

Innovations in Colouration of Wool

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AWI

Technologies

Superwhite

Improved bleaching and whitening technologies can achieve the whiteness and brightness of bleached and whitened cotton.

“Mercerised” wool

A misnomer used to describe the shiny appearance of wool treated in the soft lustre process to create a lustrous fibre with a ‘silk-like’ appearance

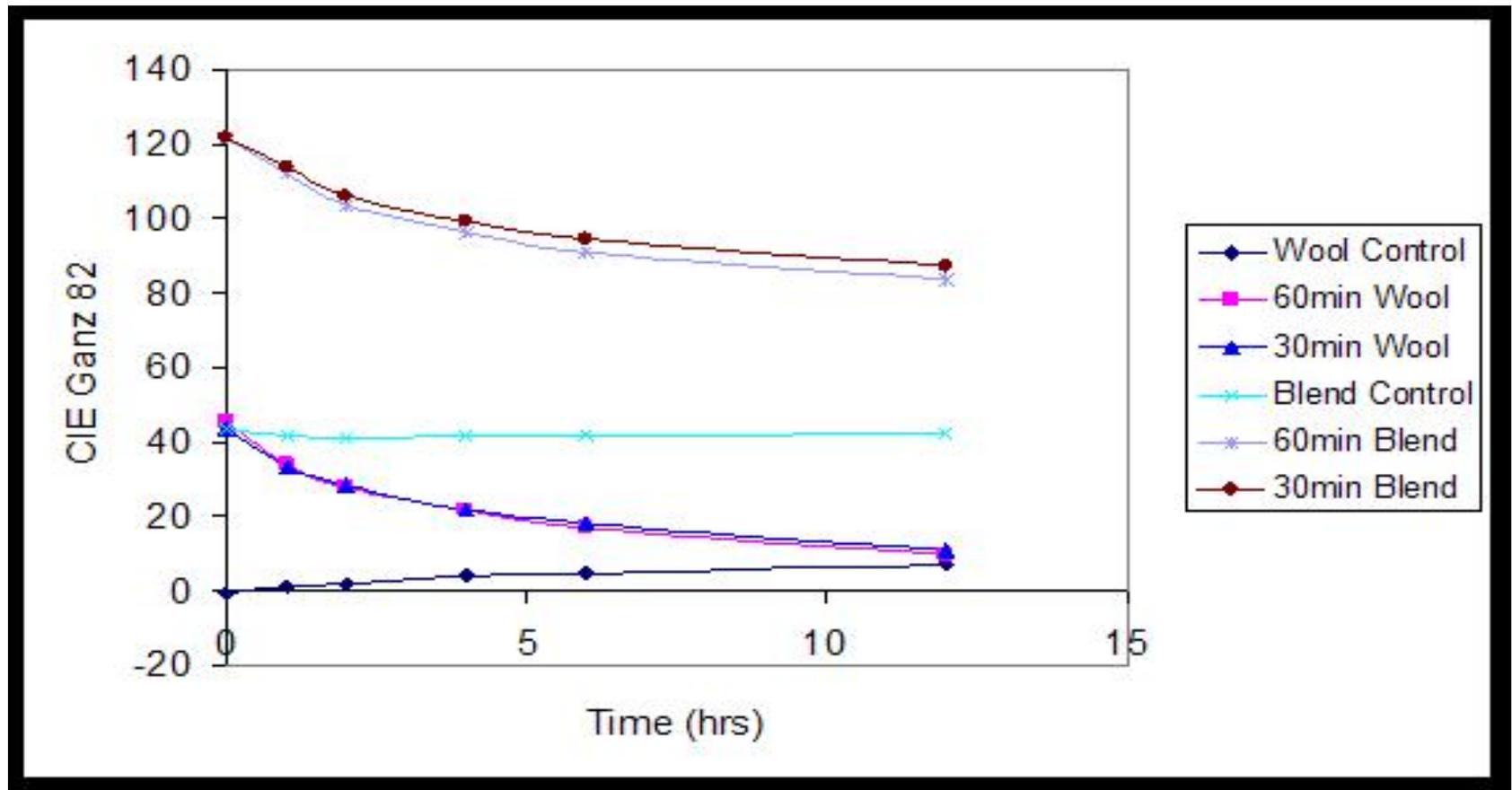
Superwhite

The Problem-Opportunity

- The consumer has become accustomed to the bright white products manufactured from cotton and synthetics
- Wool has a natural cream colour so must be bleached while minimising damage
- Wool treated with Fluorescent Whitening Agents (OBA's) yellows rapidly in sunlight, especially when wet.



