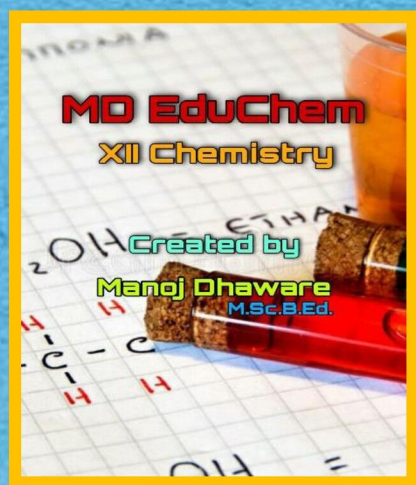
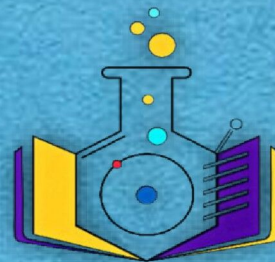


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M.Sc. B.Ed.



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15. Introduction to Polymer Chemistry

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15. Introduction to Polymer Chemistry

15.1 Introduction: Today the overall development in polymer science and technology has enriched human life. The world would be at totally different place without polymers such as artificial fibers, plastics and elastomers. From the throwaway candy wrapper to the artificial heart, polymers touch our lives as does no other class of material. In short we are living in the world of polymers. The term 'polymer' originates from Greek word '**poly**' meaning **many** and '**mer**' meaning **part or unit**.

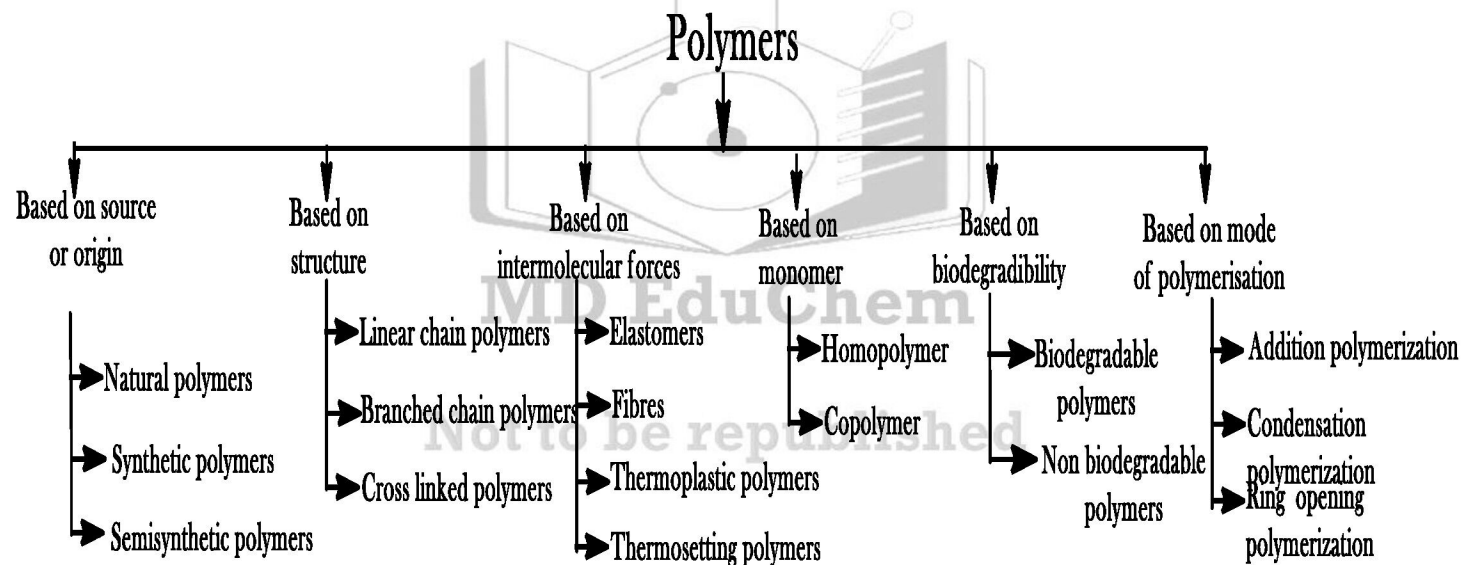
In this chapter we will study aspects of organic polymers, their classification, preparation and applications.

15.2 Monomer: 'Monomer is a smallest repeating unit of polymers.'

15.3 Polymers and their classification:

15.3.1 Definition: 'Polymers are high molecular mass macromolecules (10^3 - 10^7 u).'

15.3.2 Classification of polymers: Polymers are classified as -



D) Classification based on source or origin: On the basis of sources or origin, polymers are classified into three types

1) Natural polymers: The polymers obtained from **natural sources** are known as natural polymers.

They are classified into two types i) Plant polymers ii) Animal polymers

i) Plant polymers: The polymers obtained from **plants** sources are known as plant polymers.

For example: cotton, linen, jute, cellulose, natural rubber etc.

ii) Animal polymers: The polymers obtained from animal sources are known as animal polymers.

For example: silk, wool etc.

2) Synthetic polymers: The artificially prepared polymers are known as synthetic polymers.

For example: Nylon, terylene, neoprene etc.

They are also further classified into three types, i) Fibres ii) Synthetic rubber iii) Plastics

Natural rubber first came into the market in early 19th century. It was entirely recovered from wild *Hevea brasiliensis* trees which usually grew on the banks of Amazon River and its tributaries in South America. The amount of hydrocarbon present in *Hevea* tree is very high (35%). As per the demand the production of natural rubber increased by leaps and bounds and at present 1.5 million tons of natural rubber is sent to the market.

The latex is collected from a mature *Hevea* tree by making deep cuts on the bark and by allowing the latex stream in a pot attached below the cut. The latex is an emulsion like milk.

When a coagulant like acetic acid is added to the latex the rubber hydrocarbon gets coagulated in the amorphous solid form.

Q. The critical degree of polymerization is low for nylon 6 while high for polythene. Explain.

Ans. Nylon 6 is a polyamide polymer, and has strong intermolecular hydrogen bonding as inter molecular forces. On the other hand polythene chains have only weak Van der Waals forces as intermolecular interaction. Because of the stronger intermolecular forces the critical DP is lower for nylon 6 than polythene.

Material which undergoes degradation after use/Biodegradable materials: wood, paper bag, cotton clothes, vegetable peel, fruit peels, cardboard etc.

Material which do not undergoes degradation even after a long time/ Non-biodegradable materials: Thermocol, nylon ropes, polythene bags, Plastic, galss, batteries etc.

Impact of non-decaying substances on environment: They block the sewer pipes, contaminate water bodies, affects on aquatic life.

During digestion in carbohydrate glycosidic bond is broken and in protein peptide bond is broken

Natural wastes such as stale food, fruit peels, torn cotton cloth are biodegradable and the decomposed by microbes.

