6
Fibre to Fabric

6.1 Introduction

You all know that food, clothing and shelter are the three basic needs of life. You eat food to survive and protect yourself from diseases, you need a house to live in. Why do you wear clothes? You wear clothes for protection against climate, for modesty and beauty, and also to show status. The material that you use for clothing is called fabric.

If you go to a shop to buy fabric for your dress, you would see a variety of fabrics there. Do you wonder what these fabrics are made of? How you get variety in fabrics? Why are some materials warm, some soft and others rough? Why do some materials go bad after washing while others remain the same?

In this lesson you will find answers to these and other similar questions.

6.2 Objectives

After reading this lesson you will be able to do the following:

- describe and classify fibres;
- use the burning test to identify various fibres;
- state the characteristics of fibres;
- define a yarn;
- explain the methods of fabric formation.
6.3 Fibres

Do you know what fabrics are made of? Take a cloth and pull out a thread. Untwist to loosen this thread. You will see that it is made up of smaller threads or hair like strands. Pull out one of these. This single hair like strand is called a fibre.

A fibre is a hair like strand from which all fabrics are made.

Classification of fibres

Instead of a cloth, now pull fibres from a ball of cotton. What do you see? These fibres are very small. These are called staple fibres. Try and pull fibres from a fibres from a nylon fabric. These are long fibres. Such fibres are called filament fibres or simply filaments. Hence, you can classify fibres into two groups. See the following box.

<table>
<thead>
<tr>
<th>Short fibres</th>
<th>Staple fibre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long fibres</td>
<td>Filament fibre</td>
</tr>
</tbody>
</table>

Fibres can also be classified on the basis of their origin.

Natural Fibres:

Some fibres are obtained from natural sources, that is, from plants and animals. Fibres from such sources are called natural fibres. Some examples of fibres from natural sources are cotton, jute, silk, wool, etc.

Man-made Fibres:

The other type of fibres are obtained from chemical substance. These are called man-made fibres. They are rayon, polyester, nylon, acrylic (cashmilon) etc.

Now can you say what is the second way to classify fibres? See the following box.

<table>
<thead>
<tr>
<th>Natural fibres</th>
<th>Plants and animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man made fibres</td>
<td>Chemical substances</td>
</tr>
</tbody>
</table>

For your understanding we are putting the two classifications together in the figure given below:
1. **Natural Fibres**

(i) **Vegetable Fibres**

These fibres are obtained from different plants. Some are well known and useful to man. Cotton can you think of any such fibre? That is right, cotton, jute and coir. Cotton is obtained from seed of the plant, jute is obtained from the stem of a plant and coir is the outer covering of coconut. Fig. 6.1

(ii) **Animal Fibres**

These fibres are obtained from different animal sources. Can you name the fibre we get from sheep and goat? That’s right, we get wool from their hair. Wool can also be obtained from the hair of rabbits and camels.

Another animal fibre you all are familiar with is silk. It is the secretion of an insect called the silk worm.

2. **Man-made Fibres**

When you go to the market to buy fabrics, you must have heard from the shopkeeper that it is a synthetic material. Don’t get disturbed. Synthetic is another name for man-made fabrics. The first man-made fibre is known as rayon and was produced in the latter part of 19th century. Man-made fibres are generally filament fibres. Other examples are nylon, polyester, and acrylic.

**INTEXT QUESTIONS 6.1**

1. Complete the following chart by classifying fibres on the basis of origin and length.

<table>
<thead>
<tr>
<th>Fibre</th>
<th>Origin</th>
<th>(a)</th>
<th>(b)</th>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>On basis of length</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staple (short)</td>
<td>e.g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filament (long)</td>
<td>e.g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>On basis of origin</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural</td>
<td>Vegetables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man-made</td>
<td>animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>e.g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton,</td>
<td>e.g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silk,</td>
<td>e.g.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jute,</td>
<td>Cotton Jute</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nylon,</td>
<td>Wool Silk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rayon,</td>
<td>Polyester Acrylic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jute,</td>
<td>Polyester,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rayon,</td>
<td>Acrylic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyester,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotton,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wool,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artificial,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jute,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Classify the following fibres as man-made and natural:
   (i) Nylon
   (ii) Wool
   (iii) Cotton
   (iv) Silk
   (v) Polyester
   (vi) Rayon
   (vii) Acrylic
   (viii) Jute

3. State whether the following are true or false and correct the false statements:
   (i) Fibre is the basic unit of all fabrics.
   (ii) Filament are short fibres.
   (iii) Jute is the outer covering of coconut.
   (iv) Silk is prepared from the stem of a plant.
   (v) Polyester is a staple fibre.

6.4 Identification of Fibres

**BURNING TEST**

This test helps to identify fibres. Once fibres are identified it will help the buyer to choose as per requirement, and not be cheated by salesmen.

Procedure:- For the burning test:-

Take out a yarn from the fabric.

Burn one end of the yarn either with a match stick or burning candle.