Rapid Photo-yellowing



Superwhite

The Technical Challenges

- To bleach wool and wool-blend fabrics to a better white with minimal damage
- To prevent rapid photo-yellowing of the optically brightened wool-containing fabric

Superwhite Pure Wool

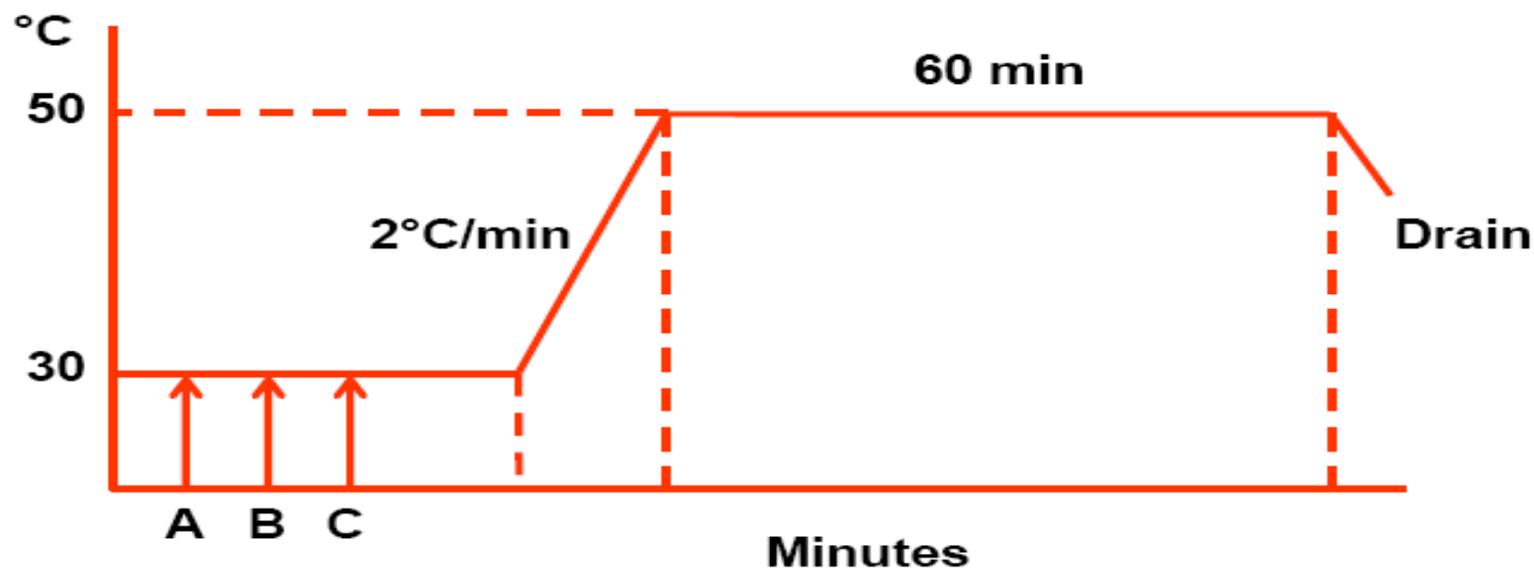
The Technical Solution

- An improved bleaching process for the wool
 - Colourclear WB (Rohm & Haas)
- A process that ensures that the contact between the OBA and the wool is minimised
 - Don't use Optical Brightening Agents (or when absolutely necessary minimise their use)

Wool Bleaching

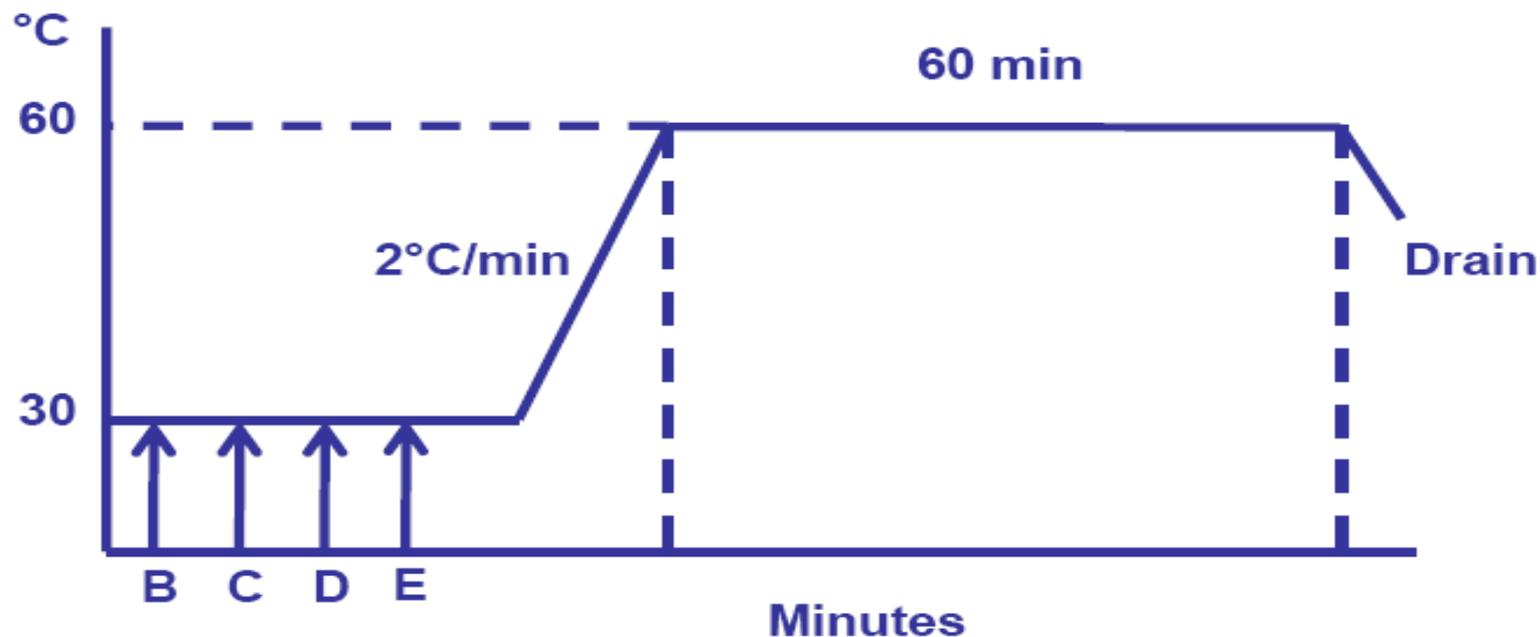
- Oxidative bleach
 - Hydrogen peroxide plus stabiliser
- Reductive bleach
 - Hydrosulphite (Blankit IN)
 - Thiourea dioxide
 - **Colourclear WB**
- Combined Oxidative-reductive bleach

