

MILK FIBRE



By: G.M. Fayssal

Image Courtesy: nouink.blogspot.com

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Introduction:

The most important material of milk fiber is milk protein, which contains 17 kinds of amino acids, and with natural and permanent bacteriostatic function, the bacteriostatic rate to those bacteria such as Staphylococcus aureus, Candida albicans, fungal and disease mildew is up to more than 80%. The plentiful natural protein humectant factor is contained in the milk fiber, which makes skin more delicate and smooth, so it is suitable for household textiles.



Milk fiber is a blend of casein protein and the chemical acrylonitrile, which is used to make acrylic. It's made using a process that is similar to rayon/viscose, but because it's a regenerated protein fiber and not a regenerated cellulose fiber, it reacts like wool. That means that it dyes like wool and even smells like wool when burned, according to Kiplinger.

Milk Fiber was firstly introduced in 1930 in Italy & America to compete the wool. It is new generation of innovative Fiber & a kind of synthetic Fiber made of milk casein Fiber through bio-engineering method with biological health which has passed international ecological certification of oeko-tex standard 100. There are also some different brands for the same fiber manufactured from milk casein known as Aralac, Lanatil and Merinova.

Milk Yarn

Cyarn milk protein fiber dewaterers and skims milk, and manufactures the protein spinning fluid suitable for wet spinning process by means of new bio-engineering technique, and new high-grade textile fiber is made by combining them.

Cyarn milk protein fiber is healthy for skin, comfortable, with bright colors due to good dye ability, etc. The milk protein fiber can be spun purely or spun with cashmere, silk, spun silk, cotton, wool, ramie and other fibers to weave fabrics with the features of milk protein fiber. It can also be used to create top-grade underwear, shirts, T shirts, loungewear, etc. to satisfy people's pursuit of comfortable, healthy, superior and fashionable garments.

General Features

Light, soft, comfortable, colorful and Elegant Colorful -Keeping tender hand-touch and right color after several washings Easy Care-Being resistant to fungus, good moisture absorption & conduction, insects and aging.

Milk fiber has the following characteristics:

1. Good to the skin and healthy, can nourish skin.
2. Amino Acid Category in the Milk albumin fiber:
3. Sumptuous appearance, the silk like gloss is very comfortable.

4. Soft hand feeling just like cashmere--the fiber is lofty and delicate with suitable modulus.
5. Very good physical chemical properties--moderated fiber breaking tenacity and modulus, etc.
6. Good hygroscopic property and moisture conductivity.
7. The product is a kind of green environmental protection product. In April, 2004, it passed the green authentication of the International Ecological Textile Oeko-Tex Standard 100 Authentication No. : 038210
8. Bacteriostatic finish and health care.
9. Easy to dye: good color fastness can dye under normal temperature.

Milk (Casein) Fiber Yarns & Blends

Casein:

Casein (from Latin caseus, “cheese”) is the name for a family of related Phosphoprotein proteins. These proteins are commonly found in mammalian milk, making up 80% of the proteins in cow milk and 20% to 45% of the proteins in human milk. Casein has a wide variety of uses, from being a major component of cheese, to use as a food additive, to a binder for safety matches. As a food source, casein supplies essential amino acids as well as some carbohydrates and the inorganic elements calcium and phosphorus.

The conversion of the casein of skim milk into textile fiber is not a process that can be carried out on the farm. The casein must be made by a controlled procedure possible only in a dairy plant or a plant making casein exclusively. The conversion of casein into fiber requires the knowledge and experience of textile engineers and equipment similar to that of plants producing viscose rayon.

Background information

The wet spinning technology, a unique spinning solvent is used, micro- zinc ions are embedded in the fiber, after drying and after treatment, zinc oxide is produced, and therefore it is bacteriostatic and durable.

Item	Test result
Golden yellow staphylococcus (ATCC NO.6538)	Restrain >3.86(99.9986) Sterilization > 1.96(98.9011)
colon bacillus (ATCC NO.8099)	Restrain >5.17(99.9993) Sterilization > 2.03(99.0741)
white Beads germ (ATCC NO.8099)	Restrain >3.84(99.9855) Sterilization >1.88(98.6667)

Tested by China National Textiles Quality Supervision Testing Center, the bacterial value of golden yellow staphylococcus is greater than 99.9986, the bacterial value of colon bacillus is greater than 99.9993 and the bacterial value of white Beads germ is greater than 99.9855.

Production process of milk fiber:

A fiber consisting of a copolymer of casein protein (25%-60%) grafted with 40%-75% acrylic monomers, of which at least half is acrylonitrile, has been developed in Japan under the trade name Chinon. The casein dissolved in aqueous zinc chloride and grafted with acrylonitrile is wet or dry spun into fibers. It dyes readily with acid dyes, but basic and reactive dyes can be used also. The fiber is marketed as a substitute for silk.