Check the following.

1. How the fibre catches fire.
2. Type of flame.
3. Smell after burning.
4. Ash left behind.

Answers to all these points will to help to identify the fibres.

<table>
<thead>
<tr>
<th>FIBRE</th>
<th>INFLAME</th>
<th>TYPE OF FLAME</th>
<th>SMELL</th>
<th>ASH</th>
</tr>
</thead>
<tbody>
<tr>
<td>COTTON AND RAYON</td>
<td>Catches fire easily</td>
<td>continues to burn with a bright yellow flame</td>
<td>Smell of burning paper</td>
<td>Light feathery ash</td>
</tr>
<tr>
<td>SILK AND WOOL</td>
<td>Does not catch fire easily</td>
<td>Burns with a yellow flame. Does not continue to burn</td>
<td>Smell of burning hair</td>
<td>Black crushable bead</td>
</tr>
<tr>
<td>NYLON, POLYESTER, ACRYLIC</td>
<td>Does not catch fire easily, melts away</td>
<td>Shrinks away from flame. Burns with sputtering</td>
<td>No definite smell</td>
<td>Hard, uncrushable bead</td>
</tr>
</tbody>
</table>
6.5 Yarns

Do you remember pulling a thread from a cloth and opening it? Yes, you found hair like fibres. That thread which was made of fibres is called yarn. Yarns are made up of a number of fibres twisted together. Fibres are thin and small and cannot be made into a fabric directly. So they are first converted into yarns which are longer, thicker and stronger. We use these yarns to make fabrics.

A yarn is a continuous strand made up of a number of fibres which are twisted together.

**YARN MAKING**

The process of making yarns from fibres is called *spinning*. Here the fibres are not only twisted but also pulled out or drawn.

You can try spinning and making a yarn yourself. Take some cotton and start pulling out a few fibres. While pulling also twist. You will see that a yarn is formed. The spinning process helps to hold the fibres together and makes the yarns strong, smooth and fine. Even the filament fibres are twisted together to form a stronger, finer and smoother yarn. Spinning can be done by using a takli (spindle), a charkha or a spinning machine.

**BLENDS**

You all must have heard of fabrics with names like terecot and cotswool. These are the names of mixed fabrics. Cotswool is a mixture of cotton and wool, and terewool of wool and terene. Blends are made from more than one kind of fibres. At the yarn stage itself, two types of fibres are mixed, pulled out and twisted together to form the yarn.

Can you name some more mixed fabrics?
INTEXT QUESTIONS 6.2

1. Write the missing steps in the process of yarn formation:
   Fibre (i) (ii) (iii) Yarn.

2. State whether the following are true or false:
   (i) Yarn is made of a number of fibres.
   (ii) Staple fibres are used to make a yarn.
   (iii) Spinning is a process of making fibres.
   (iv) Spinning increases the strength of yarns.
   (v) Twisting increases the strength of the yarns.
   (vi) Smoothness of a yarn depends on the twisting of the fibres.
   (vii) Blends are made from different fibres.

6.6 Fabrics

The term ‘fabric’ doesn’t need any explanation because you all know what it means. So we can describe it as:

Fabric is the material that is used to make clothing or household articles.

You all must have seen the seat of a chair or a charpoy made with nylon or cotton. These are made with tape - when two sets of tapes are interlaced with each other at right angles. Similarly a fabric is also made by interlacing two sets of yarns at right angles.

This whole process of interlacing two sets of yarns at right angles to make a fabric is called weaving.

Weaving is the process of interlacing two sets of yarns at right angles to each other to form a fabric.

Weaving is done on looms. Hand operated looms are called handlooms and power operated ones are called power looms.

6.7 Weaving

Weaving is done by fitting one set of yarns on the loom which forms the length of the fabric. These are called the warps. The other set of yarns interlaced at right angles with the warps, are called wefts.
The yarns can be interlaced in many different ways. These different ways of interlacing of yarns is called weaving. There are many types of weaves used to make different kinds of fabrics like cambric, popline, matt, satin, velvet, towels, denims, etc.

Common weaves used for most of the fabrics are:

(i) Plain weave
(ii) Twill weave
(iii) Satin weave
(iv) Plain Weave

(i) **Plain weave**

It is the most simple and inexpensive method of weaving. In this case, the warp and weft yarns alternate with each other, that is, each weft yarn goes over one warp yarn and under the next warp yarn, as is shown in the figure.

Examine the weave of fabrics like mulmul, cambric, organdy, silk, etc. These fabrics are made by the plain weave.

(ii) **Twill Weave**

We can change the way of interlacing yarns so as to get many different designs. If we get a diagonal line effect on the fabric, then we call it the twill weave. Fabrics made by this weave are stronger as compared to plain weave. Fabrics like denims, Jeans material are made by the twill weave.

