

FIBERS



TEXTILE FIBERS



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TABLE OF CONTENTS

1 - Introduction

2 - Classification of fibers

3 - Chemical composition of fibers

4 - Applications on fibers

5 - Properties of fibers

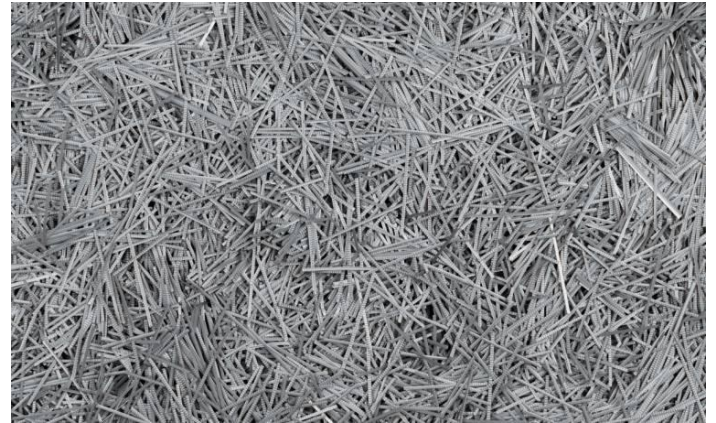
6 - Summary

7- References

1. Introduction

-What are Fibers?

Fibers are long stands of molecules interwoven to form a linear string-like structure known as "FIBERS". Fibers are natural or man-made such as cotton, silk, and jute. etc...



-What are Textiles?

-Textiles are materials that are made of fibers.

There are two main classifications of textile fibers, they are natural and manufactured, or man-made. They are exactly what they sound like. Natural textile fibers derive from nature, like from plants and animals. Man-made textile fibers require manufacturing in a laboratory. man-made fibers help fill in the gaps or solve specific needs that natural fibers can not. In other words, their design is for specific performance.

-Textile fiber is an individual, fine, hair-like substance, which forms the fundamental components of all textiles. There are mainly two types of fiber.



Natural fiber

any hairlike raw material directly obtainable from an animal, vegetable, or mineral source and convertible into nonwoven fabrics

