

Synthetic Fibres And Plastics

3

UNIT-II : MATERIALS

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INTRODUCTION

We see many things around us and we use them. They are made of different material. We wear different types of clothes such as shirt, pant, socks, suits etc. They are made of different types of natural fibre and synthetic fibres.

Synthetic Fibres

A synthetic fibre is a chain of small units joined together. Each small unit is actually a chemical substance. Many such small units combine to form a large single unit called a polymer. The word polymer comes from two Greek words poly means many and per means part. Thus a polymer is made of many repeating units.

Polymers occur in nature also. Cotton is also a polymer, called cellulose. Cellulose is made up of a large number of glucose units. There are various types of synthetic fibres.

Do You Know ?

All synthetic fibres are prepared from raw materials of petroleum origin called petrochemicals.

Rayon

As we know that natural silk is very costly, so scientists discovered a fibre having properties similar to that of silk. Such a fibre was obtained by chemical treatment of wood pulp. This fibre was called rayon. It is also called artificial silk.

Although rayon is obtained from a natural source, wood pulp yet it is a man made fibre. It is cheaper than silk and can be woven like silk fibres. It can also be dyed in a wide range of colours. Rayon is mixed with wool to make carpets and footmats etc.



Nylon

It is another man-made fibre. It is purely man made material, there is no use of plant and animal raw material. It is prepared from coal, air and water. Nylon fibre is strong, elastic and light. It is lustrous and easy to wash. So it has become very popular for making clothes.

Nylon is used to make ropes, socks, tents, car, belts, seat, sleeping bags, curtains etc. It is also used for making parachutes and ropes for rock climbing. A nylon wire is actually stronger than a steel wire.



Nylon material



Uses of nylon fibres

Do You Know ?

Nylon was the first synthetic fibre produced in 1935. It got its name from the cities of New York and London, where it was marketed initially.

Polyester and Acrylic

Polyester is another synthetic fibre. It is wrinkled free fabric. It remains crisp and easy to hand wash. It is very suitable to make dress material. Terelene is a popular Polyester. It can be drawn into very fine fabrics that can be woven like any other yarn.



Polyester and Acrylic Products

Pet is very familiar form of polyester. It is used for making bottles, utensils, films, wires and many other useful products. Polyester is actually made up of the repeating units of a chemical called ester. Esters are a chemical

which gives us the smell of fruits. Fabrics are sold by names like polycot, polywool, terrycot etc. Polyester is mixed with cotton to form terrycot. When it is mixed with wool it is called polywool. All types of sweaters, shawls, blankets are not made by natural wool.

They are available in many colours and more durable as well as affordable.

Synthetic fibres are just similar to natural fibre and more durable and cheaper but their behaviour is different from that of the natural fibre, synthetic fibres melt on heating. This is a very big disadvantage of this fibre because when synthetic clothes catch fire, they are harmful for skin, they can cause allergy. We should not use too much synthetic clothes, especially in the kitchen or in laboratory.

Properties of Synthetic Fibres

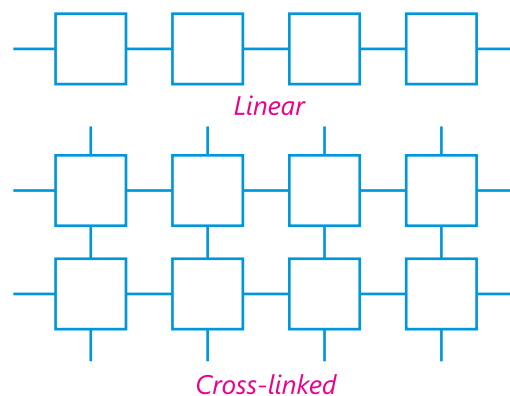
Synthetic fabrics find varied applications depending upon their properties and climatic conditions. For instance stockings and socks are generally made of nylon because it retains their original shape even after repeated use. They have some properties as follows :

1. They can absorb moisture.
2. They are lustrous and have shiny surface.

3. They are strong and light weight.
4. They are wrinkle free and springs back into shape when creased.
5. They are soft and flexible.
6. They are easily washable and dry quickly.

PLASTICS

In daily life, we use things which are made up of plastics. Plastics are capable of being moulded and cast into various shapes and size. Plastic is also a polymer like the synthetic fibre. All plastic do not have the same type of arrangement of units. In some it is linear where as in others it is gross linked.



Bucket, chair, tub, toy, stool, box, mug, glass, bottle, jar etc. are made up plastic. Plastic can be shaped in any form. It can be recycled reused, coloured, melted, rolled into sheets or made into wires.

Some plastic objects can be bend easily such as plastic of bucket, mug, chair, stool etc. Such plastic which gets deformed easily on heating and can be bent easily are known as thermoplastics.



Thermoplastics

Thermosetting plastics

On the other hand, there are some plastic which moulded once cannot be softened by heating. These are called thermosetting plastics. Handles of cooking utensils, electrical switches etc. are made up of thermosetting plastics. Melamine is a versatile material, it resists fire and can tolerate heat better than other plastics.

