

## Unit 4

### MISCELLANEOUS CELLULOSIC FIBRES & ASBESTOS

#### *Do You Know?*

- *How many plants provide us textile fibres other than Cotton and Flax plant?*
- *Which are the different parts of the plants from which we get fibres?*
- *From which material gunny bags, ropes, door mats etc. are made?*
- *In olden times which material were used to make sails, fishing nets, life jackets?*

Apart from Cotton, Linen, Silk and Wool, there are many other natural fibres which are used in various ways in different parts of the world. Their production and use is not as wide spread as the four fibres mentioned above but they have their own beauty and utility. These are also very ancient fibres with a rich history. Due to advent of man-made fibres in the 19<sup>th</sup> century, consumers became attracted towards them and the use of these fibres became very limited. Nowadays, as we are becoming more and more aware of the disadvantages of using too many synthetic products and the damage they are causing to our environment, these natural fibres are again gaining popularity. Due to progress in science and technology, better varieties of these fibres are being produced as well as new ways of using them are also being discovered. These fibres are slowly but surely replacing synthetic fibres in our lives.

#### 4.1 JUTE

Jute is known as the ‘**Golden Fibre**’ due to its golden brown colour and its importance. In terms of usage, production and global consumption, jute is second only to cotton. It is also a **bast fibre**, available from the stem part of its plant like Linen. The production is

also similar to Linen. Jute is environmentally friendly as well as being one of the most affordable fibres. It is bio-degradable and can be recycled.

India is one of the largest producer of jute in the world. The top five jute producing countries are India, Bangladesh, China, Uzbekistan and Nepal. Jute has been used in India on family farms for centuries. Jute fibres are very long (1 to 4 metres), lustrous and golden brown in colour. They are strong, have low elasticity, can absorb moisture but are not affected much by moths or mildew.



**Pic. No. 4.1 Jute field**

#### **Uses of Jute :**

1. Jute has been mainly used for making packaging materials like gunny bags, market bags, grocery bags, shopping bags

and floor mats, ropes and twines since very old times.



**Pic. No. 4.2 Jute Products**

2. It is also used as lining for carpets and linoleum.
3. Nowadays it is becoming popular in fashion garments, jackets, dress materials and fashion accessories like hand bags, footwear etc.
4. It is used for home furnishing and also for making furniture which are gaining popularity rapidly.



**Pic. No. 4.3 Jute Furniture**

5. The latest use of jute has been in paper making.

## 4.2 KAPOK

Kapok fiber is one of the natural cellulosic fibers which grow on the kapok tree. It is available from the pods of that tree. In this aspect it is similar to cotton as both are **seed-hair** fibres. The word **kapok** refers both to the tree and to the fibre. The fibre is also known as **silk cotton** or **Java cotton**. It is produced mainly in Indonesia, Thailand and Java.



**Pic. No. 4.4 Kapok Tree**

It is creamy in colour and very silky. It is very light in weight – 8 times lighter than cotton. It has a waxy coating which helps repel water, and due to its light weight, kapok is 5 times more buoyant than cork. Its length is short and it is not strong.



**Pic. No. 4.5 Kapok fibre**



### Uses of Kapok:

1. Due to its short length and lack of strength, it is difficult to make yarns out of it. Kapok is therefore mainly used as stuffing for pillows, mattresses and upholstery.
2. It is used as insulation against sound and heat.



**Pic. No. 4.6 Kapok Pillows**

3. It is used as a substitute for absorbent cotton in surgery.
4. Due to its buoyancy, light weight and waxy coating, it is the material par excellence for the manufacture of lifebuoys and belts, waistcoats and other naval life-saving appliances. It is used by military and navy for these purposes.



**Pic. No. 4.7 Kapok Life Jacket**

5. It is also used for building construction.
6. With advanced technology, it is possible to mix kapok with cotton and make yarns.
7. This will widen the use of this fibre and provide consumers with more choices.

### 4.3 RAMIE

Ramie is made from the stalks of a plant called **Chinese Nettle**. In this manner, it is also a **bast fibre** like Linen and Jute. But getting fibres from the stems of this plant is more difficult. The process is more complicated and different from retting done for Linen and Jute. Because of the elaborate making process, Ramie is a costly fibre. The major ramie producing countries are China, Philippines, Brazil, Indonesia and India. It is a very ancient fibre. Traditionally, it was very popular in Japanese textiles.



