FIBRES

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Key Terms

- Fibers
- Natural Fibers
- Man-Made Fibers
- Synthetic Fibers

Definition of Fibers.....

- A morphological term for substances characterized by their flexibility, fineness and high ratio of length to cross sectional area.

- A unit of matter, either natural or manufactured, that forms the basic element of fabrics and other textile structures.

- It is defined as one of the delicate, hair portions of the tissues of a plant or animal or other substances that are very small in diameter in relation to there length.

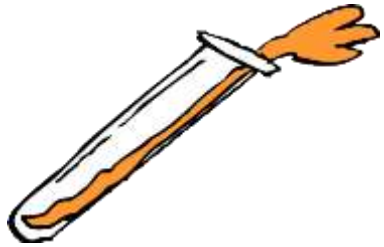
- A fiber is characterized by having a length at least 100 times its diameter or width.

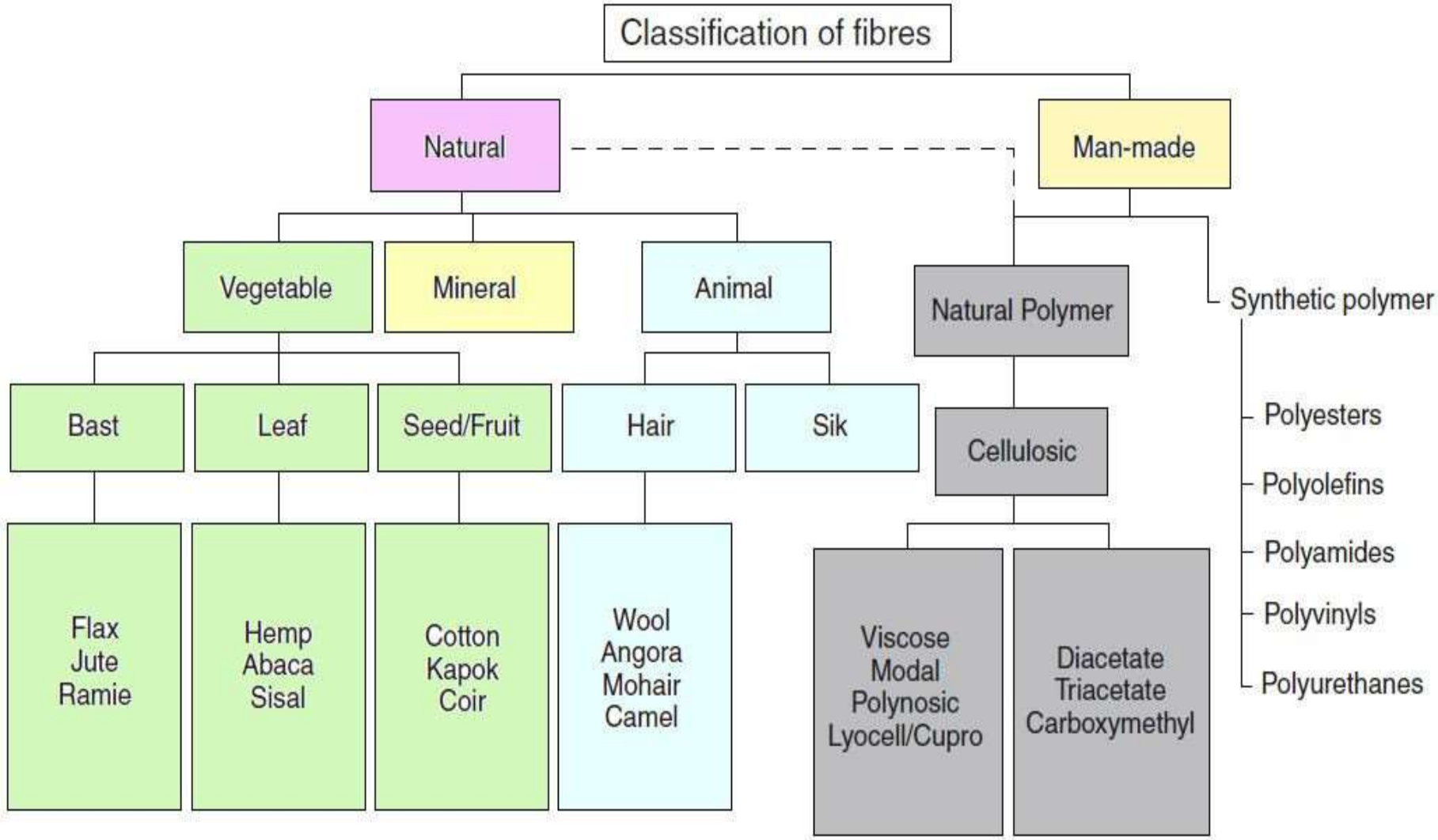
- The term refers to units that can be spun into a yarn or made into a fabric by various methods including weaving, knitting, braiding, felting, and twisting.

