

CH-3

SYNTHETIC FIBRES
AND PLASTICS

FIBRES: They are thin thread like structure.

There are two types of fibres

1. Natural fibres: They are obtained from plants and animals.

2. Synthetic Fibres: They are made in factories

Monomers And Polymers

- ❖ Substances are made of units.
- ❖ A substance having a single unit structure forming its particles called a **monomer**.
- ❖ In certain substances thousands of units join together to form a large unit, called **polymer** (poly means many). Polymer is made of many repeating units.
- ❖ The process of joining together monomers to form a polymer is called **polymerization**.

Polymers may be natural.....

Natural polymers:

- ❖ Natural fibers like cotton, wool and silk are polymers.
- ❖ Cotton is a polymer glucose.
- ❖ Wool and silk are the polymers of amino-acid (protein).
- ❖ Spider silk is one of the strongest natural polymers

Or polymers can be synthetic

Synthetic polymers:

- ❖ Synthetic polymers are made from chemical substances. They are plastic in nature .
- ❖ Nylon and polyster are synthetic fibres

Example :next slide

Raw materials for synthetics

Synthetic polymers :

❖ scientists evolved a mechanism to polymerize the monomers of certain substances like rubber, silicone and petroleum products such as ethane, propane, benzene, toluene, styrene, ester, and others. **All these are raw materials for synthetic plastics**

- ❖ In the east, including India, cotton, wool and silk and in the west it was leather, wool and fur which were the first materials to be used for clothings. Other natural fibres were also being used in different parts of the country depending upon their availability.
- ❖ It was towards the 1930s that synthetic fibre was developed.
- ❖ Most synthetic fibres are obtained from petroleum products, natural gas and coal by the process of polymerization.

Rayon

- ❖ Rayon is prepared from cellulose. Though cellulose is a natural polymer it needs extensive chemical treatment to form rayon. Hence it is also considered as a semi-synthetic fibre.
- ❖ Advantage of rayon :
 - ❖ it is cheaper to produce as compared to cotton itself since waste cotton and paper is used for making rayon.
 - ❖ Secondly, rayon can be blended with other fibres like wool and silk.

Nylon

- ❖ Nylon was first developed by American scientist, Wallace H. Carothers for M/S Dupont de Nemours & Company of America in 1935. Chemically it is a 'polyamide', a polymer. It is the strongest synthetic plastic material which can be moulded to any shape. Nylon has many uses as fibre, as sheet and as moulded solids. People believe that nylon has been named since its products were simultaneously launched in New York (NY) and London (LON).

Polyester

Alcohol and organic acid react together to make compounds called esters which are polymers. These are therefore called polyesters. If different alcohols and acids are used, different kinds of polyesters are made. Polyesters come under the brand names of 'Terylene', 'Dacron', 'Terene' and 'Polyester'.

Polyester is blended with cotton and wool in different ratios to obtain polycot or terrycot (polyester cotton) and polywool or terrywool (polyester wool) which is easily maintainable. Esters are compounds with fruity odour .

Acrylic

Acrylic fibre is commonly known by different trade names such as 'Acrilan', 'Orlon', 'Creslan', and 'Zefran'. It is a synthetic wool-like fibre with crimps



**Plastic Milk &
Juice Bottles**



Plastic Lumber
(decking, docks, etc.)



Play Sets



New Bottles

=



**Plastic Detergent
Bottles**



Buckets



Containers



Frisbees



Stadium Seats

Plastics

There is a great variety of plastics made from different chemicals. Property and uses of each kind of plastic depend upon the material being used for its synthesis (polymerization)

THERE ARE TWO TYPES OF PLASTICS

1. THERMOPLASTICS

**2. THERMOSETTING
PLASTICS**

Thermoset plastics

Thermoset plastics are hard and rigid. Example is Bakelite and melamine. Thermoset can be moulded to set it in any shape but it cannot be remoulded. It is dark in color, hard and resistant to heat and electricity. It is being widely used for the handle of kettles and pans. Earlier black telephone sets, electric switches, electric lamp holders, pins and plugs were made from thermoset plastic. It is also being used as a part of fibre glass sheet in the making of helmets. Melamine is a kind of Thermoset plastics used in good quality tableware. Melamine is also used as a coating on uniforms of firemen to make them fire resistant

Examples of theroset plastics



Thermoset handles



A firemans uniform is coated with thermoset plastic to made it fire resistant



Melamine wares



An electric pin (black)

Thermoplastics

Thermoplastics are soft and flexible through they are not elastic like rubber and steel springs. They melt on warming and regain their shape on cooling.

Thermoplastics can be drawn into fine fibers, moulded to any desired shape or stretched or spread as sheets. Some of the better known thermoplastics are nylon (polyamide), polyesters, polyethylene, polyvinyl chloride (PVC), acrylic, polyurethane, polypropylene (PP), poly-tetra-fluoro-ethylene (PTFE) etc

Thermoplastics examples



Plastic table and chairs



Plastic food containers



Plastic toys



Plastic spoons and forks



Plastic cups



Plastic daily use items