**Pic. No. 4.8 Ramie plant**

Ramie fibre is white and lustrous and looks like silk. It is very strong, has poor elasticity, very good moisture absorption and is resistant to mildew. It's clothing is very cool and refreshing and so it is a good choice for hot and humid climate.

### Uses of Ramie :

1. Ramie is used since very ancient times in China and other countries to make very sheer and translucent fabric resembling silk and linen and is used in making apparel fabrics like shirts, dresses etc.

- It is not very widely used as it is expensive to make, but with new technology, it is possible to make blends with other natural fibres. This has renewed manufacturers' interest in this fibre.



**Pic. No. 4.9 Ramie dress**

- It is used for making tablecloths, napkins and handkerchiefs like linen.
- It is also used for making industrial sewing thread, packing materials, filter clothes, fishing nets, canvas, upholstery fabrics, straw hats and fire hose.

#### 4.4 HEMP

Hemp is a bast fibre like Linen, Jute and Ramie. The scientific name of its plant is *cannabises sativa*. It is a very old fibre which was in use in 8000 B.C. too. Today it is cultivated in Africa, America, Egypt, Canada, Europe and Asia. It is known as *San* or *Patsan* in India.



**Pic. No. 4.10 Hemp plant**

Hemp fibres are 3-4 feet long, very strong and durable. They have good moisture absorption and they are resistant to damage by heat, sunlight or mildew. The fibres are naturally stiff and harsh but now with new technology, they can be made soft and flexible.

#### Uses of Hemp :

- Traditionally hemp has been an industrial fibre. Since ancient times, it has been used for making canvas, sail clothes, ropes and sacks.
- Also used for making carpets and nets.
- After ways of softening hemp were discovered, it has been used for making jeans, sports clothing and other fashion apparels.



**Pic. No. 4.11 Hemp Sails**

- It is used with other natural fibres to make blends where it imparts strength to the fabric.
- It is also used in making bedding, upholstery as well as medicinal bandage.
- Nowadays it is also used for making shoes, bags and fashion jewellery.

#### 4.5 COIR

Coir is coconut fiber extracted from the outer shell of a coconut. As it is obtained from coconut husk, it falls under the category of

**nut-husk fibres.** Because of its golden brown colour and its commercial use, it is also called the golden fibre. Like other natural vegetable fibres, even coir has been in use since ancient times. Use of coir is mentioned in Ramayan and other epics. India and Sri Lanka produce almost



**Pic. No. 4. 12 coir fibres**

90% of coir used in world. Other main coir producing countries are Phillipine, Vietnam, Thailand, Kenya, Ghana etc.

There are two types of coconut fibers, brown fiber extracted from matured coconuts and white fibers extracted from immature coconuts. Brown fibers are thick, strong and have high abrasion resistance. White fibers are smoother and finer, but also weaker. Both brown and white coir consist of fibers ranging in length from 4-12 inches.

Coir fibres are tough and durable, unaffected by moisture and mildew, are flame retardant and provide excellent insulation against temperature and sound. Due to their coarse texture, they are not used for apparel purpose.

### Uses of Coir :

1. Traditionally coir has been used for making ropes and door mats.
2. White coir is used in the manufacture of rope and, thanks to its strong resistance to salt water, in fishing nets.

3. Brown coir is used in making sacks, brushes, doormats, rugs, mattresses.
4. It is also used in making insulation panels and packaging.



**Pic. No. 4.13 coir products**

5. In Europe, the automobile industry upholsters cars with pads of brown coir bonded with rubber latex.
6. Nowadays coir is used to furnish rooms and offices with trendy look. Coir carpets decorate floors and walls as they look sophisticated and ethnic.
7. **Coir Bhoovastra** - Coir Bhoovastra is used to prevent soil erosion and promote vegetation cover. Naturally resistant to rot, moulds, and moisture, and needing no chemical treatment, coir Bhoovastra is hard and strong, and can not only protect the soil from erosion but can even be used as a protection against sea erosion.

