

Weak1

Bio chemistry

Bio chemistry :- Chemistry that deal with chemical compound in human body , that include:

1- Carbohydrate 2- Lipid 3- Protein 4- Nucleic acid

5- Enzymes 6- Hormones 7- Vitamins

Compound in human body:-

*****:- Human body consist from 65% water and 35% chemical Substance , that contain organic and inorganic compound .

Organic compound

Inorganic compound

Nitrogenous

Non – Nitrogenous

Water

Salts

Protein

Lipids

(O,N,-----, ect)

Some lipid

carbohydrates

(urea, creatinine, glycerol, -----ect

Amino saccharides-----ect)

Weak (2 - 3)

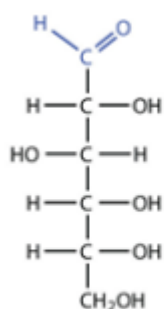
1)- Carbohydrates

***** :- Are poly hydroxy aldehyde or poly hydroxy ketene , carbohydrates

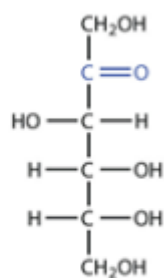
As an important source for energy for activates , or define as carbon compounds that contain

Hydrogen and oxygen in the ratio of (2:1) as in water , the empirical formula is $C_n(H_2O)_y$

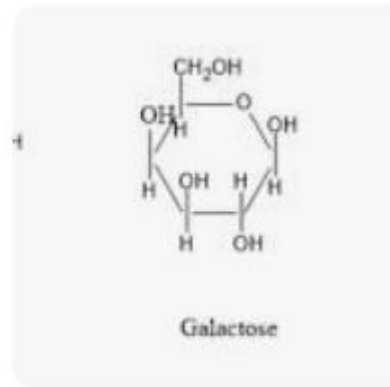
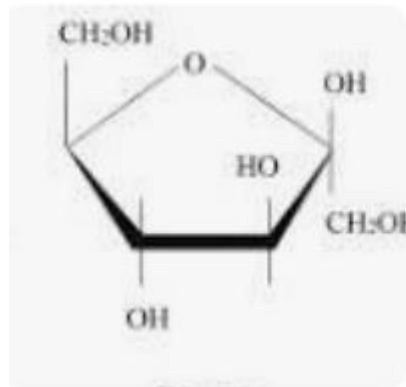
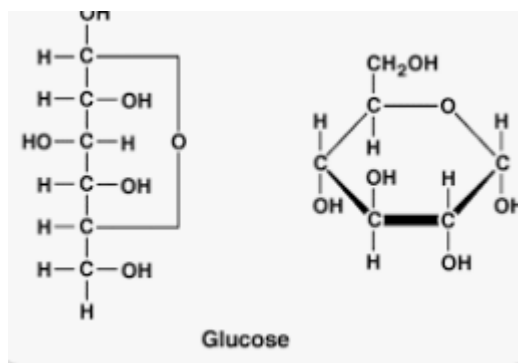
Such as:-



Glucose
(an aldohexose)

