Polymeric Fiber Technology
Lecture (1)
Fiber classification

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Introduction to fiber classifications

Fiber Definition:

A unit of matter which is capable of being spun into a yarn or made into a fabric by bonding or by interlacing in a variety of methods including weaving, knitting, braiding, felting, twisting, or webbing, and which is the basic structural element of textile products. It is a smallest textile component which is microscopic

Classifications of fibers

Fibers can be classified by:

- Type (Natural and manufactured)
- Length (Short staple, long staple, continuous filament)
- Size (Ultra fine, fine, regular, course)

According to fiber's type, fibers can be classified to:

1. Natural fibers:

- Vegetable fibers.
- Animal fibers.
- Mineral fibers.

2. Man- made fibers:

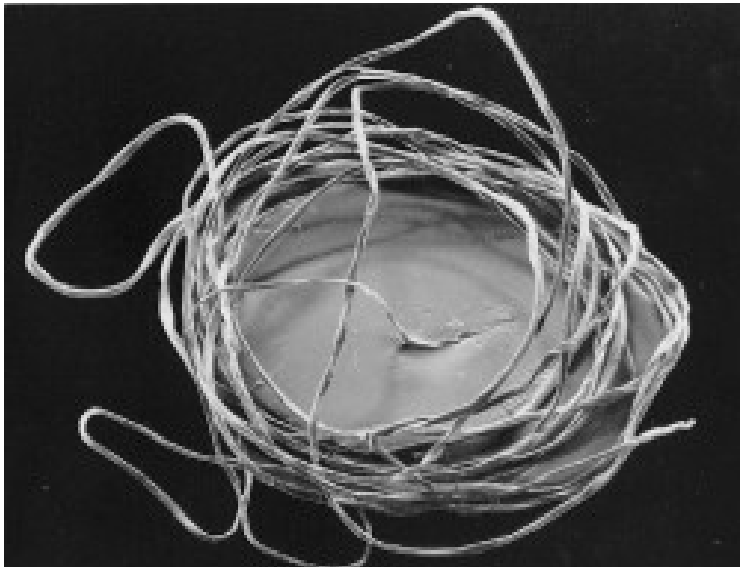
- Regenerated fibers.
- Synthetic fibers.

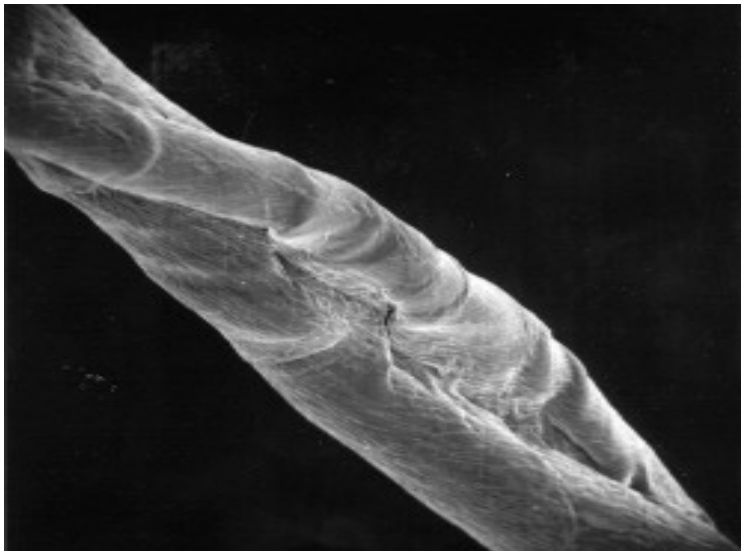
3. Inorganic fibers.

Important vegetable fibers

ﷺ Cotton fibers:

- The composition is 90% cellulose, 6% moisture and the remainder fats and impurities.
- The outer surface is covered with a protective wax like coating which gives fiber an adhesive quality.
- The cellulose is arranged in a way that gives cotton unique properties of strength, durability.





Kapok fibers:

- Kapok fibers is a silky – cotton like substance that surrounds the seeds in the pods of the ceiba tree.
- It can support as much as 30 times its weight in water, and loses only 10 percent of buoyancy over a 30 days' period.
- 8 times lighter than cotton.
- Non- allergic and non- toxic and hydrophobic.