Bleaching – Oxidative step



- | | | |
|----|-----------------------------|-----------------|
| A. | Wetting agent | 0.5 – 1.0 g/L |
| B. | Tinoclarite WO (stabiliser) | 2.0 – 3.0 g/L |
| C. | Hydrogen peroxide (50%) | 15.0 – 17.5 g/L |
- pH about 10.0 – 10.5

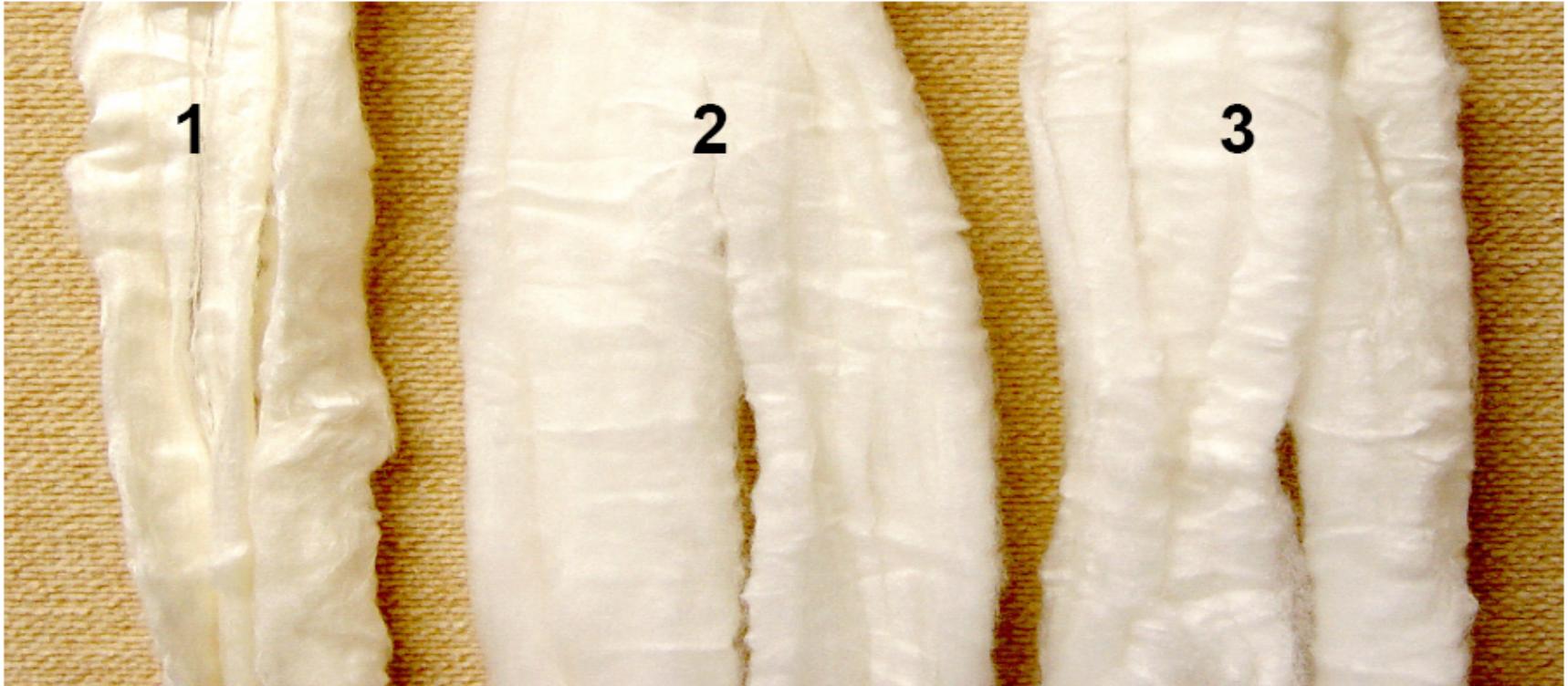
Bleaching - Reductive Step



B	Sodium metabisulfite	4–8 g/L
C	ColorClear™ WB	1–2 g/L
D	Formic acid or acetic acid	pH 4–5
E	OBA (optional)	1–2% o.w.f.

