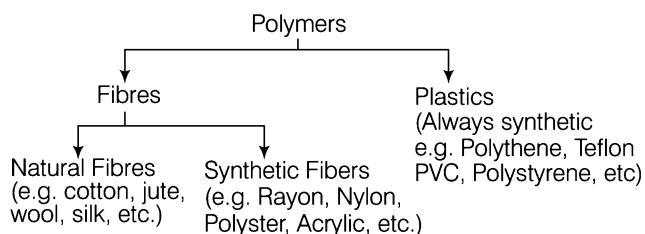


Polymers

- The word **polymer** comes from two Greek word; 'poly' meaning many and 'mer' meaning part/unit.
- A polymer is made of many repeating units called monomers.
- On the basis of origin polymers are of two main types—natural polymers and synthetic polymers.
- On the basis of utilisation, polymers are broadly divided into fibres and plastics.
- Fibres can be natural or man-made but plastics are always man-made.



Fibres

- Fibres are long thread like structure of thinner strands.
- Due to their properties and structure, fibres are utilised to make clothes, ropes, carpets, sweaters, etc.
- They may be natural or synthetic (man-made).
- Cotton, wool and silk are natural polymers while nylon, polyester, acrylic, etc., are synthetic polymers.

Natural Fibres

- These are obtained from plants and animals. Cotton flax and jute fibres are obtained from plants and are called

plant fibres. While wool and silk are examples of animal fibres.

- Wool is obtained from the fleece of sheep. Silk fibre is drawn from the cocoon of silkworm.

Cotton

- It is most widely used natural fibre.
- Cotton fibre is also known as cotton wool.
- Cotton is a soft fibre that is obtained from the cotton bolls (cotton fruits).
- Cotton plants are usually grown at places having black soil and warm climate.
- In India, cotton is mainly cultivated in Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Punjab, Rajasthan, Tamil Nadu and Karnataka.

Jute

- It is obtained from the stem of jute plant, often called **patson**.
- It is mainly grown in West Bengal, Bihar and Assam during rainy season.
- It is used for making gunny bags or sacks and for wrapping packages and some fine jute fibres are used to make fabric for clothes.

Synthetic Fibres

- The fibres made by man are called man-made or synthetic fibres.
- All the synthetic fibres are prepared by a number of processes using raw materials of petroleum origin, called petrochemicals.
- These are obtained by chemical processing of petrochemical.
- These are stronger than natural fibres.
- Depending upon the type of chemicals used for manufacturing, there are four major types of synthetic fibres which are given below:

| Synthetic Fibres | Composition | Uses |
|------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Rayon | Obtained by chemical treatment of wood pulp | In textile industry, in manufacturing of tyre cord, to make carpets, for making bed-sheets, curtains, blankets, etc. |
| Nylon | Made without using any natural raw material (from plant or animal) | For making socks, ropes, tents, brushes, car seat belts, sleeping bags. Parachutes, etc. |
| Polyester | Made up of the repeating units of a chemical called ester. | In making fabrics like saree, dress materials and curtains, for making water hoses, conveyor belts. |
| Acrylic | As substitute for wool | For making sweaters, shawls, blankets, carpets, boots and gloves, etc. |

Plastics

- A plastic is a synthetic polymer which can be moulded into desired shape when soft and then

hardened to produce a desirable article with durability.

- A large number of plastic bags, water bottles, buckets, mugs, combs, toothbrush, toys, chairs, tables, covers of electric switches, plugs, sockets, insulation of electric wire, water tanks, etc., are articles made up of plastics.

Types of Plastics

Plastics are of two types

1. Thermoplastics

- The plastics which get deformed easily on heating and can be bent easily are known as thermoplastics, e.g., polythene and Polyvinyl Chloride (PVC).
 - Thermoplastics are used for making insulation of electric wires and cables, various types of plastic containers (bottles, jars, etc.), combs, toys, raincoats, packaging materials, etc.
- ☞ 'Polythene' (poly + ethene) is a polymer of a compound known as ethene. It is used for making commonly used polythene bags.

2. Thermosetting Plastics

- The plastics which when moulded once, cannot be softened by heating are known as thermosetting plastics, e.g., bakelite and melamine.
- An article made up of thermosetting plastic retains its original shape permanently, even on heating.
- Thermosetting plastics are used for making handles of cooking utensils, plates, cups, electric switches, plugs, rockets, telephone instruments, etc.
- Melamine is a versatile material. It resists fire and can tolerate heat better than other plastics. So, it is used for making floor tiles, kitchenware are fabric which resist fire.