## 4.6 SISAL

Sisal is cultivated for fibres since 1893 in East Africa. Today it is grown in many tropical and sub-tropical countries like Brazil, Tanzania, Kenya, Madagaskar and China. It is a widely used natural fibre and is easy to cultivate. It is available from the leaves of its plant and so comes in the category of **leaf fibres**. Like all leaf fibres, it is also a **hard fibre** which means that it is toughest of all plant fibres and is not used for apparels but mainly for making ropes. Sisal fiber is an exceptionally durable and low



maintenance fibre. It is recyclable. It is anti static, does not attract dust particles and does not absorb water easily. It has the ability to stretch and does not decay in salt water. It takes dyes easily and it has good sound absorbing properties. Sisal is broadly categorized under three grades - lower, medium and high.



**Pic. No. 4.14 Sisal Plant**

**Uses of Sisal :**

1. The lower grade fibre is used by the paper industry.
2. The medium grade fibre is used in the cordage industry for making: ropes, baler and binders twine. Ropes and twines are widely employed for marine, agricultural, and general industrial use.
3. The higher-grade fibre after treatment is converted into yarns and used by the carpet industry.
4. Sisal's main use is in shipping industry.
5. It is used for making mattresses, geotextiles, handicrafts, slippers and support belts.
6. It is also surprisingly used as the fibre core of the steel wire cables of elevators, being used for lubrication and flexibility purposes.
7. It is used in automobile industry with fiberglass in composite materials.
8. The use of sisal in non-woven textile is also of prime significance, as sisal is an environmentally friendly strengthening agent to replace asbestos and fibre glass in composite materials.



**Pic. No. 4.15 Sisal Rope**



**Pic.No.4.16 Sisal baskets**



**Pic.No.4.17 Sisal Handbag**

**4.7 PINA**

**Pina fibres are leaf fibres obtained from pineapple plant.** Pineapple is mainly grown in sub-tropic countries including Philippines, Taiwan, Brazil, Hawaii, India, Indonesia, West Indies and Bangladesh. Pina weaving is an age old tradition dating back to Historic times.

During 19<sup>th</sup> century, pina fabric was much in demand all over the world. However, when other cheaper fabrics became popular, pina fabric almost disappeared. It has been revived in the recent past two decades only.



**Pic.No.4.18 Pina Plant**

**Pina fibres** have beautiful elegant appearance with natural shine, similar to that of linen. They are long, fine and lustrous. They are lightweight. They blend very efficiently with other fibers. They are very soft and have better texture than silk. They can be washed and don't need to be dry cleaned. Pina fibres are also divided into two groups - i) fine fibres and ii) coarse fibres.

#### **Uses of Pina :**

1. Pina fibres are mainly used for making valuable items like wedding dresses, kimonos, gowns, handkerchiefs etc.



**Pic. No. 4.19 Pina Wedding gown**

2. They are also used for making table cloths, mats, fans, bags and anywhere a lightweight but stiff and sheer fabric is needed.
3. Pina fiber is often blended with cotton, abaca, and silk to make amazing light and breezy fabrics. When woven with silk, it is known as pina-silk.

#### **Internet my friend!**

Find out more details about all these wonderful vegetable fibers and their usefulness in various fields.

#### **Do You Know?**

- Do you know which fibre is used extensively in building construction?
- Have you ever heard of a fibre which does not catch fire at all?

## **4.8 ASBESTOS**

It is the only natural mineral fibre. The name "Asbestos" is derived from the Greek word Asbestos which means **in consumable** (by fire). This particular property is the main speciality of asbestos and the fibre is used mainly for this property only. This is also a very old fibre and was known to the ancient Greeks as early as the 1<sup>st</sup> century A.D.



**Pic. No. 4.20 Asbestos rock**



Asbestos fibre is obtained from rocks. There are thirty different types in the asbestos group. Only six of them are of commercial importance and of these six, only one “**Chrysotile**” is used in textile manufacturing . Asbestos rocks are available from mines. 80% of the world mines of Asbestos are situated in Canada and Russia. The fibres are separated from the rocks, cleaned and then spun into yarns and later made into fabric.

The most important property of asbestos is that it does not burn. It is not affected by fire at all. The fibres are very lustrous and fine. They have good strength, flexibility and low heat conductivity. It is not affected by water, fire, acid or rust.

#### A peek in History!

Roman Emperor Charlemagne invited some invaders for dinner to discuss truce. After dinner

he threw the table cloth into fire and later retrieved it without any damage. The invaders were convinced that the Emperor has supernatural powers and so left without fighting and a war was avoided.