Samples

Bleached Wool Tops



Stabilised Peroxide
+ hydros

Stabilised Peroxide +
Colorclear WB

Stabilised Peroxide +
Colorclear WB

Technical data

CIE Whiteness Index

Untreated wool	-4
Oxidatively bleached	20
Combination bleach	54
Unbleached Blend	38
Bleached, Whitenened Blend	133
Whitenened Polyester	150

Superwhite Blends

The Technical Challenges

- To bleach wool and wool-blend fabrics to a better white with minimal damage
 - Oxidative-reductive bleach using Colourclear WB
- To prevent rapid photo-yellowing of the brightened wool-containing fabric
 - The use of an application method that ensures the OBA goes onto the synthetic fibres in the blend and not the wool

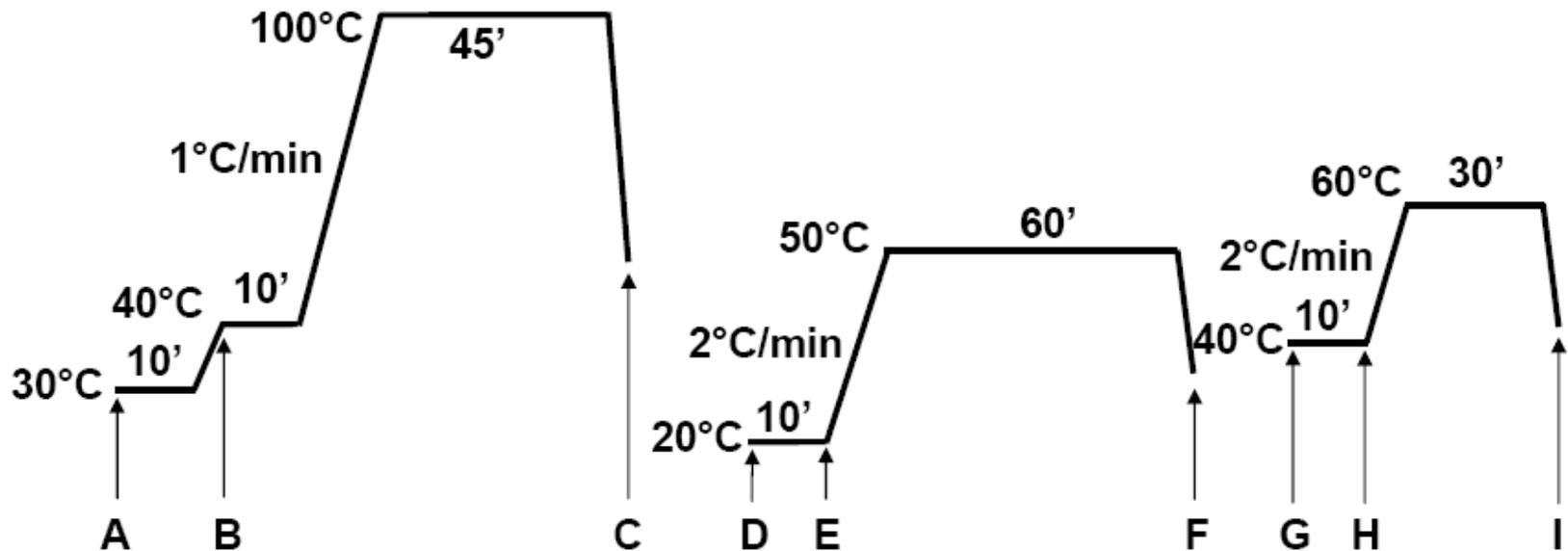
Application Method

- Dye blend with OBA that has properties of a disperse dye (i.e. poor affinity for wool)

THEN

- Bleach the wool – the bleaching process will also strip the OBA from the wool fibre

