

Plastic:-

Week #08

Definition:-

Plastic can be defined as

"It is material consisting of any wide range of synthetic or semi synthetic organic compound that are malleable and can be moulded into solid objects"
of (Wikipedia)

Polymeric material that has ability of being molded or shaped, usually by application of heat or pressure.

Introduction to Plastic:-

The word Plastic is derived from Greek word "Plastikos" meaning "to be mould". Plastic is actually synthetic (human made) material which is made from polymers, which are long molecules built around chain of carbon atoms typically with Hydrogen, oxygen, sulphur and nitrogen filling in spaces. We can think Polymer as long molecule made of small but i.e repeating called monomer. We can imagine polymer as train which is made from many portions coupled called monomer.

Two Industrially important polymeric materials are plastic and elastomers.

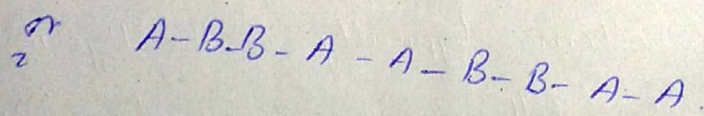
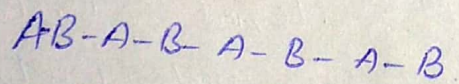
→ Ancient people used plastic in form of natural occurring rubber for different purposes.

In 1838 injection molding is develop for deacast metal product. (a technology that later revolutionize plastic making).

2. Structure of Plastic:-

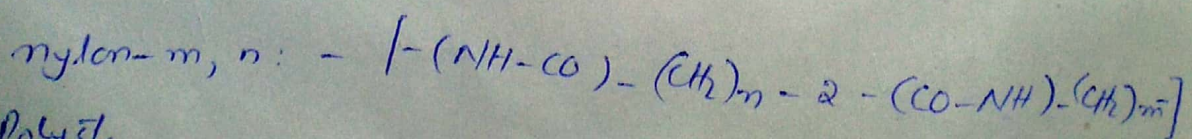
Plastic is not a regular molecule but it has complex structure and properties. Plastic is made from polymer which is than made from monomers, the basic constituent from which polymer is made of.

We can have different polymer but chemist always to seek to get different properties. We than mixed the monomer to get copolymers varying the composition but the monomeric structure. The arrangement of various monomer are different but can be manner as;

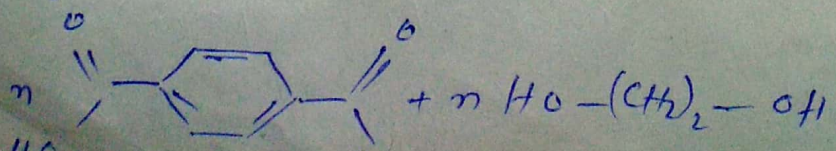


Each arrangement will give new properties for different application.

Nylon:-



Polystyrene



Types of Plastic:-

Generally there are number of types of plastic but we divide plastic into two types depending on how they physically and chemically bonded. These are.

- i. Thermoplastics.
- ii. Thermosetting Plastic.

i. Thermoplastic:-

The type of plastic that can be soften by heating and harden by cooling called thermoplastic

→ Since on heating it can be soft and can be mould to any desired shape without changing properties of plastic. So from this type of plastic we can utilized it in most of appliance because of its properties.

→ Thus the materials made from this type of plastic can be shape & reshape by mean of heat & cooling.

Properties:-

- Soften & liquifying on heating & harden on cooling
- Retain shape after manufacture
- (*) Can be reshape by heat.
- (*) Easy to recycle it.
- (*) Easily soluble in mostly solvent.

Examples:-

Polyethylene, Polystyrene & Polyamide.

(ii) Thermosetting Plastic:-

The plastic which are usually either soft and when once soften it by heat it hardens permanently after cooling.

→ This type of plastic available in different colours.

Properties:-

- (i) Permanently harden once heated & size then cannot be regain.
- (ii) It is little difficult to recycle.
- (iii) Undergo chemical changes during manufacturing.
- (iv) These plastics have large polymer than thermoplastic.
- (v) In this case the polymers are held together by strong bond that is very difficult to deform its shape.

Examples:-

- Polyster • Fiber glass.
- Bakelite • Vulcanized rubber.
- Urea formaldehyde

Polymer Technology:-

Polymer technology can be defined as;

"The manufacturing, processing, analysis and application of long chain molecule."

Polymer technology works with characteristics & properties of polymeric materials for example plastics. The study includes the mechanical properties and life length prediction. A major part of our work include the indication of material in different areas from packages to building.

Polymer technology deals with plastic and rubber from different aspects. We find the mechanical properties of material i.e. polymer and its durability in their environment of use.

1) Properties of Plastic:-

Plastic has the following different properties.

i- Mechanical Properties:-

This property of plastic refer to deformation or change in its shape of plastic when subjected to load. It tells us how strength of plastic is. For example we need some plastic so that it can bear load in some cases. So for that, that plastic should have more strength.

ii- Chemical Properties:-

It means chemical resistance to environment change when a plastic come in contact with some chemical and it place there for weeks. The

be change occur in plastic in term of their weight, size or other thing.

ii) Thermal Properties:-

It means thermal (heat) resistance and thermal conductivity.

In case of Thermoplastic which has high coefficient of thermal expansion and smaller thermal conductivity.

iv) Electric Properties:-

Plastic is best to used against electricity. As plastic is bad conductor to flow of charges. We in our daily life see most of electric appliances are made from ~~electro~~ plastics.

v) Physical Properties:-

Specific gravity Index of refraction and moisture absorption are called physical properties. The specific gravity of plastic is small depending upon the character of high polymer or thermal or mechanical treatment of plastic.

(x) Uses of Plastic as Construction Material:-

Plastic can be consider as most versatile material on earth. In our daily life we see that in every structure there is some component will be made of plastic. Some of the basic use of plastic discuss as;

*) In Construction & Block:-

Nowadays we want to decrease the weight of blocks that are used in construction of building. So we in specific portion use cutted plastic in more. We grind plastic upto some extent and then mixed with mortar. Now it pour into block's sample and the block obtain has same strength but its weight decrease.

*) In Industries:-

Low density polythene is used as film based industry use for coating of cable & wire.
High density polythenes are used for construction of buckets, basins & bottles.

Other uses:-

Polyvinyl chloride is used for gutters drains, pipes, window and door frames and shutters.

→ Polystyrene is used to insulate wires & cable in refrigerator.

→ Melamine formaldehyde is commonly known as "Formica" used commonly for worktops.

→ The outer most covering on wires & cable of electric supply also done with help of plastic as it is good insulator of electricity.