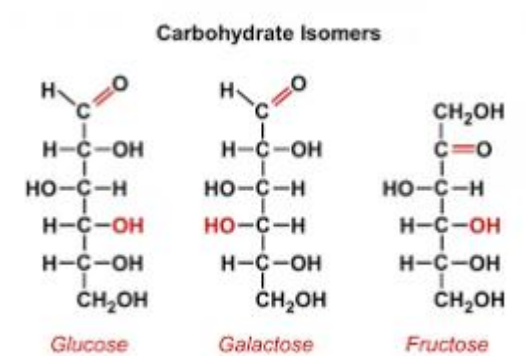


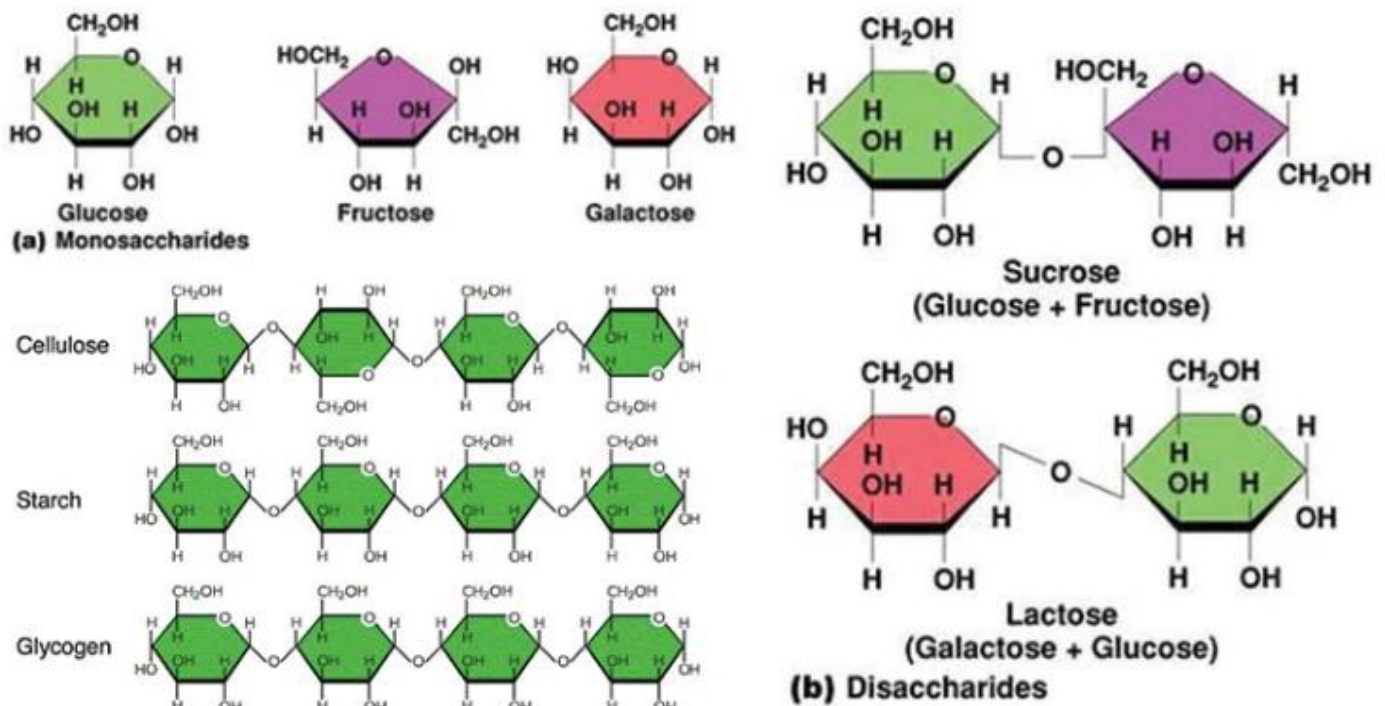
Fructose
(a ketohexose)



Carbohydrate isomers and stereochemistry

Carbohydrate isomers and stereochemistry





Carbohydrates classified into:-

- 1- Mono saccharides.
- 2- Di saccharides.
- 3- Oligo saccharides.
- 4- Poly saccharides.

