

# NUCLEIC ACIDS

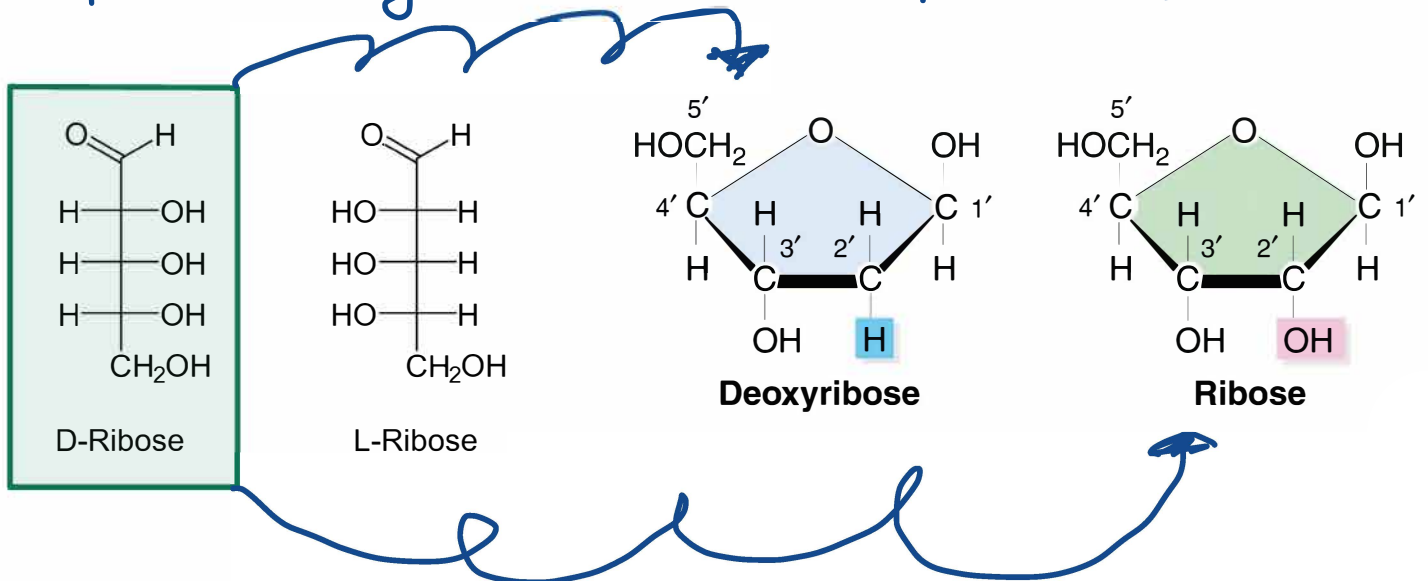
These are polymers of nucleotides present in the nucleus of the cell. These are also called polynucleotides.

- 1.) Deoxy ribonucleic acid (D.N.A)
- 2.) Ribonucleic acid (R.N.A)

## COMPOSITION OF NUCLEIC ACID

1.) Pentose sugar 2.) Phosphoric Acid 3.) Nitrogenous base

In DNA sugar present is  $\beta$ -D-2-deoxy ribose  
 In RNA, sugar present is  $\beta$ -D-ribose



Base present in Nucleic Acids are adenine (A), guanine (G), Cytosine (C), Uracil (U) and thymine (T).