Superwhite – Wool/PET

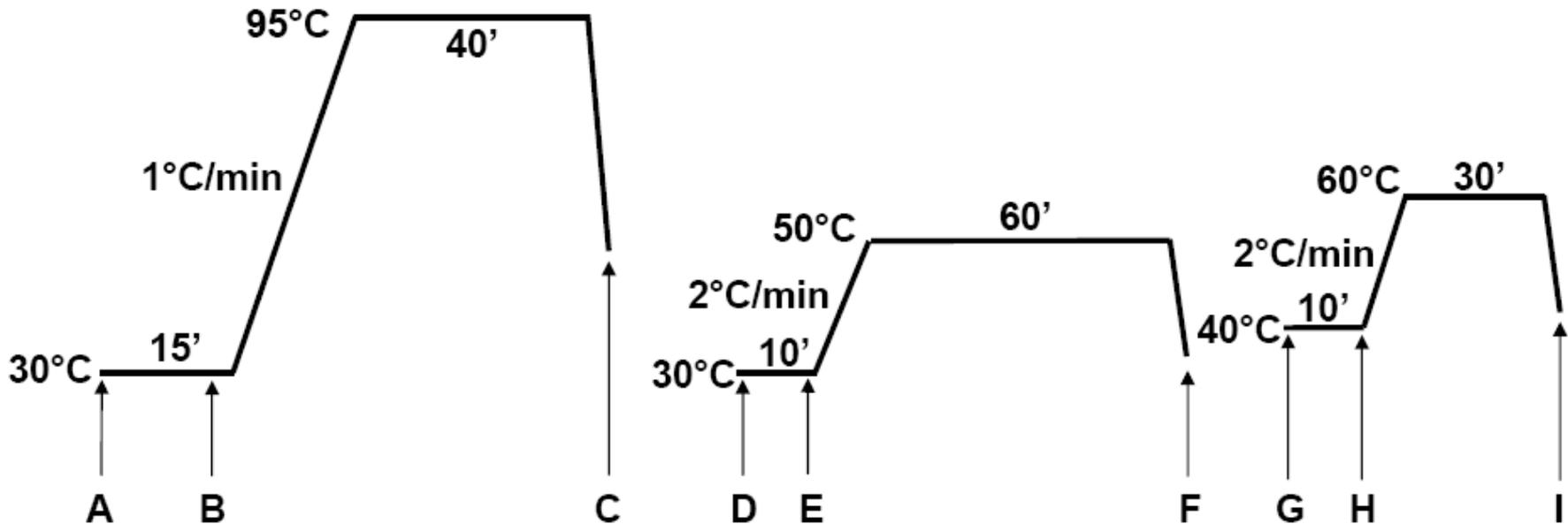


A Wetting agent: xg/L
Carrier: xg/L
B OBA for PET: x%
pH 5.0–5.5
C Rinse 30°C, 10 minutes

D Peroxide stabiliser: xg/L
E H₂O₂ (50%): 17.5mL/L
pH 10–10.5
F Rinse 30°C, 10 minutes
Acid scour with acetic acid

G Sodium metabisulfite: 8.0g/L
H ColorClear™ WB: 2.0g/L
OBA for Wool (optional): x%
Formic Acid: 2.0g/L
pH 3.5
I Rinse with H₂O₂ (50%): 0.5g/L

Superwhite – Wool/Acrylic



A Wetting agent: xg/L
OBA for Acrylic: x%

B Formic Acid
pH 3.0–4.0

C Slowly cool to 60°C
Drain and rinse 30 C, 10 minutes

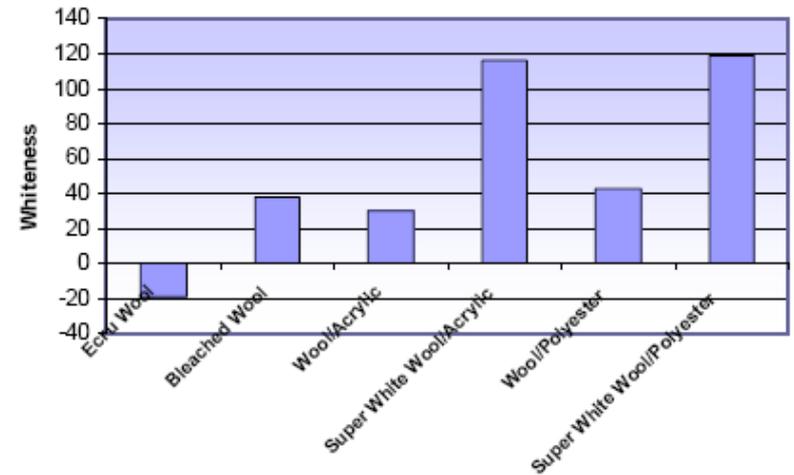
D Peroxide Stabiliser: xg/L
E H₂O₂ (50%): 17.5mL/L
pH 10–10.5

F Rinse 30°C, 10 minutes
Acid scour with acetic acid

G Sodium metabisulfite: 8.0g/L
H ColorClear™ WB: 2.0g/L
Acetic Acid 0.5g/L

I Rinse with H₂O₂ (50%): 0.5g/L

Superwhite – The Outcome



Whitened Polyester = 140

COLORCLEAR™ WB

MAKING MERINO BRIGHTER AND WHITER

THE UNIVERSAL PROMISE OF BRIGHTER WHITES

Brighter whites and colour fastness are two promises that appeal to everyone with an interest in fashion. Consumers looking for these qualities can now turn their attention to wool, with new technology tipped to shortly release even more of the inherent benefits of Australian Merino.

THE TECHNOLOGY

While the textile industry has only recently started using reductive chemistry to help lighten colours for synthetic fabrics, its application to wool and wool blends shows even greater promise. ColorClear™ WB Technology from Rohm & Haas Company has already shown potential to obtain better balance of whiteness for wool and wool blend products.

