Sarex

Vol. 10, Issue 37, Jan 2017

Saraquest

Exclusive Insight

www.sarex.com

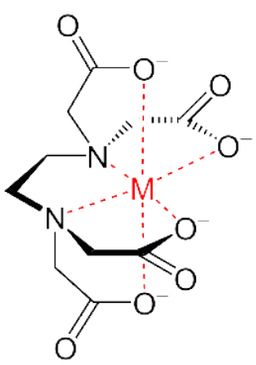
Chemistry Behind Good Feelings

CONTENTS

Ironstrong-RU - Sequestering agent

A sequestering agent is a substance that removes ions from a solution system by forming a complex that does not have chemical reactions with the ion which is removed. Sequestering agents are commonly used for removing water hardness. They form molecules in which the ions are held so securely that they can no longer react. Sequestering agents are also known as chelating agents. A chemical sequestering agent surrounds another molecule or atom and holds it "in seclusion". In this process, the chemical sequestering agent hides the molecule or atom and prevents it from entering into chemical reactions.

Cotton contains varying quantities of metal traces (iron, copper) which mainly comes from fertilizers and insecticides. The iron content of caustic soda can exceed to 100 mg/lit, so the use of sequestering agents becomes essential. Some sequestering agents like sodium tri poly-phosphate and sodium hexa meta phosphates are specially useful in scouring as they not only sequester Calcium and Magnesium but also cleanse the equipment and filters from any clogging. However, they hydrolyze at higher temperatures and therefore have limited use.



Metal-EDTA chelate

EDTA (Ethylene di-amine tetra acetic acid) is another sequestering agent that fixes Calcium and Magnesium in an alkaline medium however it cannot sequester 'Fe'.

Oxalic acid treatments will remove iron but it is more hazardous, as the chance of fabric tendering is high if proper precautions are not taken.

Calcium and Magnesium reacts with natural soaps generated during the alkaline scouring to form waxy substance on the textile material, which creates patchy dyeing and discoloration of the fibre. This waxy substance also deposits on the machinery surface.

Cotton fabric usually has to be bleached by treatment with hydrogen peroxide under alkaline conditions in order to achieve a satisfactory level of whiteness through oxidation of coloured impurities. The trapped Iron residues in the fabric acts as catalyst in this process and causes H_2O_2 to undergo homolytic fission to two hydroxyl radicals (OH•). This metal ions causes abnormal decomposition of H_2O_2. The rate of decomposition may be so high that cellulose is attacked and oxycellulose is formed. The oxycellulose thus produced becomes visible in form of tiny holes commonly addressed as iron pinholes in the industry. Fabrics comprising pinholes results into poor mechanical properties are rejected as waste and are cause of major concern to textile processing organizations.

The presence of metals as salts of iron, copper, zinc, manganese, tin, aluminium etc., in the dye bath also is highly undesirable as it adversely affects the tone and brightness of the colour.

To overcome these deleterious effects in the scouring and bleaching bath, sequestering agents are often used. These are compounds which sequester the metal cations, rendering them harmless. Sarex has developed one such product **Ironstrong-RU** which posses very high iron chelating capacity. Ironstrong-RU effectively chelates Fe^{+++} and hence prevents it from interfering with the chemical processing of textile material. It prevents catalytic damage of cellulosic fibres in bleaching bath during hydrogen peroxide bleaching.

Unique Features:

- High iron chelating capacity.
- Prevents pinholes and catalytic damage of cotton in peroxide bleaching.
- Applicable in bleaching and scouring process.

Recommended procedure:

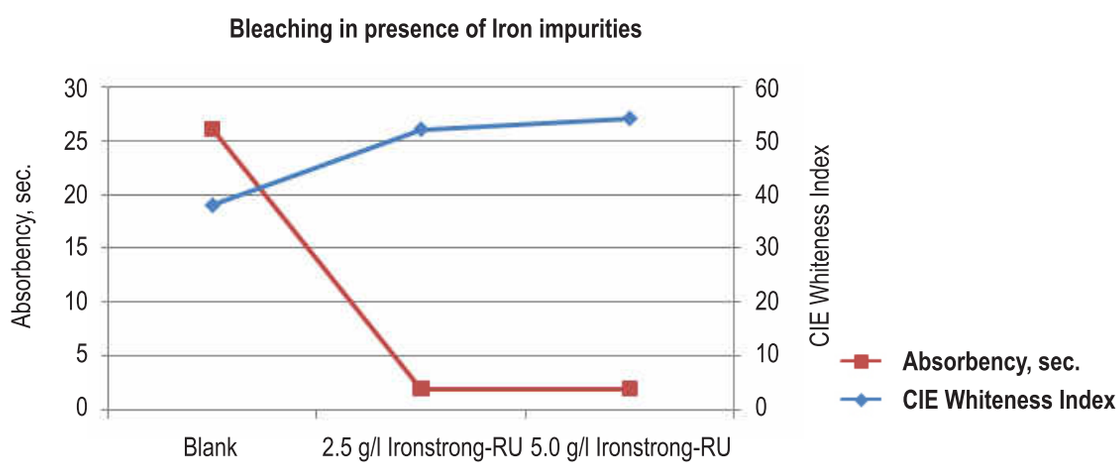
For scouring and bleaching process of cotton, 2.5-5 g/l Ironstrong-RU is recommended.