In DNA  $\rightarrow$  A, G, C, T

In RNA  $\rightarrow$  A, G, C, U

## NUCLEOSIDE

$\hookrightarrow$  Sugar + Base

## NUCLEOTIDE

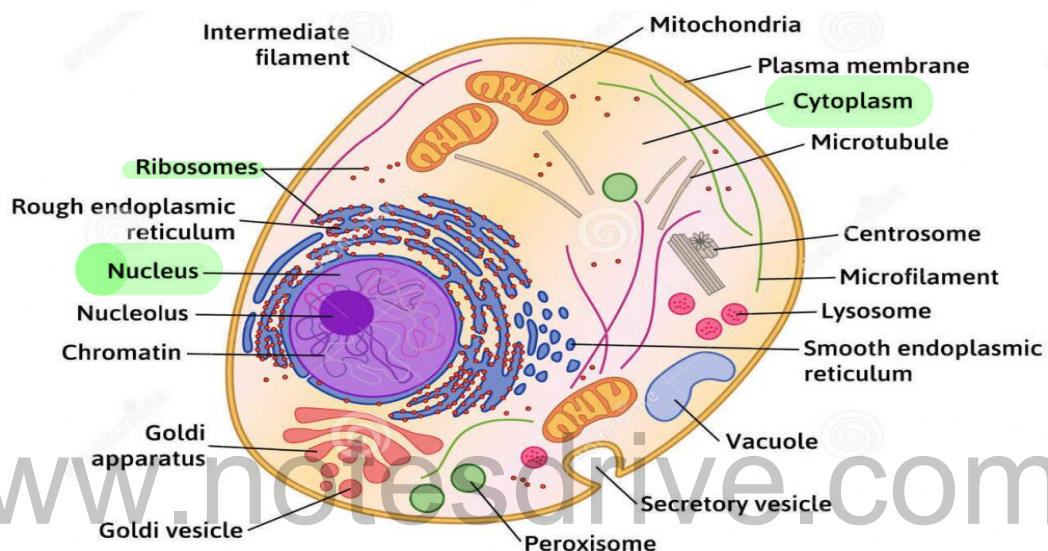
$\hookrightarrow$  Sugar + Base + Phosphoric Acid.



	Nucleoside	Nucleotide
(i)	Nucleoside is a compound formed by the union of a nitrogen base with a pentose sugar.	Nucleotide is a compound formed by the union of a nitrogen base, a pentose sugar and phosphate.
(ii)	It is a component of nucleotide.	Nucleotide is formed through phosphorylation of nucleoside.
(iii)	It is slightly basic in nature.	A nucleotide is acidic in nature.

## DIFFERENCE BETWEEN DNA & RNA

DNA	RNA
It is double stranded nucleic acid.	It is single stranded nucleic acid.
It contains deoxyribise sugar.	It contains ribose sugar.
It contains Thymine (T) as a nitrogenous base.	It contains Uracil (U) instead of Thymine.
It is the genetic and hereditary material of the cells.	It is involved in synthesis of proteins.
It is present in the nucleus of the cells.	It is present in both nucleus and cytoplasm.



# TYPES OF RNA:

(i) Messenger RNA (m-RNA)

This carries genetic code from DNA to ribosomes where protein is synthesised

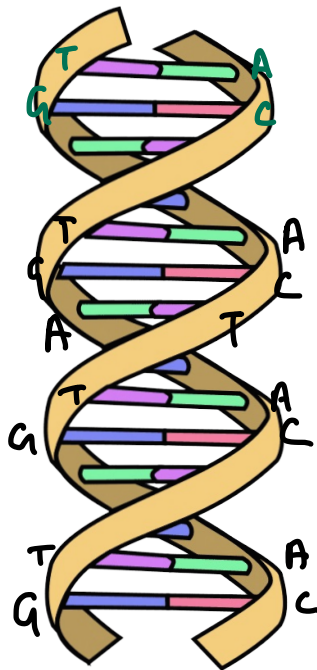
(ii) Ribosomal RNA (r-RNA)

This provide site for Protein Synthesis.

(iii) Transfer RNA (t-RNA)

This transfer amino acid from different parts of cytoplasm to ribosomes during protein synthesis

# STRUCTURE OF DNA:



DNA

Green = Adenine

Purple = Thymine

Pink = Cytosine

Blue = Guanine



Yellow = Phosphate backbone

DNA has a double helical structure with A & T and G & C linked together through two and three hydrogen bond respectively.

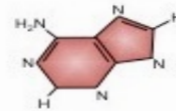
# STRUCTURE OF RNA:

Not Imp.

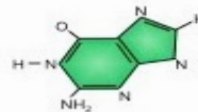


RNA

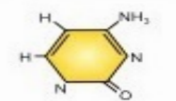
Adenine



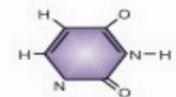
Guanine



Cytosine



Uracil

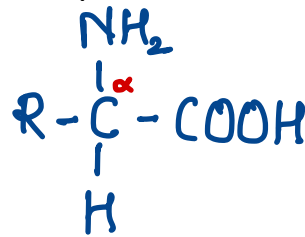


# PROTEINS

These are the biomolecules from w...  
living system made up of.