“...manufacture the protein spinning fluid suitable for wet spinning process by means of new bio-engineering technique...”

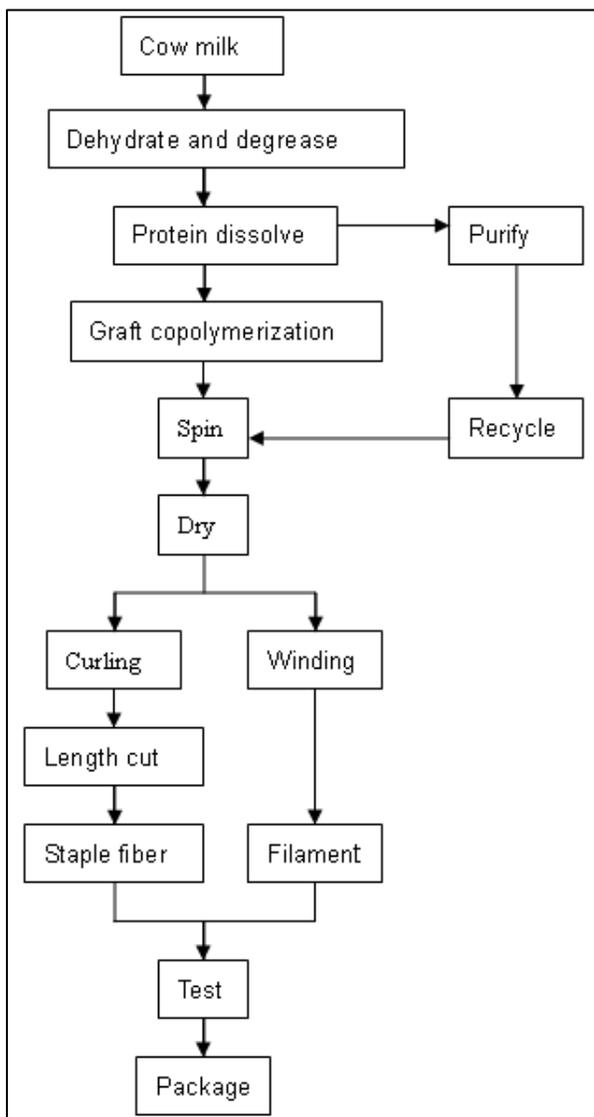
The casein is dissolved in alkali, various other substances are added, and the solution is extruded through the fine apertures of a spinneret into a bath containing acid and dehydrating and hardening agents.



There are a lot of chemicals involved in manufacturing milk fiber. So definitely not like making or eating cheese, the casein is dissolved in water that contains about 2 percent by weight of alkali to make a viscous solution with 20 to 25 percent protein. The next step is to pump the filtered casein solution by a metering pump through a platinum-gold

alloy disc, or spinneret, which has thousands of fine, accurately placed, and uniform holes. The solution, streaming from the holes of the spinneret, is immersed in water that contains an acid. The acid neutralizes the alkali used to dissolve the casein. The small, continuous fibers are then stretched, treated in various solutions, and collected by the spinning machinery. The tensile strength of the yarn is enhanced by stretching the fiber while it is being tanned with aluminum salts and formaldehyde. The action of the hardening baths can be accelerated by heating, and the fiber can then be stretched much more than at low temperatures. A further treatment is needed in order to make the fiber resist the boiling bath commonly used in dyeing wool.

In case your eyes just glazed over, what that brain melting paragraph just said was that the proteins from milk have to be dissolved in water and then processed through various chemicals in order to try and make them solid again. Now, there are some chemicals in there that I'm not wild about, as they sound dangerous, but according to some of the websites selling milk fiber commercially, the milk fiber industry was granted the Oeko-Tex Standard 100 green certification for international textiles in 2004.



Kinds and content of amino-acid in milk protein fiber

Kinds of amino-acid	Actual data	Kinds of amino-acid	Actual data
Aspartic acid	2.039	Methionine	0.7587
Threonine	0.9918	Isoleucine	1.101
Serine	1.429	Leucine	2.493
Glutamic acid	5.549	Tyrosine	1.572
Pro.	2.529	Phe.	1.331
Glycocoll	0.5259	Lysine	2.289
Alanine	0.9037	Histidine	0.8602
Cystine	0.0815	Arginine	0.9246
Val.	1.71	Tryptophan	0.1831

Tested by SGS-CSTC Standards Technical Services Co. Ltd Shanghai Branch, the content of amino acid is 30.34%.