Can you guess the fabric from which that table cloth was made?

#### Uses of Asbestos :

Asbestos fibres have rough edges which can hurt our skin and so it is not used as apparel. In India, it is not available in open market. It is made according to order and supplied to the industry where required. It is used as -

- Body suits of fire brigade persons.
- For military purpose.
- For aprons and gloves of workers in ammunition factories.
- For making insulating material for industries.
- As insulating cover for steam or hot water pipes.



**Pic. No. 4.21 Fire suits**

- As insulating cover for electric cables.
- For building construction.
- As filter in chemical laboratories.
- For sound proofing.



**Pic. No. 4.22 Insulating covers**

**Asbestos Hazard :** Asbestos fibres come out of the fabric, float in air and if inhaled, they get fixed in the lungs causing respiratory problems and cancer. Due to this possible health hazard, nowadays asbestos is not so widely used. Many countries have even banned its use.



**Pic. No. 4.23 Asbestos gloves**



### Internet my friend!

Find out more about the types of health problems caused by Asbestos and which countries have banned its use.

### Use Your Brain Power

1. Find out the names of all eight fibres mentioned in this chapter in the following grid.

A	X	E	Y	O	M	J	U	T	E	L	K
Y	S	I	K	Q	A	D	F	N	J	I	A
N	A	B	P	S	H	E	M	P	T	B	P
S	G	O	E	D	P	K	R	I	C	F	O
P	M	H	Q	S	R	V	X	N	Z	A	K
K	W	B	F	L	T	R	C	A	J	M	A
B	P	D	O	P	X	O	C	F	O	H	Z
R	A	M	I	E	N	B	S	V	D	A	M
X	E	Q	L	O	X	K	D	N	W	S	R
C	J	E	D	K	C	H	F	R	D	I	N
U	M	P	Y	B	E	S	I	V	O	D	A
S	I	S	A	L	J	O	M	C	G	Q	O

2. Who am I ?

- a) I am a nut husk fibre. \_\_\_\_\_
- b) I am so light weight that I float on water. \_\_\_\_\_
- c) I am called the “golden fibre”. \_\_\_\_\_
- d) I am a Greek word meaning unconsumable by fire. \_\_\_\_\_
- e) I am a bast fibre resembling silk. \_\_\_\_\_
- f) I am used in automobile Industry. \_\_\_\_\_
- h) I am used for making wedding dresses. \_\_\_\_\_

## EXERCISE

### Objective Type Questions

#### 1. Match the following :

A		B	
1.	Asbestos	a)	Golden fibre
2.	Hemp	b)	Protein fibre
3.	Kapok	c)	Health hazard
4.	Sisal	d)	Bast fibre
5.	Jute	e)	Very light weight
		f)	Nut husk fibre
		g)	Leaf fibre

#### 2. Select and write the most appropriate answer from the given alternatives for each question :

- Fabric used to prevent soil erosion  
a) Carpet                      b) Bhoovastra  
c) Pina calado
- Fibre used for making ropes  
a) Asbestos    b) Pina    c) Sisal
- This is a leaf fibre  
a) Coir                      b) Hemp    c) Sisal
- This is a nut husk fibre  
a) Coir    b) Sisal    c) Hemp

#### 3. Write whether the given sentences are True or False :

- Asbestos is obtained from rock deposits.
- Sisal fibre resembles Silk.
- Pina is used for making life jackets.
- India is one of the top Jute producing countries.

5. Jute is used in paper making.

#### 4. Name the following :

- The rock from which Asbestos is obtained.
- The coir fabric which prevents soil erosion.
- Embroidered Pina fabric.
- Light weight fibre used for fibre fill.

### Short Answer Type Questions

#### 1. Classify the following into following categories :

- i. Leaf fibres and Bast fibres  
jute, pina, sisal, ramie

#### 2. Give Reason:

- Coir is not used for apparel purpose.
- Kapok is used for making life jackets.
- Hemp is used for making sails.

#### 3. Write short notes on the following :

- Uses of Sisal
- Uses of Coir
- Asbestos fibre
- Uses of Ramie
- Hemp fibre
- Pina fibre

### SELF STUDY / PROJECT

- Collect information about the production and uses of various vegetable fibres.
- On a world map, note down the areas/countries which produce the various fibres given in this chapter.