"These are the polymers prepared by the  
monomers of  $\alpha$ -amino acid by condensation polymerisation.

Str. of  $\alpha$ -amino acid.



**AMINO ACIDS** colourless, water soluble, high melting  
crystalline solids and behave like salts.

In aqueous solution carboxyl group can lose  
a proton and amino group can accept one forming  
**ZWITTER ION** (Amphoteric Nature)



except glycine (R=H) all  $\alpha$ -amino acids are optically  
active and have D and L configuration

## CLASSIFICATION OF AMINO ACIDS

### ON THE BASIS OF SOURCE

#### Essential amino acids

Which can't be synthesized in  
the body and must be supplied  
through diet.

Leucine  
Lysine  
Methionine

#### Non essential amino acids

Which can be synthesised  
in the body.

Cysteine  
Glutamate  
Glutamine

# ON THE BASIS OF NATURE

## NEUTRAL

Equal no. of amino and carboxyl gp.

e.g. Glycine, Alanine, Valine

## ACIDIC

More no. of carboxyl group

e.g. Aspartic Acid, Glutamic Acid

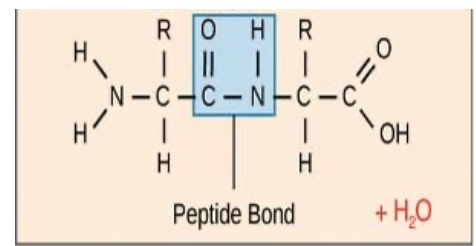
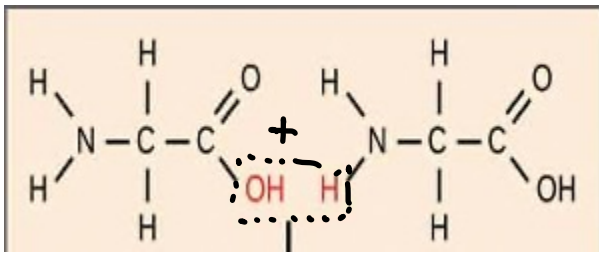
## BASIC

More no. of amino group.

e.g. Lysine, Arginine.

## PEPTIDE BOND

When two  $\alpha$ -amino acids combined together to form peptide by the elimination of water, the bond CO-NH present in peptide is known as peptide bond.



▶ Peptides are further divided into di, tri, tetra depending upon the number of  $\alpha$ -amino acid combined.

## ISOELECTRIC POINT:

The pH at which dipolar ion (zwitter ion) exists as neutral ion. i.e. +ve and -ve charge is equal and it does not migrate to either electrode is called isoelectric point.

## Primary str.

It refers to sequence of amino acid in each polypeptide chain

## Tertiary str.

It represents the overall folding of polypeptide chain i.e. further folding of 2° str.  
i) fibrous (ii) globular

## Secondary str.

It refers to shape in which polypeptide chain exist

- (i)  $\alpha$ -helix
- (ii)  $\beta$ -pleated

## Quaternary str.

It refers to spatial arrangement of subunits w.r.t each other

# Str. of Proteins

### Primary



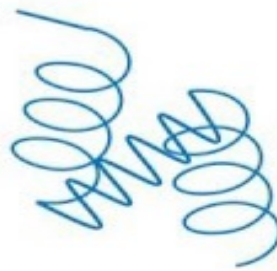
### $\alpha$ Helix



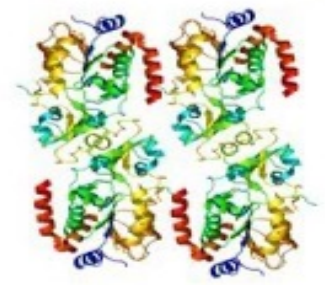
### $\beta$ sheet



### Tertiary



### Quaternary



## DENATURATION OF PROTEIN

- A protein found in a biological system with a unique 3-D str. and biological is called as **Native Protein**
- ▶ When a protein in its native form is subjected to physical change like change in temperature or chemical change like change in pH, the hydrogen bonds are disturbed due to which globules unfold and helix get uncoiled and protein loses its biological activity.

▶ During denaturation, 2° and 3° str. are destroyed but 1° str. remains intact

e.g. coagulation of egg white on boiling  
curdling of milk.