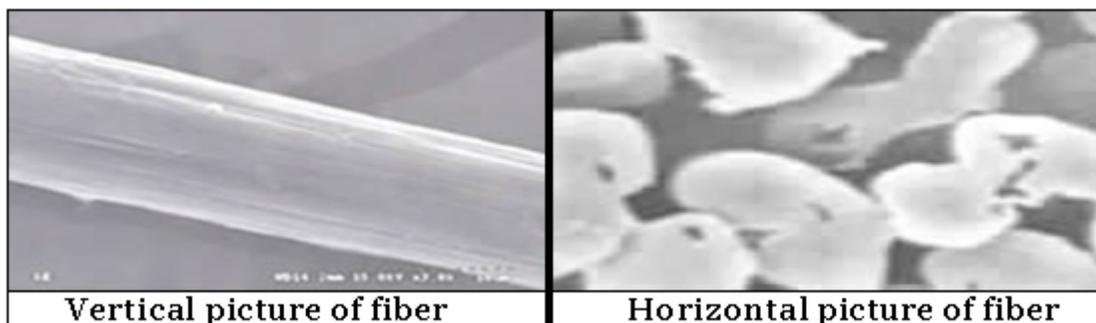
Technical information on how to work milk fibers can be obtained from us.

Fiber Properties

- Good moisture - absorption and conduction
- Excellent dye ability
- Comfortable, white, fluffy and springy
- Ph of 6.8 (same as the human skin)
- Can be blended with most any fiber



The fiber base body does not have regular channels, which makes the milk fiber have as fine in moisture absorption as natural fiber and better moisture conduction than synthetic fibers - milk fiber is both comfortable and permeable.



Main technical indexes of milk protein fiber

No	Item name	Index
1	Fiber tenacity (dtex)	0.8-3
2	Breaking tenacity (cN/dtex)	2.5-3.5
3	Breaking elongation rate (%)	25-35
4	Modulus (cN/dtex)	60-80
5	Standard moisture regain (%)	5.5
6	Specific resistance	1.5×10 ⁴
7	Static friction coefficient	0.187
	Dynamic friction coefficient	0.214
8	Color fastness to washing	4-5 grade
	Fastness to crocking	4-5 grade
	Fastness to perspiration	4-5 grade
	Color fastness to light	4 grade
9	Pilling resistance	3-4 grade
10	Content of formaldehyde	0

Dye ability: The fiber can be dyed in bright colors using reactive, acid or cationic dye technology.

Antimicrobial Properties: A unique spinning solvent utilizing zinc ions is used in the spinning solvent when the fibers are produced. After drying and treatment this solvent produces zinc oxide, giving the fibers an inherent bacteriostatic property.

Synopsis: Fabrics made of milk (casein) yarns are comfortable with excellent dye ability, and perfect for fashion products such as T-shirts,

underwear, sports wear and sweaters. The processing of the milk protein into fiber has an effect on the environment with zero formaldehyde in the fiber. So milk fiber can be considered a "green product".

Functional comparison of milk protein fiber fabrics

1) Permeability

Knit fabric	Milk protein fiber	Polypropylene fiber	Polyester	Polyamide	Acrylic	Silk
Permeability	1.78	0.64	0.775	0.645	0.98	1.215

2) Wet conduction

Knit fabric	Milk protein fiber	Polypropylene fiber	Polyester	Polyamide	Acrylic	Silk
10minutes wicking rate	3.78	3.10	4.11	0	2.06	0.85
Wetting area (cm ²)	8.170	15.54	13.9	0	4.6	1.04
Wetting volume (cm ³)	0.430	0.653	0.695	0	0.298	0.058

3) Heat retention

Fabric	Thermal resistance (clo)	Heat transfer coefficient (kal/m.h.)	Heat retention rate (%)
Milk protein fiber knit fabric	0.2491	26.08	28.5
Acrylic knit fabric	0.1985	33.33	24.02
Cotton knit fabric	0.2639	25.98	29.71
Wool knit fabric	0.3341	19.3	36.26

4) Antistatic property

Fiber	Milk protein fiber	Polyester (deoiled)	Polyamide (deoiled)	Acrylic	Silk
Mass specific resistance (lg pm) (Relative humidity is 65%)	9.1	14	14	9.12	9.8

5) Friction coefficient

Knit fabric	Milk protein fiber	Cotton	Silk
Friction coefficient	0.214	0.298	0.332

6) Bending elastic modulus

Knit fabric	Milk protein fiber	Cotton	Silk
Bending elastic modulus	0.33	3.65	1.47

7) Drapability

Knit fabric	Milk protein fiber	Cotton	Silk
Drape coefficient (%)	8	16	10

Property comparison between milk protein fiber and other textile fiber:

Property	Milk protein fiber	Cotton	Silk	Wool
Length (mm)	38	25-39	-----	58-100
Fineness (dtex)	1.52	1.2-2.0	1.0-2.8	6-9
*Dry tensile strength (CN/dtex)	2.8	1.9-3.1	3.8-4.0	2.6-3.5
*Dry breaking elongation rate (%)	25-35	7-10	11-16	14-25
Wet tensile strength (CN/dtex)	2.4	3.2	2.1-2.8	0.8
Wet breaking elongation rate (%)	28.8	13	27-33	50
Friction coefficient (static)	0.187	-	0.52	0.24
Friction coefficient (dynamic)	0.214	-	0.26	0.384
Logarithm of mass specific resistance (Wg/ cm ²)	9.1	6.8	9.8	8.4
*Initial modulus (CN/dtex)	60-80	60-82	60-80	44-88
Moisture regain (%)	5-8	7-8	8-9	15-17
Specific weight (g/cm ³)	1.22	1.50-1.54	1.46-1.52	1.34-38

* The intensity of fiber breakage and mould are moderate, it is great to extend, and the spinning and weaving performance is good.

Milk yarn

The most important material of milk fiber is milk protein, which contains 17 kinds of amino acids, and with natural and permanent bacteriostatic function, the bacteriostatic rate to those bacteria such as Staphylococcus aureus, Candida albicans, fungal and

disease mildew is up to more than 80%.The plentiful natural protein humectant factor is contained in the milk fiber, which makes skin more delicate and smooth, so it is suitable for household textiles.



The characteristics of the milk fiber fabric and blend fabric:
Milk albumen fiber for its excellent quality, can spin purely with cashmere, silk, spun silk, cotton, wool, hemp, etc. It can develop and produce into top-grade underwear, shirt, T shirt, milk shirt, home spun articles etc. in order to satisfy people's pursuit for the clothing: the trend of fashion, comfort ability and health care.

1. Cool type: (milk fiber/silk, bamboo fiber, natural silk, cashmere)

Moisture retentive, sweat conductive, comfortable and ventilate, has pleasant gloss, do not lose its straight character in being soft and smooth, can wear outside, can show out the elegance, person's taste and it is really good for health.



2. Thermal protection type: (milk fiber/mercerized wool, cashmere)

Milk albumen fiber is a kind of three-dimensional and multi gap structure, its characteristic of light weight and high moisture absorption make it become extremely good cold-proof material; it is light and thin and cold-proof, comfortable and healthy.

3. Top grade underclothes: (milk fiber/cotton, cashmere)

The milk protein has abundant amino acid and natural wet protecting gene; it can moisten the skin and raise the skin, restrain the fungus and health care; when close-fitting wearing, it will take good care of your skin, make you younger, more beautiful and your vigor is limitless.



4. Health care and body beauty: (milk fiber/cotton, Leica)

Fashion, soft and light, health care. It combines the beauty and health together; reach the effect of beautifying body while being comfortable.

5. Home textile supplies: (milk fiber/cotton, silk)

Anion milk fiber can regulate air quality, promote the human blood circulation, make you feel like you're taking a shower in milk and return to nature; in the noisy city, it is likely to open up a pure land, make the family life more warmhearted, and full of interest and charm.



The milk fiber is a piece of brand-new products; it is a top grade fiber which is green, healthy and comfortable. We believe firmly that through our untiring efforts, it will become the new market focus and will become new pets of textile industry!

Advantage

Today's Milk Fiber is environmentally friendly, high strength & much more superior as compare to man-made fibers. Some of the benefits of having Milk Fiber are as given below:

- As it is having continues graft polymerization technique hence it is totally eco-friendly in nature.
- It can be considered as "Green Product" as no formaldehyde is present in the product.
- Milk fiber is made from milk casein instead of fresh milk. We may use acid, reactive or cationic dyes for this kind of specialty fiber.
- Ph of milk fiber is 6.8 which are same as that of human skin. Hence the products made up from them are more compatible to human skin.
- Milk Fiber contains seventeen amino acids & natural anti-bacterial rate is above eighty percent. Hence milk fiber has sanitarian function.
- It is a new synthetic Fiber having milk protein as main material based on high technical process. Milk Fiber has the advantages natural Fiber combined with synthetic Fiber.
- These are more comfortable, excellent water transportation & air permeability

Application

Because of the healthy & bacteriostatic nature of milk Fiber, it is being considered as a perfect material for manufacturing of underwear. As discussed above, milk casein proteins are considered as a main ingredient of milk protein Fiber, which can lubricate the skin. The milk protein contains the natural humectant factor which can help to maintain the skin moisture, to reduce the wrinkles & to smooth the skin - which may help to realize the people of taking milk bath. The major usages of milk Fiber are as given below:

- 1) T-Shirts
- 2) Underwear
- 3) Sportswear
- 4) Ladies outerwear
- 5) Sweaters

Reference:

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