

## Definations

- Polymers are large molecules formed by the linking up of many small molecules
- Monomers are small molecules that link up to form a polymer
- Polymerization is the reaction where many monomers link up to form a polymer
- There are two types of polymers

→ Addition Polymers

→ Condensation Polymers

## Addition Polymers

• Formed by addition reaction in which many small molecules are added to each other to form a large molecule, without the formation of bi-products

• Takes place only in compounds containing carbon to carbon double bond

→ Cut off one part of double bond

→ Check what is around double bond

→ They will be place above and below the two carbons

→ Only take place on double bond

• Unsaturated monomers for saturated polymers

• Mainly plastics

→ Polyethene

→ Polypropene

→ Polychloroethene

→ Polytetrafluoroethene

→ Polyphenylethene

## Condensation polymers

• Polymers formed by condensation reaction in which water is formed as bi-products

• It can be made by same or different monomers

• It has two classes

→ Synthetic polymers

→ Natural polymers

## Synthetic Polymers

### *Nylon (Common name)*

• Made with Dioic acid and Diamine

→ Dioic loses both OH

→ Diamine loses both H

• Amide linkage (C—N)

• Other name Poly Amide

• Used to make clothes, rope, tires etc

### *Terylene (Common name)*



## Synthetic Polymers (cont)

- Made with Dioic acid and Diol
- Dioic loses both OH
- Diol loses both H
- Ester linkage ( $C-\overset{\text{double bond}}{O}-O-R$ )
- Used to make cushions, mattresses etc

## Natural Polymers

### Carbohydrates

- Monosaccharides (monomers)
- Glucose - simple sugars
- Disaccharides (dimers)
- Maltose
- Sucrose
- Polysaccharides (polymers)
- Starch
- Glycogen
- Cellulose
- Glucose (loses both OH) condenses to make starch and water
- Glucosidic bond/linkage ( $\text{box}-O-\text{box}$ )

### Proteins

- Amino acids (monomer)
- Polypeptide (polymer)
- Protein
- Two amino acids (both lose H and OH) condense to make protein (poly peptide/amide) and water
- Amide linkage/Peptide linkage ( $N-\text{box}-C$ )

### Fats

- Macromolecules but not polymers
- Made by reaction of one glycerol and three fatty acids
- Glycerol loses H and Fatty acids loses OH
- Ester linkage ( $O-C-\text{zig zag}$ )
- + Protein chain continues as ( $N-\text{box}-C-N-\text{CoIBox}-C$ )

