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TEXTILE AUXILIARIES

Viscose, Modal and Lyocell (TENCEL®)



Who's who in fibers



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fibers					
natural fibers		from natural polymers		from synthetic polymers	from anorganic polymers
protein based	cellulose based	cellulose based	protein based		
wool silk angora cashmere ect.	cotton flax hemp jute ect.	viscose modal lyocell (TENCEL®) cupro acetate ect.	casein collagen ect.	polyester polyamide polyethylene polyurethane (elastane) acrylic polytetraflour-ethylene	carbon ceramic glass metal

Man-made cellulose fibers



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- combine the natural wearing properties of natural fibers and the advantages of synthetic fibers such as purity, consistent quality etc.
- occupies a middle position between natural and chemical fibers.

How fibers differ?



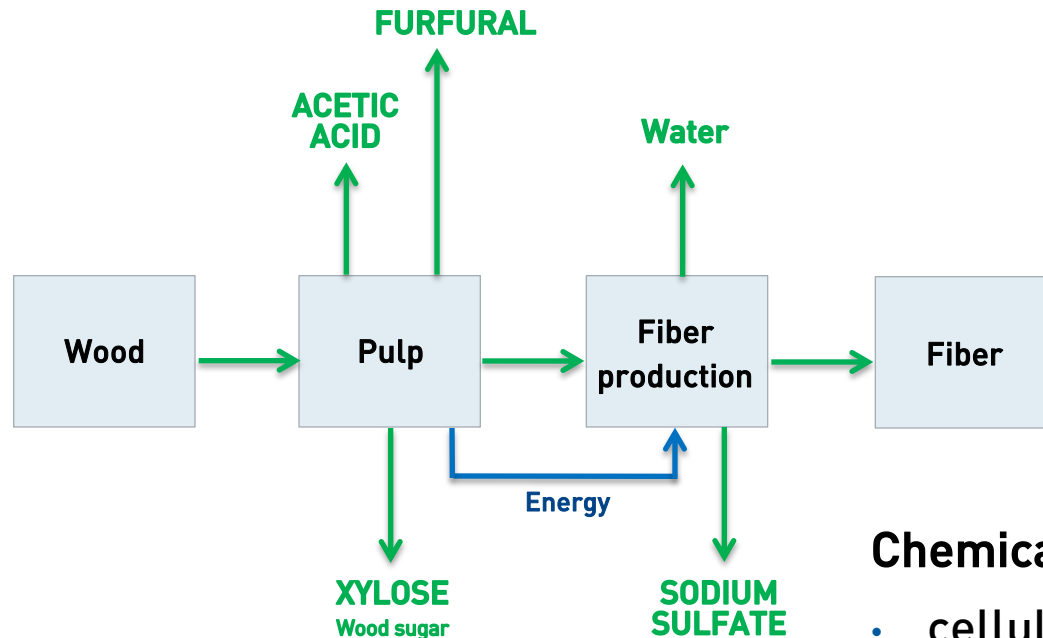
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- fiber production
- fiber properties
- fiber swelling during wet processes
- dimension stability
- stability to certain processing step
- dye uptake, dyeability

Viscose and Modal production process



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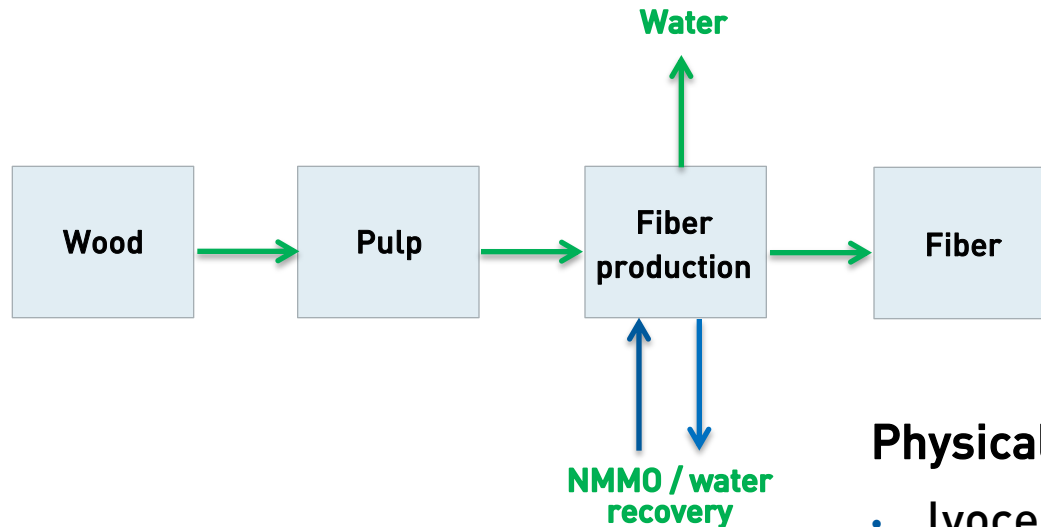
Chemical solution