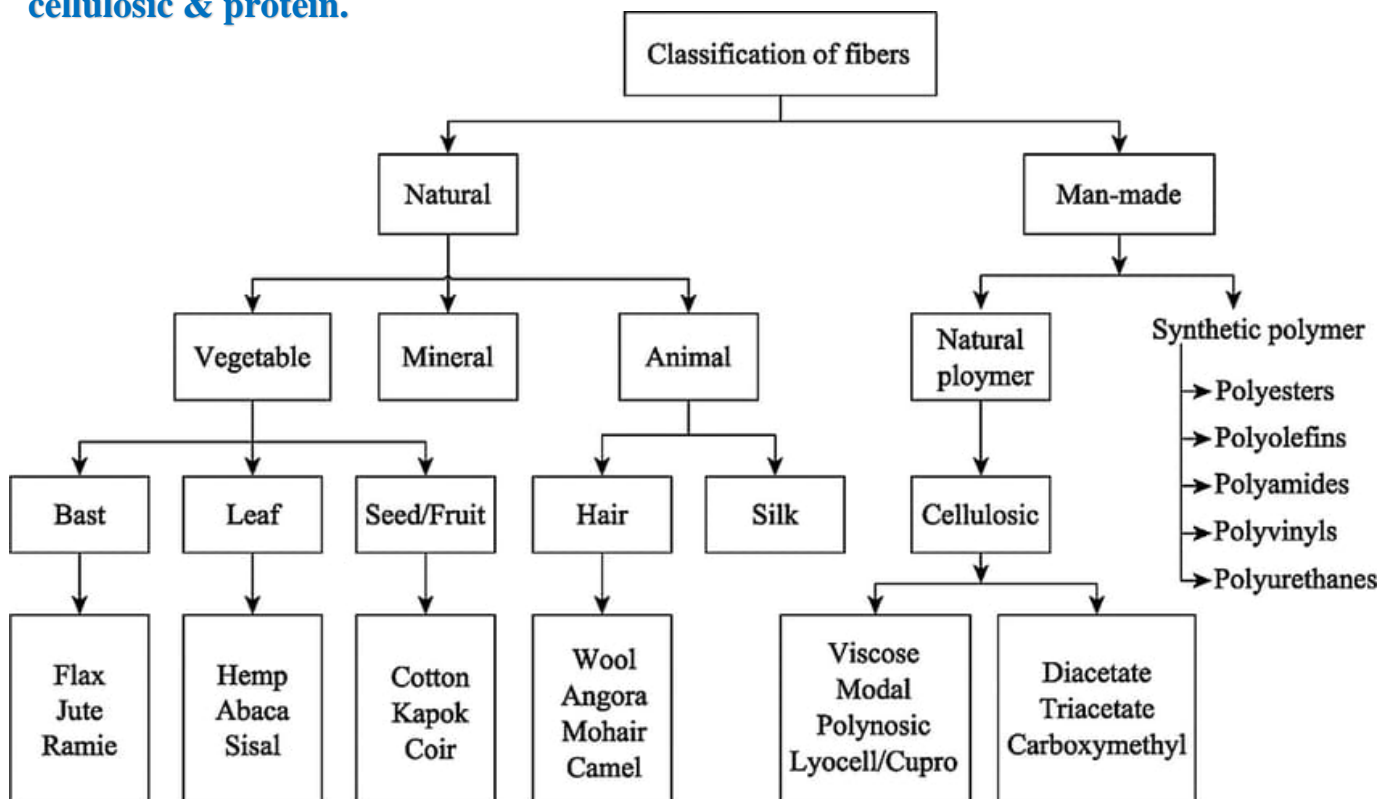
Man-made fiber

a type of fiber that is made artificially, such as polyester or rayon, rather than occurring naturally, like cotton or wool

2. Classification of Fibers

*Textile fibres are divided broadly into 2 groups namely
Natural fibres and Man-made fibres*

- **Natural Fibres** : These are the first known category of fibres which are available in abundance in nature. This category refers to all fibres that occur in fibre form in nature. According to chemical nature, they may also be classified as
 - Cellulosic Fibres.
 - Protein Fibres.
 - Mineral Fibres.
- **Man-Made Fibres** : These are textile fibres that do not exist in fibre form in nature. But natural material is processed and made into fibres that resemble silk. According to the TFPIA, man-made fibres are any fibres made by a process of manufacture from a substance which at any point in the manufacturing process, is not a fibre. These man-made fibres are again divided into two groups man-made cellulosic & protein.

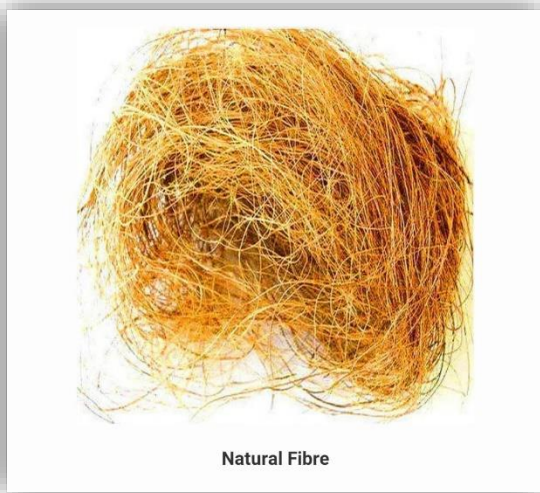


3. Chemical composition of Fibers



Every fiber consists of some chemical elements. Such as cotton contains cellulose, protein, pectin, etc. The chemical composition and reactivity of natural fibers differ, leading them to have a particular affinity for specific stains or dyes type.

fibers that are not naturally present in nature and are made artificially by man, man-made fibers have high strength and are strong when wet with low moisture absorption characteristics.



Natural composite materials are made from natural fibers and natural resins. Various natural fibers, such as jute, hemp, coir, cotton, and others are used in industry to fabricate natural composite materials. The fibers are load-carrying members



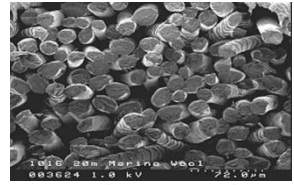
Man-made fibres are to be distinguished from natural fibres such as silk, cotton, and wool. Natural fibres also consist of polymers (in this case, biologically produced compounds such as cellulose and protein), but they emerge from the textile manufacturing process in a relatively unaltered state. Some man-made fibres, too, are derived from naturally occurring polymers.

4. Applications of Fibers

- Cotton fiber	Used in cooking and products like soap, cosmetics, rubbers, and plastics
- Flax fiber	used in shirts, jackets , bed sheets, pillow covers, high-quality papers and surgical thread
- Jute fiber	Used in packaging products like bags, sacks, wrapping materials(cotton &woold packs)
- Silk fiber	Used in silk apparel, pillows, wall hangings, draperies, upholstery, wedding dresses, scarves & neckties
- Camel hair fiber	Men's & women's coats jackets and blazers, skirts, brushes, sweaters, gloves, scarves, mufflers, caps, and robes
- Coir fiber	Used in making ropes, matting, rugs, brushes and insulation panels
- Bambo fiber	Used in bath towel, socks, face mask, bandages, table clothes and hand towels
- Polyester fiber	Used in apparel such as trousers, skirts, dresses, suits, jackets, as cushioning In pillows, and used in safety belts
- Nylon fiber	Used in making fishing nets, ropes, parachutes, fabrics in textile industry and plastic for making machine parts
- Acrylic fiber	Used in filtration materials, car batteries, carpets, blankets, cartops, boat covers, sweaters and sportswear
- Carbon fiber	Used in alternate energy, wind turbines, compressed natural gas storag and erath quake protection
- Spandex fiber	Used in personal care products and swimming wears

5. Properties of Fibers

1 – Length and Diameter of the Fiber



Diameter is defined as the length of a straight line through the center of a circle or sphere and wool fibers are assumed to be circular. Mean fiber diameter is the average diameter measured in a millionth of a meter. The unit commonly called microns

2 - Strength



Strength is just what it sounds like. How much force will break a fiber or fabric? Nylon is one of the strongest commodity fibers available, while acetate is extremely weak. Acetate is very cheap and often used as a cost-saving alternative to line the inside of jackets. This is why in some fast fashion jackets the line starts to fray and rip from just a little bit of wear.

