

Tech Study

Where Passion Meets Education

Fibres from Plants

- Plant fibre is mainly composed of cellulose and cellulose fibres. These are most used to make paper and cloth.
- Cellulose generates long, often highly lustrous fibres when prepared appropriately.
- Plants including cotton, jute, flax, and hemp are used to obtain plant fibres.

Jute

- Jute fibre is obtained only from the stem of the jute plants. It is soft, shiny, and long fibre with a silky texture which is grown in rainy season.
- Jute mainly grows in regions having alluvial soil which is found in the delta regions of the Ganges and Brahmaputra rivers.

Fibres

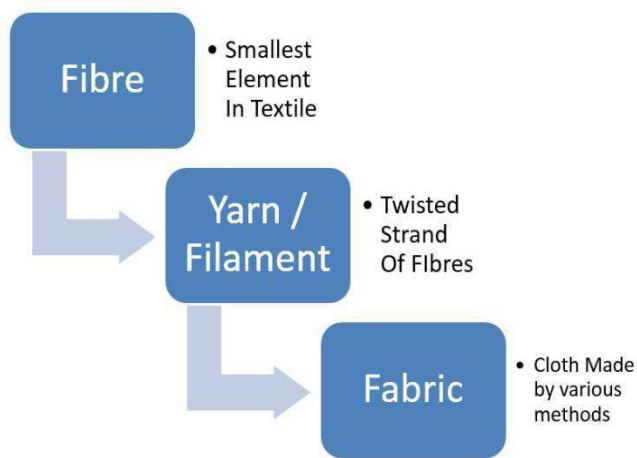
- The finer part of the thread is referred to as fibre.
- Fibre is a thread like structure that is spun into ropes, clothes, and strings.
- Fabrics are made from fibres obtained from natural or artificial sources. Example: rayon, nylon, polyester, etc.

Fibre to Yarn to Fabric

Fabric consists of thin strands called yarn, which in turn consists of thinner strands called fibres.

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Cotton and Its Processing

- Cotton is obtained from cotton bolls which are directly from the surface of cotton seeds.
- It is grown in black clayey soil with a warm climate.
- The processing of cotton involves Ginning, Spinning, Weaving and Knitting.

Wool Fibre from Animals Wool

- The natural animal fibre obtained from sheep, goat, yak, camel, etc.
- All these animals have an outer covering of hair, which is shaved off to obtain wool fibres.



Silk

Natural protein fibre is cultivated from the cocoon of mulberry silkworm larvae.

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Wool from Animals

Wool comes from sheep, goat, yak, and some other animals. These wool-yielding animals bear hair on their body because hair keeps them warm, and wool is derived from these hairy fibres.

- Wool is used to make various wool fabrics like woollen clothes, carpets, woollen sweaters, saddle cloths etc.

Rearing and Breeding of Sheep for Wool



Rearing: It is a process of breeding, feeding, and providing medical care to sheep. These animals are kept since they produce one or more useful products for the human beings.

Breeding: Some special breeds of sheep are specially chosen to give birth to sheep which have only soft under hair. This process of selecting parents for obtaining special characters in their offspring is termed as ‘selective breeding’.

Processing fibres into wool

The skin of the sheep is hairy having two types of fibres forming its fleece:

- (i) the coarse beard hair

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- (ii) the fine soft under-hair near the skin is the fleece. This fleece is the main source of fibres of wool.

The process of making fibre into wool follows a series of processes: Shearing → Scouring → Sorting → Dyeing → Straightening, Rolling and Combing.

Occupational hazards of fibre production

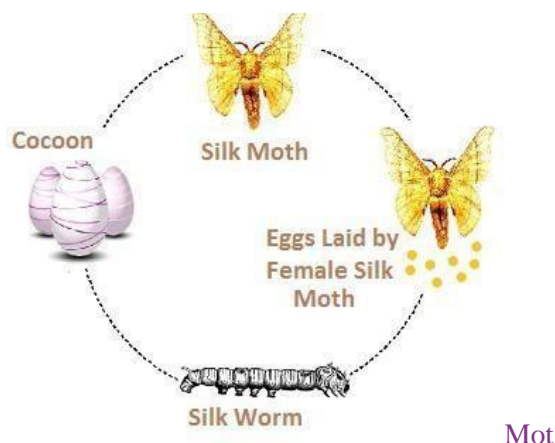
Sometimes the sorters get infected by a bacterium, anthrax, which causes a fatal blood disease called sorter's disease.