- cellulose + NaOH + CS₂ = Xantogenate (derivatization)
- viscose = quick (aggressive) derivatization
- modal = more gentle derivatization
- raw material beechwood

Lyocell (TENCEL®) production process



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Physical solution

- lyocell (TENCEL®) = without derivatization
- NMMO, N-methyl morpholine N-oxide is an aqueous, non-toxic, biodegradable, organic solvent
- raw material eucalyptus wood

Fiber properties



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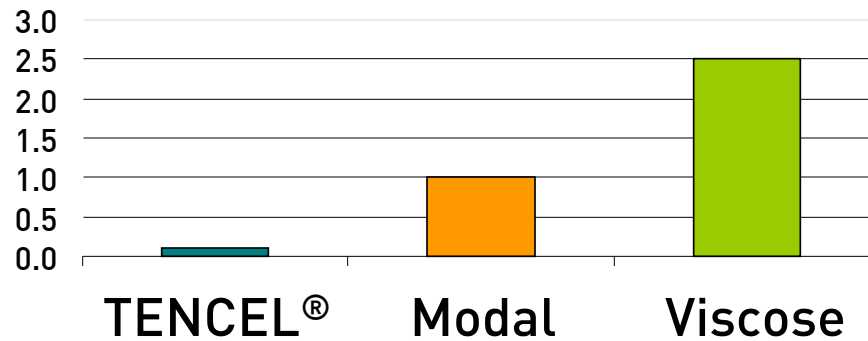
	Viscose (CV)	Modal (CMD)	Lyocell (CLY)	Cotton (CO)
Titer / Length	1.3 dtex / 39 mm	1.3 dtex / 39 mm	1,3 dtex / 38 mm	depends on cotton type
Tenacity cond. [cN/tex]	25	35	41	30
Elongation cond. [%]	19	13	16	8
Tenacity wet [cN/tex]	11	20	35	28
Elongation wet [%]	22	14	18	12
Bisfa Modulus [cN/tex] at 5 % elongation	2	6	9	8
Dye uptake	+++	++	+++	+
Natural moisture content [%] (65 % rel H)	11	11	11	8
Polymerisation degree DPv	250 - 300	300 - 600	550 - 600	2000 - 3000

Distribution of water and swelling data

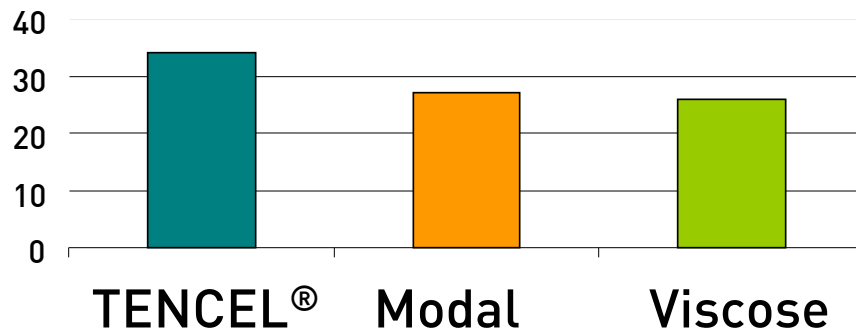


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Fiber length increase in water %



Fiber diameter increase in water %



TENCEL® fiber specialities



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Fibrillating man made cellulose fiber