3 - Elasticity

There are two parts to elasticity. The first is stretch or elongation. This measures how far we can pull and lengthen a fiber. The second part is recovery. This is how close can the fiber return to its original length after stretching. There is a special category of elastic textile fibers, they are elastomeric fibers. Spandex and rubber belong to this group.

Elastomeric is just a fancy word that means a fiber can stretch over 100% of its

4 – Plasticity

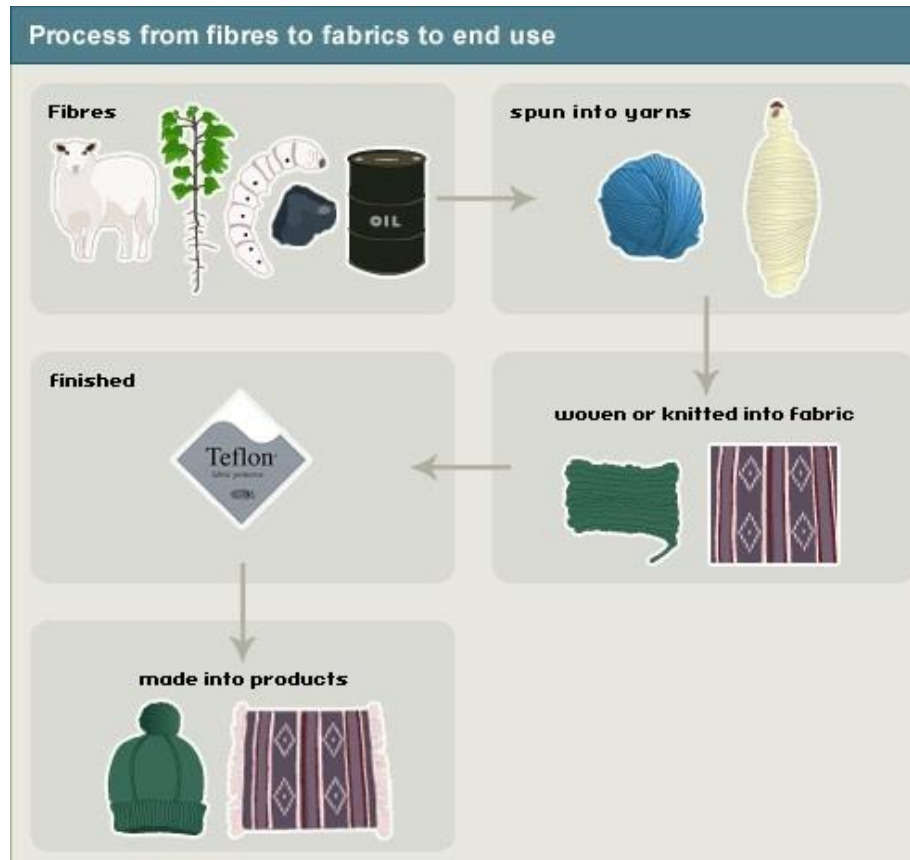
It is the property of a solid by which under certain conditions of temperature and pressure it can be made to take on the shape of any mould and to retain this shape after cooling. The synthetic fibers being thermoplastic materials possess this property. They are all heat softened.

5 – Color

Most natural fiber have some color e.g. silk is yellow to tan. Wool is brownish tint. Cotton is a creamy white or brown. This is a natural coloring matter and requires to be removed before subsequent wet processing treatments such as dyeing and printing.

6. Summary

- Textile fibers exist in great variety and are used for many applications in a diversity of structures.
- Much more could be written on their place in materials science and technology than can be included in this article. However, in another sense, the materials are limited
- about 80% of the world's textile fibers are now based on cellulose or polyester, 18% on nylon, polyacrylonitrile, and polypropylene, and 2% on proteins.
- Some vinyl polymers, which have not achieved wide market acceptance, and the newer high-performance and specialty fibers, which are expensive, account for about 0.5%. The diversity is mainly achieved by form, shape, size, process parameters, copolymerization, additives, and finishes.



- In order to sustain the oil's stock on the production of synthetic fibre by replacing it with new sources, several research and developments have been done in order to do so. Soy fibre and Corn fibre are some of the new advancements in regenerated fibre product based on their stock availability and good properties. Although natural fibre seems loss in terms of availability compare with synthetic, many countries already have their own farms or fields in order to meet the local and world demands such as China(wool, cotton), Australia(cotton, wool), Sudan(wool), and Greece(cotton).

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19

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39

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92

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