fig.1-5. Thus Sarakol-RDL is best for the following situations:

- Dyeing of green shades based on the Reactive Blue 19, Reactive Blue 21 and Reactive Blue 198 types of dye
- Dyeing with low solubility dyes
- Dyeing with yarn packages of more than 1.5kg on short-liquor-ratio machines

- To prevent dark creases in dyeing of cotton knits due to precipitation of dyes in creases Sarakol-RDL has replaced conventional dyebath conditioners and so-called levelling agents. Of course, Sarakol-RDL cannot perform miracles if dyeing parameters are not correct.

Placebos can lead to faith healing but medicines cure. Thus Sarakol-RDL is a medicine for exhaust dyeing of reactives. ○

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