Importantly from a processing viewpoint early indications are that ColorClear™ WB could also pave the way to new colouration tech-niques, saving costs and overcoming environmental concern over chrome based dyeing systems.

FEATURES

- Whiter whites
- High colour fastness
- Machine washability
- Traditional Merino comfort
- Metal free dyeing

PRODUCT APPLICATIONS

Improved whiteness will create new markets for Australian Merino in a range of fashion and active wear applications.



To find out why ColorClear™ WB Merino White could become the coolest new colour please contact Australian Wool Innovation.

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'Mercerised' Wool (Soft-Lustre Wool)

The Problem-Opportunity

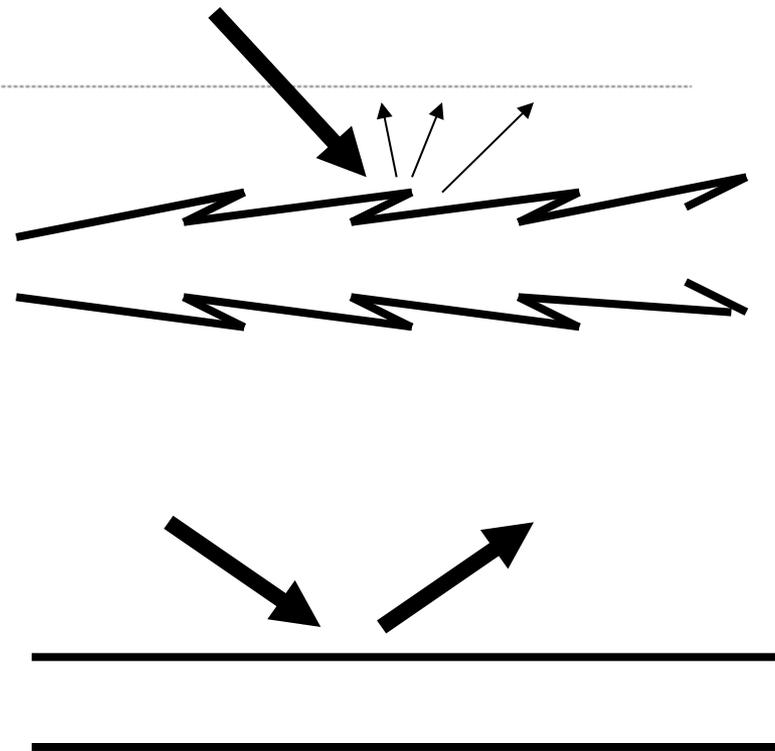
- There is a market for wool products that will rival cashmere in appearance and handle
- To capture that market wool needs a softer handle and greater lustre



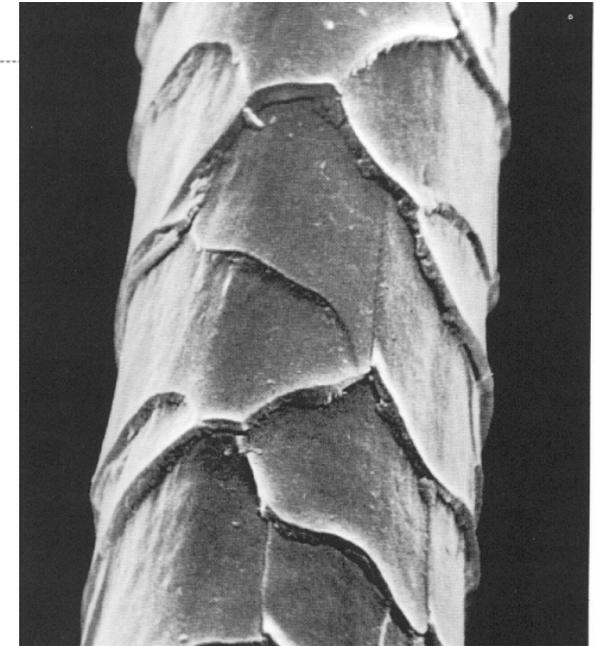
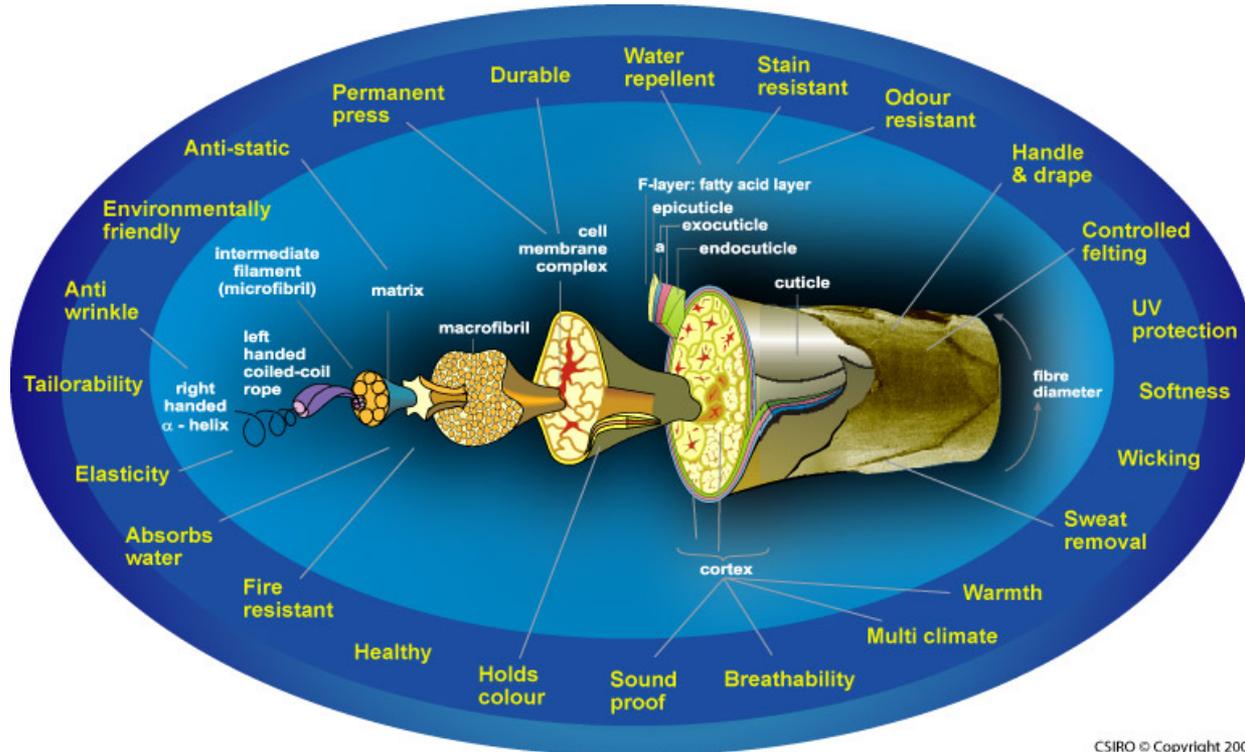
'Mercerised' Wool