- The essential requirements for fibers to be spun into yarn include a length of at least 5 millimeters, flexibility, cohesiveness, and sufficient strength. Other important properties include elasticity, fineness, uniformity, durability, and luster.

Types of Fibers and Yarns

- Fibers are spun into yarn
- Yarns are uninterrupted threads of textile fibers that are ready to be turned into fabrics
- Natural
  - Originate from natural sources
  - Plant (cellulosic) or animal (protein)
- Manufactured, synthetic, or man-made (terms interchangeable)
  - Originate from chemical sources
  - May also be from regenerated or recycled sources




Classification of fibres
Natural
Man-made
Vegetable
Mineral
Animal
Natural Polymer
Synthetic polymer
Bast
Leaf
Seed/Fruit
Hair
Sik
Cellulosic
Polyesters
Polyolefins
Polyamides
Polyvinyls
Polyurethanes
Flax
Jute
Ramie
Hemp
Abaca
Sisal
Cotton
Kapok
Coir
Wool
Angora
Mohair
Camel
Viscose
Modal
Polynosic
Lyocell/Cupro
Diacetate
Triacetate
Carboxymethyl

Natural Fibers

- Natural fibers are textile fibers made from plants or animals
- Cellulosic (from plants)
  - Cotton
    - From cotton plants
  - Flax (linen)
    - From flax stems
    - Jute (Jute stems)

- Protein (from animals)
  - Silk
    - From cocoons of silkworms
  - Wool
    - From fleece (hair) of sheep or lambs

Characteristics of Natural Fibers

- **Natural fibers are usually:**
  - Absorbent
  - Comfortable
  - Cooler to wear
  - Wrinkle more
  - Shrink when washed

- **Important natural fibers are:**
  - Cotton
  - Linen
  - Jute
  - Wool
  - Silk

Cotton

- **Cellulosic fiber**
- From “bolls” (seed pods) growing on bushes
- “Environmentally friendly” cotton can be grown in a range of colors
- Main textile products of China, India, Iran, Pakistan and Egypt
- Made into a wide range of wearing apparel

Cotton

Advantages:

- Comfortable
- Absorbent
- Good color retention
- Dyes & prints well
- Washable
- Strong
- Drapes well
- Easy to handle and sew
- Inexpensive

Disadvantages:

- Shrinks in hot water
- Wrinkles easily
- Weakened by perspiration and sun
- Burns easily
- Affected by mildew

Linen (Flax)

- Flax is the fiber name; linen is the fabric name.
- World's oldest textile fiber, dates back to Stone Age 5,000 years.
- Cellulosic fiber from stem of flax plant.
- Towels, sheets, and tablecloths are called "linens".

Linen (Flax)

Advantages:

- Strong
- Comfortable
- Hand-washable or dry-cleanable
- Absorbent
- Dyes and prints well
- Resists dirt and stains
- Durable
- Withstands high heat
- Lint-free

Disadvantages:

- Wrinkles easily
- Can be expensive
- Shrinks
- Burns easily
- Affected by mildew and perspiration
- Ravels
- Difficult to remove creases
- Shines if ironed

Wool

- Protein fiber from sheep or lambs
- Worsted wool is higher quality with long staple fibers (over 2 inches)
- Natural insulator
- The term wool can only apply to all animal hair fibers, including the hair of cashmere or angora goat
- As well as the specialty hair fibers of camel, alpaca, llama, or vicuna

Wool

Advantages:

- Warm
- Lightweight
- Wrinkle-resistant
- Absorbent
- Dyes well
- Comfortable
- Durable
- Creases well
- Easy to tailor
- Recyclable

Disadvantages:

- Affected by moths
- Shrinks with heat and moisture
- Needs special care, dry cleaning
- Absorbs orders
- Scratchy on skin
- Weakens when wet
- Harmed by bleach, perspiration

Silk

- Silkworms spin cocoons in filaments
- Filament is a very long, fine, continuous thread
- It can take as many as 500 cocoons to create 1 blouse

Silk

Advantages:

- Soft
- Drapes well
- Dyes and prints well
- Very strong
- Lightweight
- Resists soil, mildew, and moths
- Comfortable
- Absorbent

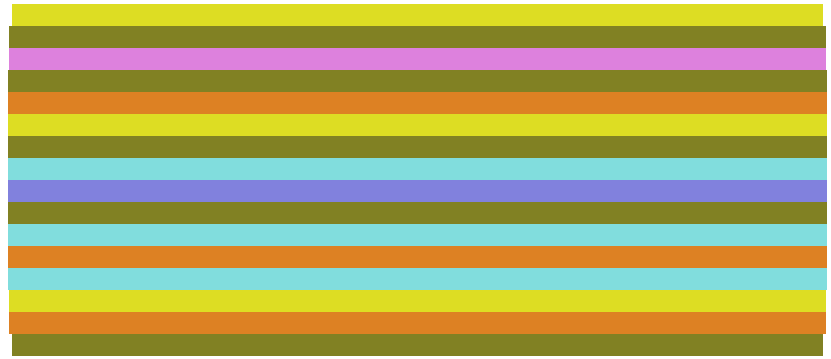
Disadvantages:

- Expensive
- Needs special care, dry cleaning
- Stains with water
- Yellows with age
- Weakened by perspiration, sun, soap
- Attacked by insects, silverfish

Man Made Fibers

Manufactured Fibers

- Manufactured fibers are fibers created by a manufacturing process of any substance that is not a fiber.
- Cellulosic- from generated fibrous substance in plants.
- Non-cellulosic or synthetic- made from petrochemical products.
- Process
  - Raw materials melted or dissolved to form thick syrup
  - Liquid extruded through spinneret
  - Extruded filaments stretched and hardened into fibers



Rayon

- 1st manufactured in 1894 by the American Viscose Company
- Used during WW 1 for industrial products
- Derived from wood pulp, cotton linters, or vegetable matter
- Rayon led to crepe, velvet, and satin fabrics

Rayon

Advantages:

- Soft and comfortable
- Drapes well
- Durable
- Highly absorbent
- Dyes and prints well
- No static or pilling problems
- Inexpensive
- Colorfast
- May be washable

Disadvantages:

- Wrinkles easily unless treated
- Low resiliency
- Heat sensitive
- Susceptible to mildew
- Stretches
- Weakens when wet
- Fabric shrinks if washed
- May need dry cleaning

Acetate Rayon

- Developed in early 20th century
- Produced in 1924 by the Celanese Corporation
- Used to line coats and fabrics

Advantages:

- Luxurious appearance
- Crisp (texture) soft hand
- Wide range of colors; dyes and prints well
- Drapes well
- Resists shrinkage, moths, and mildew
- Low moisture absorbency, relatively fast drying
- No pilling, little static

Disadvantages:

- Requires dry cleaning
- Weak
- Heat sensitive
- Poor abrasion resistance
- Dissolved by nail polish remover (acetone)

Corn Fiber

- Trade name of this fiber is Ingeo.
- Ingeo fiber combines the qualities of natural and synthetic fibers in a new way.
- Strength and resilience are balanced with comfort, softness and drape in textiles. In addition, Ingeo fiber has good moisture management characteristics.
- This means that Ingeo fiber is ideally suited to fabrics from fashion to furnishings.

Advantages of Corn fiber

- Good color fast (i.e. does not fade).
- Wrinkle free (doesn’t need ironing).
- Good Resilient - it doesn’t shrink.
- Doesn’t absorb odors.
- Has excellent soil release and stain resistance.
- Has excellent performance when compared to other fibers.
- Is hypoallergenic. Ingeo has never caused an allergic reaction in independent testing.
- Has excellent U.V. resistance (better than polyester).

Synthetic Fiber

Polyester

Synthetic fiber developed in the 1950's by DuPont

Advantages:

- Strong
- Crisp, but soft hand
- Resists stretching and shrinkage
- Washable or dry-cleanable
- Quick drying
- Resilient, resists wrinkles
- Abrasion resistant
- Resistant to most chemicals
- Colorfast
- Strong, durable
- Dyes well

Disadvantages:

- Low absorbency
- Static and pilling problems

Nylon

- Invented in 1938 by DuPont
- 1st synthetic fiber
- Made completely from petrochemicals in an experimental laboratory

Advantages:

- Lightweight
- Exceptional strength
- Abrasion resistant
- Easy to wash
- Resists shrinkage and wrinkles
- Resilient, pleat retentive
- Fast drying, low moisture absorbency
- Can be pre-colored or dyed in a wide range of colors
- Resists damage from oil and many chemicals
- Insulating properties

Disadvantages:

- Static and pilling
- Poor resistance to sunlight
- Low absorbency
- Picks up oils and dyes in wash
- Heat sensitive

Acrylic

•Manufactured in the 1950's by DuPont.

•Originally used for blankets and sweaters because it resembled wool.

•Fiber composed of linear macromolecules having in the chain at least 85% by mass of acrylonitrile repeating units.

Advantages:

- Lightweight, soft, warm, wool-like hand
- Dyes to bright colors
- Machine washable, quick drying
- Resilient, retains shape, resists shrinkage and wrinkles
- Wool-like, cotton-like, or blended appearance
- Excellent pleat retention
- Resists moths, oil, chemicals

- Disadvantages:
  - Low absorbency
  - Develops static
  - Pilling
  - Heat sensitive
  - Weak
  - Dissolved by nail polish remover (acetone)


THE END