Note: Ironstrong-RU should be added along with wetting agent before loading the material.

Ion sequestering efficiency of Ironstrong-RU

	Fe chelation value (mg of Fe/gm of sample at pH 12-12.5)	Ca chelation value (mg $CaCO_3$/gm)
Ironstrong-RU	400	60

Sequestering efficiency of Ironstrong-RU in Bleaching



Conclusion:

From the graph it could be clearly seen that, bleaching done in presence of iron impurities does not give the absorbency and whiteness index. This is because of the added iron impurities which causes uncontrolled decomposition of H_2O_2 leading to incomplete bleaching. Bleaching done in presence of 2.5-5g/l Ironstrong-RU show reasonably good absorbency and whiteness index indicating that it posses good sequestering efficiency.

Optawhite-DA3 - Whiter than the Whites

Textiles, both natural and synthetics are not completely white and efforts have been made since ancient times to free them from their yellowish tinges. This yellowish tinge from fabric is generally decolorized by different bleaching methods. However, even if bleaching processes are carried to the technically acceptable limits of damage to the fibres, they never succeed in completely removing this intrinsic colour. Whiteness in these substrates can be improved by the treatment with Optical Brightening Agents (OBAs) which intensifies the whiteness level. OBA increases the apparent reflectance of the article in the blue-violet region of the spectrum.

The conventional whites are produce by applying the OBA on jigger, soft flow m/c by exhaust method during bleaching followed by treatment with Acetic acid to neutralize the alkali. Conventional process can able to achieve whiteness index around 135 to 140 however it imparts yellow tint to the fabric. Sarex has developed a specialty product **Optawhite-DA3** which improves the Whiteness index of the OBA treated fabric by 10-15 units without any yellowness. Optawhite-DA3 treatment is to be done in place of Acetic acid. Optawhite-DA3 will make the fabric neutral and hence no acetic acid treatment is required.

Unique Features:

- Improves the whiteness index of OBA treated fabric by 10-15 units.

Application:

After application of OBA on jigger, treat with 1.5-2.0% Optawhite-DA3 at 60°C for 15 min.

Note:

The fabric should not be treated with Acetic acid.

How Optawhite-DA3 is to be used:

Cotton fabric :

After desizing → Bleaching with OBA → Give hot wash → In fresh water, take Optawhite-DA3 and run at 60°C for 15 min and then give over flow rinse to cool then fabric and unload.

Do not use Acetic acid

Knits and yarn dyeing:

Bleaching with OBA → Give hot wash → In fresh water, take Optawhite-DA3 and run at 60°C for 15 min and then give over flow rinse to cool the fabric and unload.

Do not use Acetic acid

Towel:

Bleaching with OBA → Give two hot wash → In fresh water, take Optawhite-DA3 and run at 60°C for 15 min and then give over flow rinse to cool the fabric and unload.

Do not use Acetic acid

		
Bleached base white	**Bleached with OBA → 2 g/l Acetic acid**	**Bleached with OBA → 1.5-2% Optawhite-DA3 at 60°C, 15 min.**
CIE Whiteness Index = 63	CIE Whiteness Index = 133	CIE Whiteness Index = 146

*100% Cotton Knit

Efficiency of Optawhite-DA3

Samples	CIE Whiteness Index
Bleached base white	63
Bleaching with OBA → 2 g/l Acetic acid treatment	133
Bleaching with OBA → 1.5-2% Optawhite-DA3	146

Conclusion:

Fabric treated with Optawhite-DA3 will remit more light in the visible region thus gives more whiteness than conventional bleaching and OBA treatment and neutralizing with acetic acid.

Sarakol-BU - Multifunctional auxiliary in Dyeing

Reactive dyes are one of the most largely used class of dyes for cotton materials. Most of the dyes do not chemically react with the cellulose molecule to affix the colour but in case of reactive dyes, chemical reaction between hydroxyl group of cellulose and the dye molecule occurs. In general, reactive dyes on cellulosic fibres are easy to apply, they are available in a range of bright colours and give very good shades. Due to this reason, in the exhaust dyeing segment of cotton, reactive rules 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,. In spite of such developments, there are still instances of unlevel dyeing, batch-to batch variation, dye specks etc.

Unlevelness in exhaust dyeing of reactive's can occur due to one or more of the following reasons.