General Properties of Plastics

Number of things are packed in polythene bags such as milk, water, pickles etc. Plastic containers are more convenient because of their light weight, lower price, good strength and easy to use. Being lighter as compared to metals, plastics are used in cars, two wheelers, aircrafts and spacecrafts too.

Plastics are poor conductor of heat and electricity so they are used in refrigerators in plastic body of many household goods. Plastics are also used in wiring.

Plastics are insoluble in water and for this reason bottles, buckets and containers made of plastics are used for storing water and plastics tumblers and cups for drinking water.

Plastics are extensively used in the medicine field, tablets, capsules, syringes are packed in plastic made material.

Teflon is the brand name of poly tetrafluoroethylene, a type of plastic discovered by US based company Dupont in 1998. Teflon coating are widely used in non stick cooking pans and other cookware. Teflon does not stick to materials easily and has a high melting point unlike many common plastics which makes it effective for use in pans or easy cooking and cleaning.

Bad Effects of Plastics on Environment

A material which gets decomposed through natural processes such as action by bacteria is called biodegradable.

A material which is not easily decomposed by natural processes is called plastics, it is non-biodegradable so it has hazardous effect on the environment and health associated with its disposal. Accumulation of plastics is considered a serious problem because most of the methods used to dispose them result in some type of pollution to the environment.



Hazards associated with plastic disposal

Plastics that are buried in the soil cannot be decomposed by microorganisms. This prevents rain water from seeping into the earth. The water thus remains on the earth's surface, forming muddy puddles. This affect the underground water table.

Most plastics wastes end up littering roadsides, floating in the lakes, streams and rivers they result in water pollution. They also pose a threat to aquatic life as toxic substances present in plastics can cause death or reproductive failure in fish and other aquatic animals.

Disposal of plastics has become a big problem. Avoid the use of plastics as far as possible. Make use of cotton or jute bags which are biodegradable when you go to the market. The biodegradable and non biodegradable wastes should be collected separately in different dustbins and disposed off separately. It is much better to recycle plastics waste. Most of the thermoplastics can be recycled. 4R principle, Reduce, Reuse, Recycle and Recover should be followed by every citizen.

Know the Keywords :

Synthetic materials : Man made or manufactured materials.

Plastics : A material that can be moulded or formed into different shapes.

Polymer : Long chain of molecules containing thousands of smaller monomers called polymers.

Monomer : The smaller basic molecule in a fibre.

Rayon : Artificial silk prepared from cellulose.

Thermoplastic : Plastic that can be moulded upon reheating.

Point to Remember

- A synthetic fibre is a chain of small units joined together. Each small unit is actually a chemical substance. Many such small units combine to form a large single unit called a polymer.
- Nylon is prepared from coal, air and water.
- Polyester is mixed with cotton to form terrycot.
- When polyester is mixed with wool it is called polywool.
- There are some plastic which moulded once cannot be softened by heating are called thermosetting plastics.

EXERCISE TIME

A. Answer the following questions :

1. What is difference between natural and synthetic fabrics ?
2. Why is rayon called artificial silk ?
3. What is the difference between thermoplastics and thermosetting plastics ?
4. Which part of sheep are sources of raw material for natural fabrics ?
5. Why disposal of plastics is the threat to the environment ?
6. What are the bad effects of synthetic fabrics to the skin ?
7. What are 4R principles ?

B. Fill in the blanks :

1. The raw materials for the production of synthetic fabrics are obtained from _____ and _____.
2. Rayon is also known as _____.
3. Synthetic fibres are also called _____.
4. Like synthetic fibres, plastic is also a _____.
5. Most synthetic fabrics have high _____.
6. The synthetic fibre commonly used for making socks is _____.

C. Write 'T' for true and 'F' for false statement :

1. Raw materials for most of the natural fabrics are obtained from petroleum.
2. Polyester is a type of lycra.

3. Cotton and wool are synthetic fibre.
4. Plastics are generally bad conductors of heat and electricity.
5. Esters give the smell of fruits.
6. Handles of cooking utensils are made up of thermoplastic.
7. Plastic is biodegradable material.
8. PVC is used for making sanitary fittings.
9. Teflon coating is non-sticky.

D. Complete the words by filling one or two letters :

G ___ uc ___ se

po ___ yme ___

___ oly ___ hene

mic ___ org ___ nis ___

E. Tick (✓) the correct option :

1. Which of the following is a natural fabric ?

(i) PVC

(ii) polythene

(iii) wool

2. Which one of the following is used to make socks and parachutes ?

(i) bakelite

(ii) wool

(iii) nylon

3. Which one of the following is the example of synthetic fibre ?

(i) polyester

(ii) acrylic

(iii) cotton

4. Which one of the following is not included in 4R principle ?

(i) recharge

(ii) reuse

(iii) recover

5. Which one of the following is not a non-biodegradable substance ?

(i) plastic bag

(ii) tin, aluminium

(iii) paper



Creative Work

- Here is a short story on plastics. It has some jumbled words. Unjumble them and write them in the space provided.

All plastics are 1. YRLOPMSE. They are 2. THNYSITCE materials. They are inexpensive and resistant to 3. RPOSITIONCO. But, a major drawback of plastic bags causes harm to the environment, Hence, we must take adequate steps to preserve the environment.

1. _____ 2. _____ 3. _____