Bast fibers:

- Collected from the phloem.
- The bast fibers have higher tensile strength than the other kinds.
- High strength to weight ratio.
- Used in the manufacture of r es, bagging materials, and heavy rial fabrics.

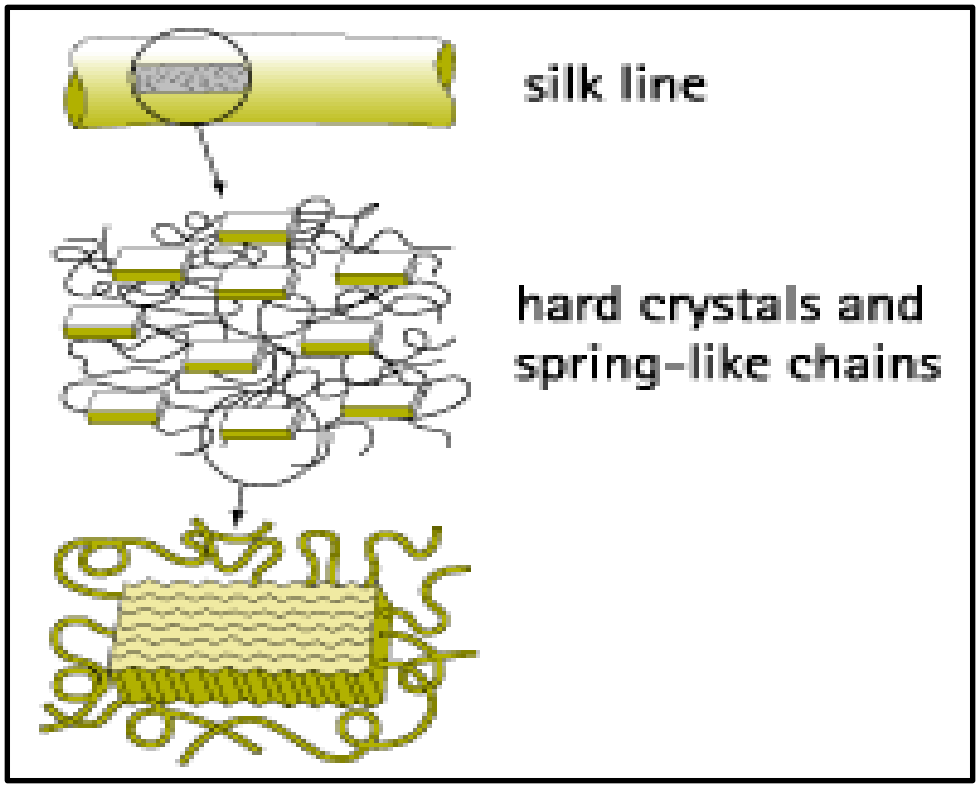
Jute fibers:

- One of the cheapest natural fibers, and it's second in amount next to cotton. Therefore, jute fibers are inexpensive to produce.
- Jute fibers have low wet strength and low elongation.
- Used in the manufacturing of carpet, furniture and clothes.

Important animal fibers

Silk Fibers:

- It's the longest and thinnest natural filament fiber with the longest filament, about 3000 yards.
- Smooth, light weight, strong, and elastic.
- Biocompatible and biodegradable.
- Outstanding toughness (very extensible while sustaining large forces).
- Used in textiles, surgical sutures for decades,


silk line
hard crystals and
spring-like chains

嫰Wool fibers:

- Wool fibers have the highest moisture regain.
- Each wool fiber is a molecular coil spring making the fiber remarkably elastic. Nature has folded the chemical polypeptide chains back upon themselves in such a way that they act like a coiled spring which elongates when it is extended and retracts when it is released. This molecular crimp, along with the 3-

- Resistant to tearing due to the natural elasticity
- Apparel- outerwear, sportswear, sweaters, socks, suits, Interiors- carpets, wall hangings (wool is the “look” against which synthetic carpets are measured), Industrial- felt pieces used in machines, used to clean up oil spills

Important mineral fibers

- **Asbestos fibers:**

- Asbestos is the only natural mineral fiber obtained from varieties of rocks.
- It's fibrous form of silicate of magnesium and calcium containing iron, aluminum and other minerals.
- They occur as bundles of fibers that can be easily separated from the host matrix or

- Loose asbestos fibers, or formulations containing asbestos fibers for spray coatings, were widely used in the building industry for fire protection and heat or sound insulation during and following World War II.