- 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 demineralization 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.

Due to these reasons, sometimes their is presence of unfixed dye which leads to poor fastness and lowering of depth of shade.

In textile wet processing, the most substantial and influential role is played by water, so the quality of colouration is vastly dependent on quality of water. "Right First Time" dyeing hugely depends on the quality of water. Water contains hardness in the form of Ca and Mg salts, alkalinity, turbidity etc., which leads to dye precipitation and the precipitates can further promote dye aggregations, which results in colour specks and loss of depth. The other problem in reactive dyeing is hydrolysis of the dyestuff in the water due to sudden change in pH of the dye bath to alkaline. This leads to lower depth of shade and poor washing and rubbing fastness. As reactive dyes have very high affinity towards the cellulosic fabric in alkaline pH and in presence of salt, the strike rate of the dye towards the fabric is very high leading to patchy dyeing.

To overcome the above problems and to achieve "Right First Time" dyeing, Sarex has developed a product, **Sarakol-BU**, which can be used during reactive dyeing. Sarakol-BU will help in improving the solubility of the dyestuff in presence of calcium ions thereby preventing precipitation of dyestuffs during package dyeing and dyeing at low liquor ratio. It will also help in reducing the strike rate in salt phase and also due to its buffering action it will lead to gradual increase in pH leading to even dyeing.

Unique Features:

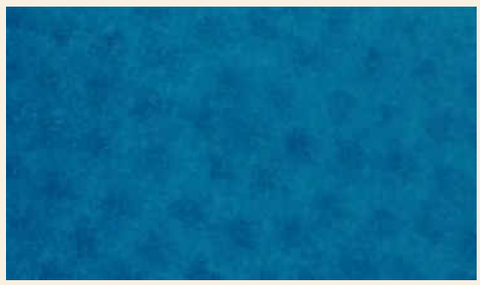
- Improves solubility of dyestuffs.
- Excellent dispersing action.
- Reduces strike rate during exhaustion.
- Does not affect yield or tone.
- Performance not affected by mineral content of cotton.

Recommended procedure:

0.5% - 1% Sarakol-BU is recommended before addition of dyestuff.

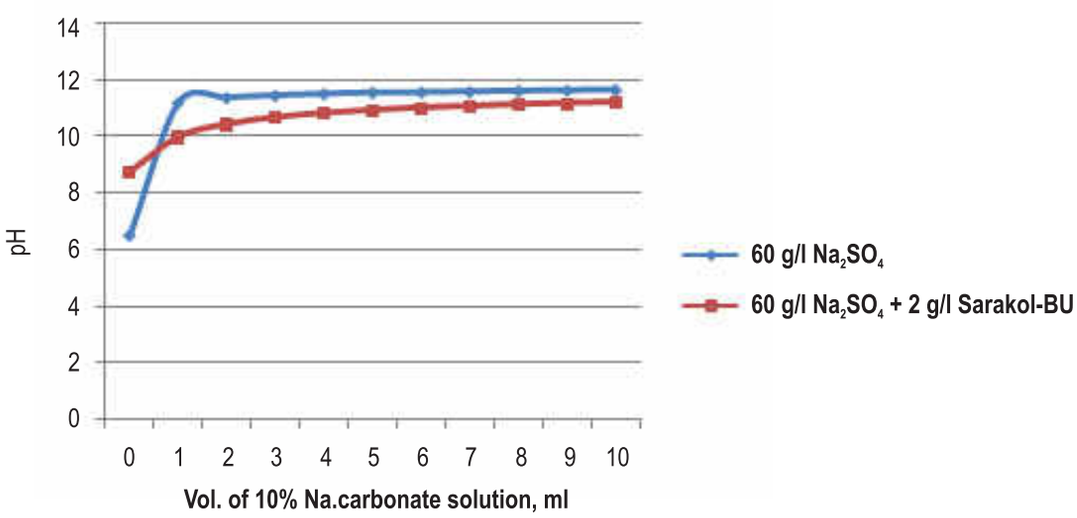
Dispersion behavior of Sarakol-BU

Without Sarakol-BU



With 1% Sarakol-BU

Buffering efficiency of Sarakol-BU



Conclusion:

It could be clearly seen from the photograph that Sarakol-BU posses excellent dispersing action whereas the graph concludes the buffering action of Sarakol-BU in reactive dyeing. Sodium carbonate added during the dye fixation results in sudden shift of the pH leading to un-level dyeing whereas Sarakol-BU show gradual rise in the pH leading to uniform and level dyeing.

Arkolan-432 - Anti-tinting agent

Dye transfer is one of the most aggravating of all laundry care problems. It occurs when a colour from one garment bleeds and stains on another garment. This phenomenon is called "colour transfer or tinting" and usually happens when garments with different colours are washed together.