Some Plastics and their Uses

| Plastics | Starting material (Monomer) | Uses |
|--------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| Polythene | Ethylene | Coats, milk cartons, bread wrappers, carry bags, toys etc. |
| Polyvinyl chloride (PVC) | Vinyl chloride | Rain coats, hand bags, toys, hosepipes gramophone records and electric insulations etc. |
| Polystyrene | Styrene | Ceiling tiles, lining materials for refrigerators, TV cabinets etc. |
| Perspex | Methyl methacrylate | Lenses, transparent objects, domes and sky lights, aircraft windows, protective coatings, plastic jewellery etc. |
| Teflon | Tetrafluoroethylene | Non-sticky coating for utensils, making seals and gaskets. |

Practice Exercise

- The repeating unit of polymer is called
(a) Monomer (b) Dimer
(c) Oligomer (d) None of these
- Which of the following statements is incorrect about fibres?
(a) Fibres are long thread like
(b) These are always natural
(c) These can be used to make clothes, ropes etc
(d) All of the above statements are correct
- Which of the following is/are natural fibre(s)?
(a) Flax (b) Silk
(c) Jute (d) All of these
- Which of the following is an animal fibre
(a) cotton (b) jute (c) silk (d) flax
- Cotton is a
(a) natural fibre (b) artificial fibre
(c) plastic (d) strong fibre
- Which part of the cotton plants form cotton bolls?
(a) Root (b) Shoot
(c) Fruit (d) Leaves
- Cotton is mainly grown at places having
(a) red soil (b) black soil
(c) clayey soil (d) loamy soil
- In India, jute is mainly cultivated in
(a) gujarat (b) maharashtra
(c) punjab (d) west Bengal
- Which of the following is not a natural fibre?
(a) Cotton (b) Jute (c) Nylon (d) Flax
- Which of the following is a source of rayon?
(a) Wool (b) PET
(c) Wood pulp (d) Silk
- Which of the following is most suitable for making strong ropes?
(a) Cotton (b) Silk
(c) Acrylic (d) Nylon
- Which one of the following fibre is made from natural raw materials?
(a) Rayon (b) Nylon
(c) Polyester (d) Polystyrene
- The material similar to silk in appearance is
(a) nylon (b) rayon
(c) polyester (d) terylene
- Nylon is suitable for making
(a) carpets (b) blankets
(c) parachutes (d) bed-sheets

- 15.** Which of the following is the most suitable substitute for wool?
 (a) Silk (b) Cotton
 (c) Acrylic (d) Rayon
- 16.** Which of the following groups contains all synthetic substances?
 (a) Nylon, terylene, wool
 (b) Cotton, polycot, rayon
 (c) PVC, polythene, bakelite
 (d) Acrylic, silk, wool
- 17.** A is a synthetic material which can be moulded into desired shape when soft and then to produce a desirable article with durability. Plastic is also a polymer like synthetic fibre. This means that plastics consist of very molecules made by joining many small molecules together. For this, the starting materials are obtained from petroleum products called
- Choose the correct order to fill in the blanks.
 (a) Fibre, softened, short, monomers
 (b) Petrochemical, hardened, long, plastics
 (c) Plastic, hardened, long, petrochemicals
 (d) Plastic, softened, short, petrochemical
- 18.** PET used to make water bottles, is a
 (a) polyester
 (b) nylon
 (c) polyamide
 (d) thermosetting polymer
- 19.** Which of the following is the monomer of polythene?
 (a) ethane (b) ethene
 (c) ethyne (d) methane
- 20.** Which of the following is not a thermoplastic?
 (a) PVC (b) Polythene
 (c) Bakelite (d) All of these
- 21.** Which of the following is used for making non-sticky coating particularly for cooking utensils?
 (a) Teflon (b) PVC
 (c) Bakelite (d) Terylene
- 22.** Which one is a thermosetting plastics?
 (a) Melamine (b) Polythene
 (c) PVC (d) Nylon
- 23.** Thermosetting polymers are not suitable for making
 (a) electrical switches (b) crockery items
 (c) telephone (d) bristles of brush
- 24.** Consider the following properties.
 I. Non-reactive II. Light weight
 III. Good conductor of electricity
 Which of the above properties are found in plastics?
 (a) Only II (b) I and II
 (c) I and III (d) I, II and III
- 25.** A plastic used for making crockery is
 (a) Melamine (b) Acrylic
 (c) Nylon (d) Teflon
- 26.** The main compound used to make polythene bags is
 (a) Methane (b) Ethene
 (c) Carbon dioxide (d) None of these
- 27.** Which of the following is most suitable for making rain coats?
 (a) PVC
 (b) Rayon
 (c) Nylon
 (d) Polythene
- 28.** Polymer of styrene is not utilised to make
 (a) ceiling tiles
 (b) sole plate of electric irons
 (c) TV cabinets
 (d) lining material for refrigerators

Answers

| | | | | | | | | | | | | | | | | | | | |
|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|
| 1 | (a) | 2 | (b) | 3 | (d) | 4 | (c) | 5 | (a) | 6 | (c) | 7 | (b) | 8 | (d) | 9 | (c) | 10 | (c) |
| 11 | (d) | 12 | (a) | 13 | (b) | 14 | (c) | 15 | (c) | 16 | (c) | 17 | (c) | 18 | (a) | 19 | (b) | 20 | (c) |
| 21 | (a) | 22 | (a) | 23 | (d) | 24 | (c) | 25 | (a) | 26 | (b) | 27 | (a) | 28 | (b) | | | | |