Standard TENCEL®

Surface modification

- clean finish
- peach skin
- wash out / used look effects

Non fibrillating man made cellulose fiber

chemical crosslinked

TENCEL® LF cross linker **stable under alkaline conditions**

TENCEL® A100 cross linker **stable under acid conditions**

Recommended blending partner *



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	VISCOSE	MODAL	TENCEL® Standard	TENCEL® LF	TENCEL® A100
Cotton	+	+	+	+	-
Linen	+	+	+	+	-
Silk	+	+	+	-	+
Wool	+	+	+	-	+
Polyamide	+	+	+	-	+
Polyester	+	+	+	-	+
Polyacrylic	+	+	+	-	+
Polyester	+	+	+	-	+

* If the blending partner needs to be dyed

Stability to alkaline processing steps



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	6-7 °Bé	12-14 °Bé	26-28 °Bé
VISCOSE	+ (tension)	-	-
MODAL	+	-	- (only blends with cotton)
TENCEL® Standard	+	+	+
TENCEL® LF	+	+	+
TENCEL® A100	+ (70 °C)	-	-

Fiber specialties – processing



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	VISCOSE	MODAL	TENCEL® Standard	TENCEL® LF	TENCEL® A100
Prewash neutral / soda ash 85-90 °C	+	+	+	+	+
Bleaching 90 °C	-	+	+	+	-
Bleaching 98 °C / 120 °C	-	-	+	-	-
Neutral reductive bleach	+	+	+	+	+
Mercerisation	-	+ -	+	+ -	-
After treatment: neutralize 30 °C	+	+	+	+	+
After treatment: neutralize 60 °C	+	+	+	-	+
Biopolishing – Cellulases (Enzymes)	-	-	+	-	-
Resination (easy care)	+	+	+	+	-

- fiber/fabric tenacity loss

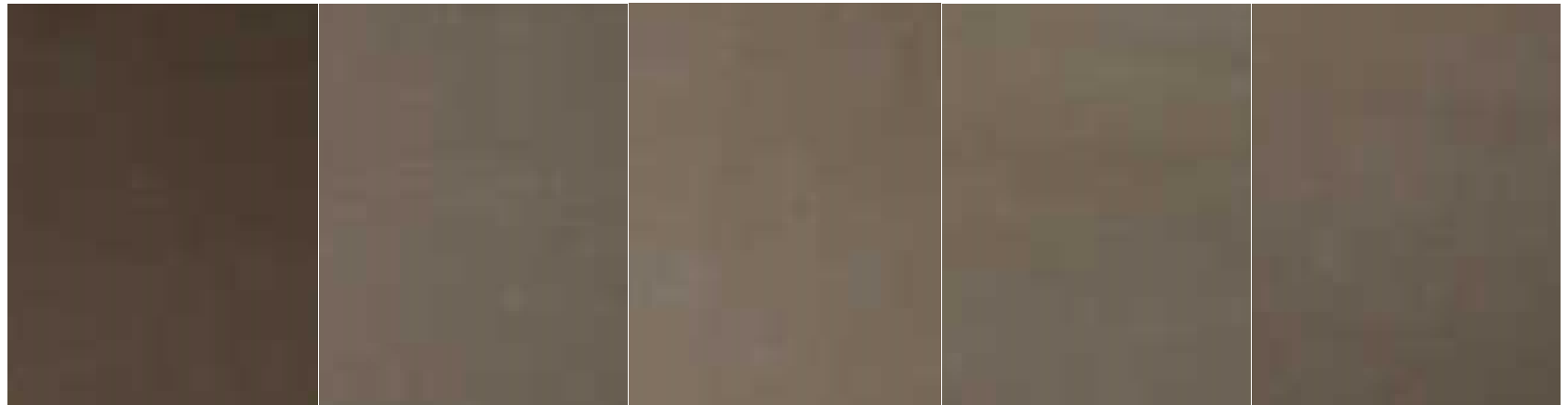
- fiber inhibits enzyme function

- chemical crosslinking systems destroyed

Dye uptake, dyeability



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TENCEL® A100

TENCEL® Std.