(iii) **Satin Weave**

Satin weave fabrics differ in appearance from twill weave fabrics because the diagonal line of twill weave is not visible. In the case of satin weave, there are long lengths of warp yarns between the wefts. As a result, the warp yarns are seen more on the surface of the fabric. Reflection of light from these yarns give a shine to the fabric. Moreover, the yarns used for making this weave have lesser twist as compared to the yarns used for other weaves. All these together give the fabric a soft, smooth and shiny appearance.

The other method of making a fabric is:

**KNITTING**

Pick up a sweater and any other woven fabric and compare the two? Yes, in case of a sweater, there is interlocking of loops. You must have seen your mother knitting swea-
ers with needles. If you try to do it yourself, you will see that every time you make new loops from previous ones the length increases. Knitting is also done on machines. Besides sweaters, you can make other garments also. For example, T Shirts. Examine a gents’ baniyan or vest. Can you tell how it is made?

Knitting is interlooping of one or more set of yarns.

When compared with wovens, knitted fabrics are more stretchable and can therefore be used for undergarments. They are also used for T-shirts, short pants for sports, socks, etc, because they allow freedom of movements along with a close fit.

**ACTIVITY**


Note: these can be collected from tailors.

**INTEXT QUESTIONS 6.3**

Fill in the blanks with suitable words.

1. Fabrics are made by .................. and ..................
2. The three basic weaves are .................
3. Length wise yarns are known as .................
4. Widthwise yarns are known as .................
5. ......................... fabrics are stretchable.

**6.8 Characteristics of Fabrics**

Now let us look at some of the properties of the various fibres which, if considered, prove a great help in the selection, use and maintenance of fabrics.
INTEXT QUESTIONS 6.4

1. Match the following statements:

(a) Polyester     (i) Strongest fibre
(b) Nylon         (ii) high moisture absorption
(c) Wool          (iii) Can not tolerate hot iron
(d) Cotton        (iv) Longest natural fibre
(e) Silk          (v) Poor heat conduction

2. State whether the following statement are true or false:

(i) Cottons have a smooth look.
(ii) Wool sweaters conserve body heat.
(iii) Silk shirts get dirty easily.
(iv) Nylon ropes are used by mountaineers.
(v) Polyester is good for making towels.

3. Choose the correct alternative to answer the following questions:

(i) Which of the fabric is most suitable for summer?
   (a) Cotton
   (b) Nylon
   (c) Silk
   (d) Terelene.

(ii) Which of the following fabrics does not take stains easily?
    (a) Cotton
    (b) Nylon
    (c) Wool
    (d) Silk

(iii) Which of the following fabrics is a bad conductor?
     (a) Nylon
     (b) Wool
(iv) Which fabric is made of staple fibre?
   (a) Cotton
   (b) Nylon
   (c) Polyester
   (d) Silk

(v) Which is the strongest fibre?
   (a) Cotton
   (b) Nylon
   (c) Rayon
   (d) Wool

(vi) Which fabric has a dull surface?
   (a) Nylon
   (b) Polyester
   (c) Silk
   (d) Wool

(vii) Cotton is most desirable fabric for making undergarments because it is:
   (a) Absorbant
   (b) Dull
   (c) Shinning
   (d) Strong
6.9 What You Have Learnt

In order to make it easy for you to remember, here are the main points of the lesson:

Properties
have

FIBRES
are classified as

NATURAL
MAN MADE
STAPLE
FILAMENT

Veg. e.g. cotton jute
Animal e.g. wool.
silk

e.g. cotton

e.g. polyester
nylon

e.g. rayon

used in the process of

SPINNING
consists of

Straightening
drawing

Twisting

to give

YARN
through

KNITTING

Gives

WEAVING

Plain

Twill

Satin

FABRIC
6.10 Terminal Exercise

1. How will you classify fibres on the basis of their origin?
2. What is the difference between rayon and nylon, though both are man-made fibres?
3. How do you get yarn from a cotton ball? Explain the steps with help of a diagram.
4. How will you make a fabric and how will you get different designs?
5. Why do we all prefer cottons over nylons in summer?

6.11 Answers to Intext Questions

6.1 1. (a) Length   (b) Staple   (c) Filament
       (d) Natural   (e) Man-made

2. Man-made: (i), (v), (vi), (vii)  
   Natural: (ii), (iii), (iv), (viii)

3. (i) T   (ii) F - Filaments are long fibres  (iii) F - Jute is obtained from the stem of the jute plant  (iv) F - from secretion of the silk worm  (v) T

6.2 (i) Straightening (ii) Drawing (iii) Twisting

1. (i) T  (ii) T  (iii) F  (iv) F  (v) T  (vi) T  (vii) T

6.3 1. Weaving, Knitting

2. Plain, twill, satin

3. Warp

4. Weft

5. Knitted

6.4 1. (a) (iii), (b) (i), (c) (v), (d) (ii), (e) (iv)

2. (i) F, (ii) T, (iii) F, (iv) T, (v) F

3. (i) (a), (ii) (d), (iii) (b), (iv) (a), (v) (b)