Silk

Silk from Animals

- **Silk** is a natural protein fibre which is obtained from silkworm and can be used as a textile fibre.
- The different types of silk are produced by different types of silkworms.
- It can be differentiated based on lustre and texture. Few examples are Kosa, tassar, mooga, etc. They are produced by various types of silk moths. One of the common types is the mulberry silk moth.

Development of Silk



Sericulture

- Rearing of silkworm to produce raw silk is called sericulture.

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- In this process, silkworms are reared at appropriate temperature and humidity to get silk threads from cocoons.

Processing Silk Obtained from Cocoons

- Cocoons are collected and left under the sun or boiled for separating out the silk fibres.
- After that reeling of silk is done, the process of unwinding silk from a cocoon.
- Then, the spinning of silk fibres into threads is done.
- The silk threads obtained are woven into desired clothes.

Natural Fibres vs. Synthetic Fibres

- The naturally occurring fibres that humans derive from plants or animals are known as natural fibres.
- **Animal fibres:** These are the fibres that are acquired from animals. For example, Wool, silk etc.
- **Plant fibres:** These are the ones that are obtained from plants. These fibres are extracted from the plants to make fabrics.

Polymer

- The word 'polymer' comes from two Greek words; poly meaning many and mer meaning part/unit.
- A polymer is a substance composed of many repeated similar subunits.

Synthetic Fibre

- Fibres that are made or created by humans are known as synthetic or man-made fibres.
- Humans have been able to make a variety of synthetic fibres. E.g.: rayon, nylon etc.

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Synthetic fibre

Rayon

- Rayon is made from purified cellulose, which is chemically converted into a soluble compound.
- Rayon comes from natural sources such as wood pulp but is considered as a man-made fibre. This is because rayon can be treated chemically.
- When rayon is compared with silk, it is inexpensive but can be woven like silk fibres.

Nylon

- Nylon is a synthetic fibre obtained from coal, water, and air.
- The first fully synthetic fibre obtained was nylon.
- The characteristic properties are that it is light, strong, and elastic.
- Nylon finds application in the manufacturing of socks, ropes, tents, car seat belts, sleeping bags, curtains etc.

Polyester

- Polyester is made of repeating units of a chemical called an ester.
- It is a crease free synthetic fibre.
- It is best suited for the making of dress materials as it is crisp and is easy to wash.

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- A popular polyester is Terylene.

Acrylic Fibre

- Acrylic is a synthetic fibre that resembles wool.
- The wool obtained from natural sources is quite expensive, whereas clothes made from acrylic are relatively cheap.
- Synthetic fibres are more durable and affordable which makes them more popular than natural fibres.

Plastic

- Plastic is also a polymer like the synthetic fibre.
- All plastics do not have the same type of arrangement of units. In some, it is linear whereas in others it is cross-linked.
- Plastic can be recycled, reused, coloured, melted, rolled into sheets, or made into wires. That is why it finds such a variety of uses.

Thermoplastics

Plastic which gets deformed easily on heating and can be bent easily are known as thermoplastics. E.g.: polythene and PVC

Thermosetting Plastics

Plastics which when moulded once, cannot be softened by heating. E.g.: Bakelite and melamine.

Characteristics of Plastics

- Plastic is non-reactive.
- Plastic is light, strong, and durable.
- Plastic is a poor conductor.

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Biodegradable and Non-Biodegradable Materials

A material that decomposes through natural process is biodegradable and materials that are not easily decomposed by natural processes is termed as non-biodegradable.

E.g.: Biodegradable – fruits, paper

Non-Biodegradable – plastic, tin

Environmental Effects on Plastic

- Plastic takes several years to decompose; it is not environmentally friendly.
- It causes pollution.
- The burning process in the synthetic material is quite slow and it does not get completely burnt easily.
- It releases lots of poisonous fumes into the atmosphere causing air pollution in the process.

Implement the 4 R principle in everyday life. Following are the 4Rs:

- Reduce
- Reuse
- Recycle
- Recover