TENCEL® LF

MODAL

VISCOSE

Processing TENCEL® Standard



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TENCEL® Standard

woven fabrics, clean skin, open width

Processing TENCEL® Standard woven fabrics, clean skin, open width



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singeing (removing hairiness)

causticizing / mercerizing

cold pad batch or pad steam
desizing / bleaching

cold pad batch or pad steam dyeing

resination

**MUST
DO!**

for better:

- crease resistance
- dimension stability
- pilling behaviour
- against fibrillation

Processing TENCEL® Standard woven fabrics, clean skin, open width



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Common resin finishing

40 – 60 g/l PERFIXAN CLY
(Crosslinking resin with a **low** content of formaldehyde)

16 – 24 g/l PERISTAL KSV
(Catalyst for resin finishing)

20 – 25 g/l PERISOFT NIS/R
(Universal softener for all types of fibres)

15 – 20 g/l PERISOFT MSN
(High-quality silicone **macro** emulsion)

- liquor pick up: approx. 70 %
- drying: as usual
- curing: 45 sec at 170 °C or 3 min at 150 °C

Processing TENCEL® Standard woven fabrics, clean skin, open width



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Softener selection in case of pilling issues

15 – 20 g/l PERISOFT SML
High-quality silicone **micro** emulsion

or

15 – 20 g/l PERISOFT HSM NEW
Hydrophilic silicone **micro** emulsion

or

5 – 20 g/l PERISOFT NANO
Hydrophilic silicone **micro** emulsion

Processing TENCEL® Standard



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TENCEL® Standard

woven fabrics, peach skin, rope

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

Singeing (open width)

Desizing (open width)

- Recipe depending on kind of size and machinery

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

90 - 120 g/l NaOH 100 %
(approx. 12 - 14 °Bé, constant)

causticizing

3 g/l PERIWET MN NEW

tensionless fabric guiding

- liquor pick up: 100 - 110 %
- temperature: 25 - 30 °C
- time of exposure: depending on aggregate 10 - 20 min
- aggregate: padder, beck with rollers, jigger
- rinsing: start hot, neutralise

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

initial temperature 60 °C

causticizing

0.5 g/l PERLAVIN NIC

4.0 g/l PERILAN VF

0.4 g/l PERILAN RFC

fibrillation (rope)

4.0 g/l soda ash (to be added prediluted via dissolving tank)

- heat up with 2 °C/min to 95 °C
- treat 90 min at 95 °C
- cool down with 2 °C/min to 60 °C
- rinse hot (approx. 60 °C)

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

initial temperature 55 °C

causticizing

0.5 g/l PERLAVIN NIC

4.0 g/l PERILAN VF

0.4 g/l PERILAN RFC

2.0 g/l PERISTAL E

fibrillation (rope)

pH value approx. 4.5 - 5.5

temperature 55 °C

enzymatic defibrillation (rope)

1.5 - 2.5 g/l PERIZYM 2000

- treat 60 min at 55 °C
- enzyme stop by fast temperature increase (2 °C/min) to 85 °C
- treat 10 min at 85 °C
- rinse thoroughly hot and warm

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

initial temperature possibly > 50 °C

causticizing

4.0 g/l PERILAN VF

0.4 g/l PERILAN RFC

1.0 g/l PERIQUEST BSD

x g/l dyestuff / salt / fixing alkali
temperature profile/dosage
depending on dyestuff

fibrillation (rope)

enzymatic defibrillation (rope)

- rinse warm, cold

dyeing (rope or pad batch)

soaping:

4.0 g/l PERILAN VF

1.0 g/l PERLAVIN SRL

- treat 15 min at 95 °C

- rinse hot, warm

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

causticizing

fibrillation (rope)

enzymatic defibrillation (rope)

dyeing (rope or pad batch)

tumbling

Removal of fibre fibrils/further development of the peach skin (if necessary)

- treatment on rope tumbler at approx. 80 °C
- initial speed: approx. 300 m/min
- accelerate up to 800 - 1000 m/min

repeat if necessary

Processing TENCEL® Standard woven fabrics, peach skin, rope



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singeing / desizing

causticizing

fibrillation (rope)

enzymatic defibrillation (rope)

dyeing (rope or pad batch)

tumbling

resination

Resin finishing for peach skin fabrics to reduce abrasion of fibrils

30 - 40 g/l PERFIXAN CLY
16 g/l PERISTAL KSV
40 g/l PERIPRET PUS
40 g/l PERISOFT ME SPECIAL

- liquor pick up: approx. 70 %
- drying: as usual
- curing: 45 sec at 170 °C or 3 min at 150 °C

If necessary, short repeat of tumbler treatment to obtain maximum softness and volume.



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The above indications are based on the latest state of our knowledge. Due to different operational conditions and requirements these are guidelines only. A legally binding assurance cannot be drawn from our indications. Our technical staff will always be at your disposal to support you in testing our auxiliaries and to answer further technical questions.

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