## GLOBULAR PROTIEN

- ▶ They have nearly spherical structure.
- ▶ These are soluble in water
- ▶ Have  $\alpha$ -helix str.
- ▶ Insuline, albumin

## FIBROUS PROTIEN

- ▶ They have linear thread like str.
- ▶ These are insoluble in water
- ▶ have  $\beta$ -pleated str.
- ▶ Keratin (hair, wool, silk)  
myosin (muscles)

## CARBOHYDRATES

These are optically active polyhydroxy aldehydes or ketones

General formula :  $C_x(H_2O)_y$

## CLASSIFICATION ON THE BASIS OF HYDROLYSIS

### MONOSACCHARIDES

Cannot be hydrolysed further  
eg glucose, fructose, ribose etc

### OLIGOSACCHARIDES

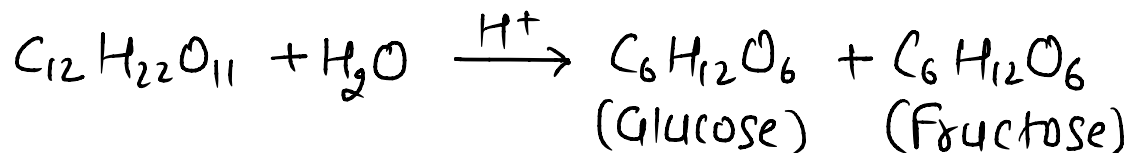
Give 2-10 molecules of monosaccharides  
eg Sucrose, maltose

### POLYSACCHARIDES

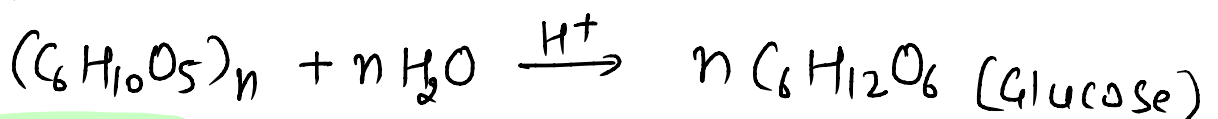
Give large number of monosaccharides  
eg starch, cellulose

## PREPARATION OF GLUCOSE

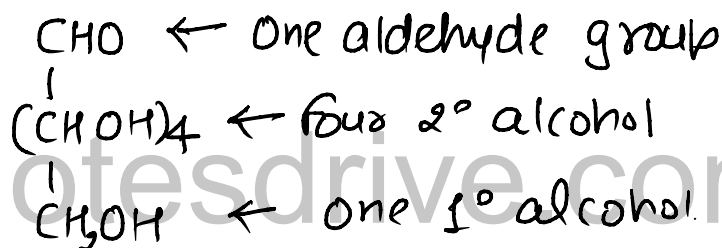
From Sucrose



From starch



## STRUCTURE



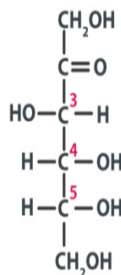




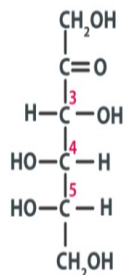
## Fischer Projection

## Haworth Projection

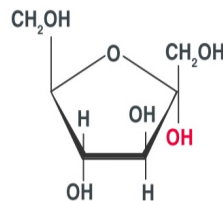
Str. of fructose



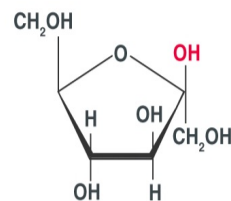
D- Fructose



L- Fructose

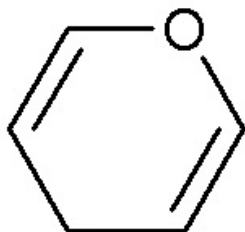


$\alpha$ -D- Fructose

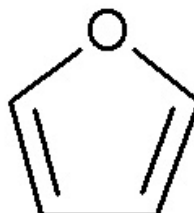


$\beta$ -D- Fructose

Six membered  
Cyclic ring



Pyran



Furan

five member  
Cyclic Ring

## Reducing Sugars

- Free aldehydic or ketonic group
- Reduce fehling sol<sup>n</sup> and Tollen's Reagent.
- Maltose and Fructose

## Non Reducing Sugars

- Do not have free aldehydic or ketonic gp.
- Do not reduce fehling sol<sup>n</sup> and Tollens Reagent.