The Technical Challenges

- To smooth out the scales so that the fibre has enhanced lustre.
- To ensure that the modified surface of the fibre does not impair the handle of the fibre or wool products



The Wool Fibre



CSIRO © Copyright 2005

Diagram courtesy of CSIRO

'Mercerised' Wool

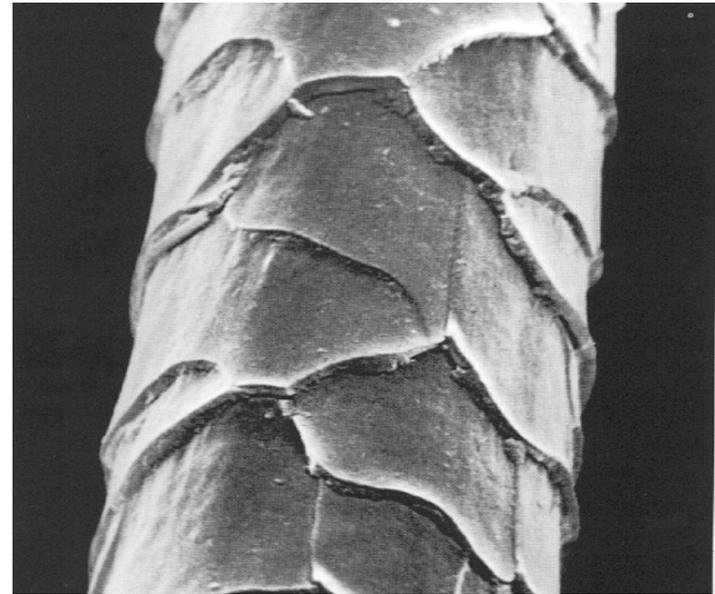
The Technical Solution

- High level chlorination to smooth out the scales
- Application of a (silicone) softener to remove the 'scroopy' handle imparted
 - The scroopy handle is derived from the high friction of the exposed protein on the fibre surface