Cotton comprises over 40% of world textile consumption. Of all the dyes employed for coloration of cellulosic fibers, reactive dyes find greatest use with over 50% of world consumption. Reactive dyes are extensively used for colouration of cellulosic fibres because of their excellent wash fastness (stability to washing with aqueous detergent solutions), ease of application, good exhaustion etc. Reactive dyes exhibit excellent wash fastness due to formation of covalent bond between dye and fibre. However the dyestuff gets hydrolyzed in presence of alkali. This hydrolyzed dye has an affinity for the fibre through hydrogen bonding or Van der Waals forces and exhibits poor wash fastness. This unfixed or hydrolyzed dye results in tinting of adjacent fabrics during washing and decreases aesthetic value of fabrics. Fabric after printing, during washing step also stains fabric adjacent to printed area. This type of tinting will be problem in laundering during garment wash.

The best way to handle dye transfer problems is to avoid them. Mostly garments are tagged with care labels mentioning quotes such as "Sort carefully by colour", "Wash with like colours" or "Wash separately." In today's busy life, one do not have time to give special attention to such instructions.

In view of these, laundry detergents are formulated inclusive of dye transfer inhibitors. The use of dye transfer inhibitors (DTI) in domestic laundering detergent compositions is common practice. DTI limit random dye re-deposition onto the fabric during the wash cycle.

DTI are also termed as Anti-tinting washing-off agents. Anti tinting washing-off agent helps in neutralizing the bleeded colour & prevents redeposition of colour back on the fabric during washing after printing.

Sarex has developed a novel dye transfer Inhibitor **Arkolan-432** that works by binding with dyes which are released from garments during the wash cycle. Arkolan-432 is a dye transfer inhibiting or Anti-tinting washing-off agent which helps in neutralizing the bleeded colour and prevent its redeposition on the fabric.

Arkolan-432 forms stable complexes with various classes of dyes. It removes the unfixed dye completely from the fabric resulting in very good wet fastness properties.

Unique Features:

- Very good wash fastness property.
- Can be incorporated in powder detergents.
- Offers excellent cost / benefit ratio in detergent formulations.

Recommended procedure

Efficiency of Arkolan-432 were evaluated by following:

- As an Anti-tinting agent in washing off of the printed fabric.
- As an additive in laundry formulation.

As an Anti-tinting agent in washing off of the printed fabric

100% Cotton RFD fabric was printed with Reactive Red 152 dye. After steaming, the printed fabric was washed without and with 1.5g/l Arkolan-432 + 2g/l Sarakol-1583 at 60°C for 10 mins. followed by hot wash and cold wash. The tinting on the adjacent fabric was evaluated. Also the wash fastness of the printed was performed by ISO 105 C10 at 60°C.

As an additive in Laundry Formulation

Dyed and undyed 100% cotton knit fabric were washed in same bath with commercial detergent and 5g/l Arkolan-432 at 40°C for 30 mins keeping MLR at 1:10. The fabrics were then washed and dried. The staining on the undyed fabric was observed.

As an Anti-tinting agent in washing off of the printed fabric		Additive in Laundry Formulation	
			
Without Arkolan-432	With 1.5g/l Arkolan-432	2g/l Standard detergent	5g/l Arkolan-432 + 2g/l Standard detergent

Washing fastness test of the printed fabric - ISO 105 C10

Printed fabric	Staining on Multifibre	
		Blank
		Washing off with 1.5g/l Arkolan-432 + 2g/l Sarakol-1583

Conclusion:

It can be observed that Arkolan-432 prevents staining of white portion adjacent to printed fabric, while control fabric shows complete tinting of the adjacent unprinted white portion. Also it could be seen that the fabric treated with Arkolan-432 along with standard detergent shows no staining on adjacent fabric while fabric treated with only standard detergent shows staining on adjacent fabric. The results demonstrate the need of Arkolan-432 along with standard detergent during laundering of fabrics to prevent dye transfer problems. Washing-off done with Arkolan-432 also ensures complete removal of unfixed dye from the printed portion which gets verified with the wash fastness test results.

Use of Arkolan-432 in the washing-off of Reactive dyes enables development of an efficient, economical and sustainable process.

CONTACT US

Corporate Office:
501, Waterford Building, 'C' Wing, C D Barfiwala Marg,
Juhu Lane, Andheri (W), Mumbai - 400 058, India.

Tel.: **+91 22 6128 5566** Fax: **+91 22 4218 4350**
Email: **tcmktg@sarex.com** Web: **www.sarex.com**

Plants:
N-129, N-130, N-131, N-132 & N-232, MIDC,
Tarapur - 401 506, India.

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

M & S

REACH

OHSAS 18001:2007

ISO 17025:2005

ISO 14001:2004

ISO 9001:2008

TWO STAR EXPORT HOUSE

GOTS