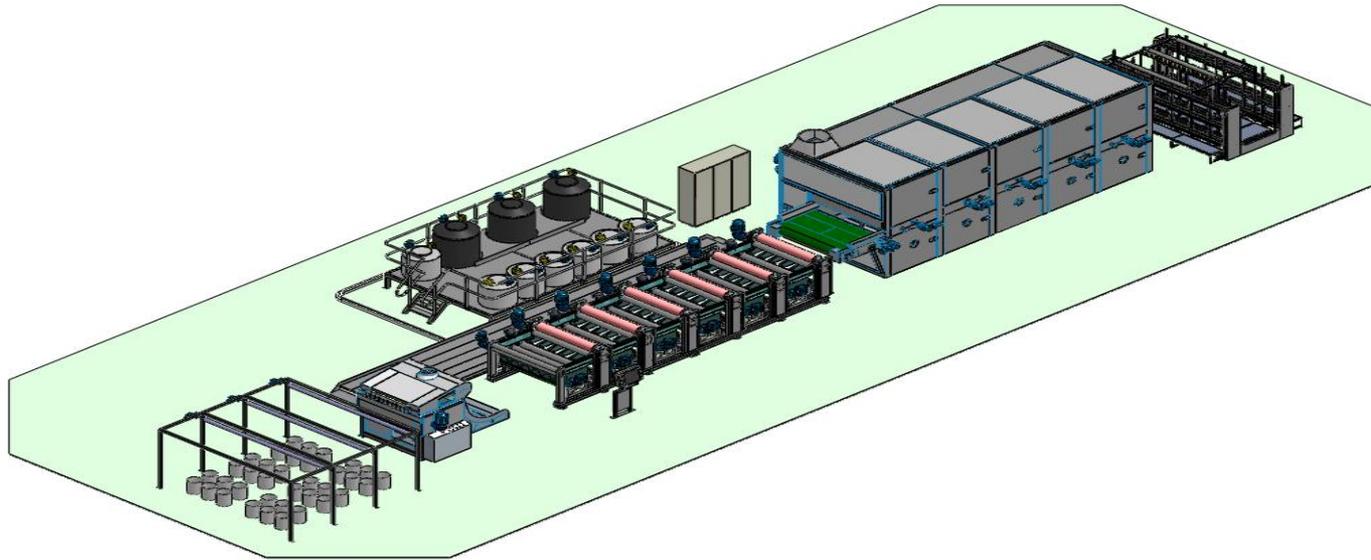


'Mercerised' Wool – The Process

- Application of 3.5-4.5% chlorine on weight of wool at pH= 1.5-2.0
- Antichlor with sodium metabisulphite
- Neutralise and remove degraded protein pH=9.5-10
- Efficiently rinse
- Re-acidify
- Application of a micro-silicone softener (eg CT80 – Wacker)
- Dry



The Equipment



Equipment

The minimum requirements

- a six-bowl suction drum backwashing line
- a suction drum drier of adequate capacity.
- a chemical supply station featuring
 - stock tanks,
 - making up facilities and
- flow monitoring devices
- automatic pH control facilities for the anti-chlorination, protein strip and rinse bowls.

Processing conditions

The main potential problems likely to be encountered when processing *Soft Lustre* treated wool are associated with the following:

- Very low fibre cohesion
 - Reduced tendency to re-absorb moisture
 - Loss of the imparted handle.
- Re-combing & Gilling
 - Sliver less cohesive, recombining using stuffer box or cohesive lubricant recommended.
 - Roving & Spinning
 - Rubbed rovings use higher level of rubs
 - Antistat (Disperstat IP) required
 - Normal yarn twists
 - Steam below 80C

Dyeing & Finishing

'Mercerised' wool:

- All dyes usable, reactives recommended
- Dyes have a higher strike rate
- Evenness depends on the evenness of the chlorination as well as dyeing conditions
- May be necessary to pre-neutralise the fibres
- Softer yarn packages recommended
- Fabric inherently machine washable



'Mercerised' Wool – The Outcome

Outcomes

- Equivalent handle to fibre 2um finer
 - Some diameter reduction
 - Softer handle, effect of softener
- Higher lustre – silk like finish
 - Scales 'smoothed'
- Machine washable garments



Samples



Partners

Zhe Jiang Xin Ao Textiles Group Co.,Ltd
 Milos Knitwear (International) Ltd.
 Babylon Yarns (Suzhou) Co. Ltd.
 CRYSTAL SWEATER LTD

merinosoft

Mercerisedmerino

Mercerised Merino provides luxurious handle and appearance whilst still offering enhanced fluidity, drape and comfort.

Australian Merino wool is regarded as one of the finest and softest fibres in the world. The softness and comfort of Merino wool has further been enhanced by an innovative mercerising process, specifically developed for this purpose.

On average this new process is equivalent to using a Merino fibre which is an average of 2 micron (a unit of measurement used in assessing the diameter of a fibre which equals one millionth of a metre) finer.

Mercerised Merino gives a smooth surface finish, lending a 'silk like' appearance to the fabric.

The technology

During the mercerising process the scale structure of the Merino fibre is completely removed, resulting in each fibre having a very smooth and soft surface.

By removing these scales, the light then reflects off the smooth surface to make the fabric look slightly glossy and give a subtle lustre.

Today mercerised technology is well established, a number of spinners specialising in Australian Merino wool yarns offer Mercerised Merino or Soft-Lustre knitting yarns in their collections.

This technology is generally applied during early stage processing, prior to spinning.

Light Diffused colours



Untreated Merino fibre

Light Sharper, brighter



Mercerised Merino fibre



Features

- 1 Luxurious handle
- 1 Enhanced comfort
- 1 Improved drape
- 1 Shiny appearance
- 1 Enhances brighter colours
- 1 Compatible for blending with noble fibres e.g. cashmere, silk

Product applications

This treatment is best used for Australian Merino wool knitted products created for next to skin wear. This includes loungewear, underwear and lingerie, men's polo or t-shirts; it is extremely beneficial for women's knitwear.

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