Mono saccharides:-

***** It is the simplest carbohydrate which cannot be split by hydrolysis ,

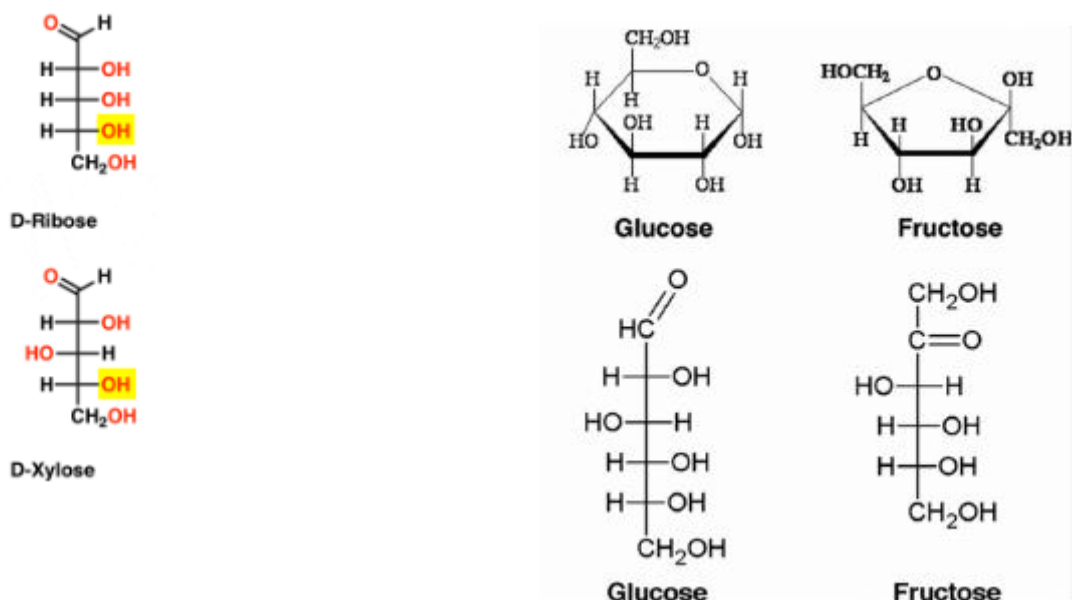
Classified into:-

- 1- According to the carbon atom ($N \geq 3$) like:-

C3 = Triose C4 = Tetrose C5 = Pentose C6 = Hexoses

**Pentoses like (Ribose , Xylose)

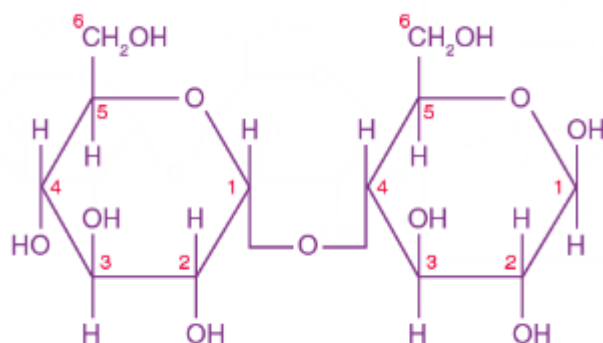
** Hexoses like (glucose , fructose , mannose , galactose)



Di saccharides

*****:- The sugar that consist from (2- molecules) of the same or different Mono saccharides combination by glycosidic bond such as:-

1- Maltose -----> glucose + glucose

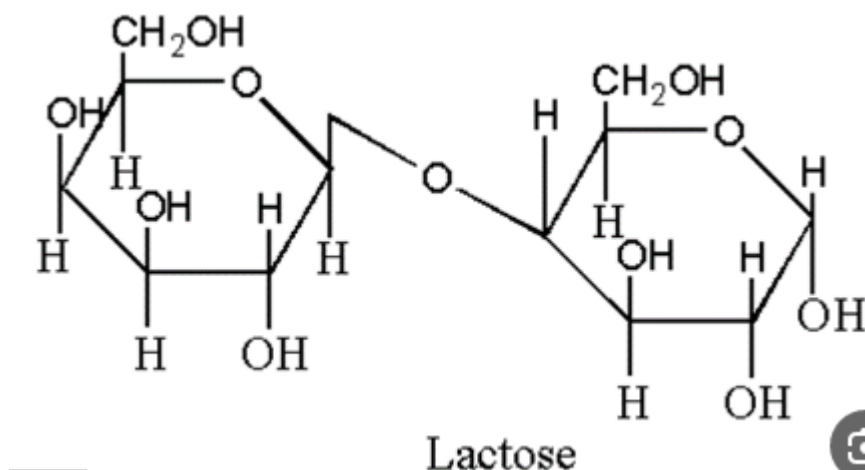


Maltose

β- Maltose

2- Lactose -----> glucose + galactose

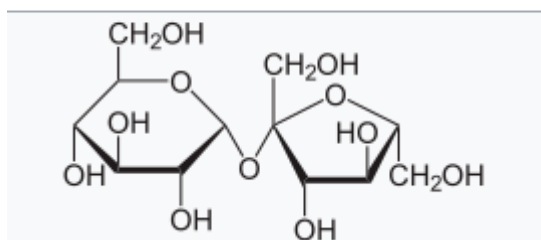
3- Sucrose -----> glucose + fructose



Lactose

β- Lactose

Sucrose



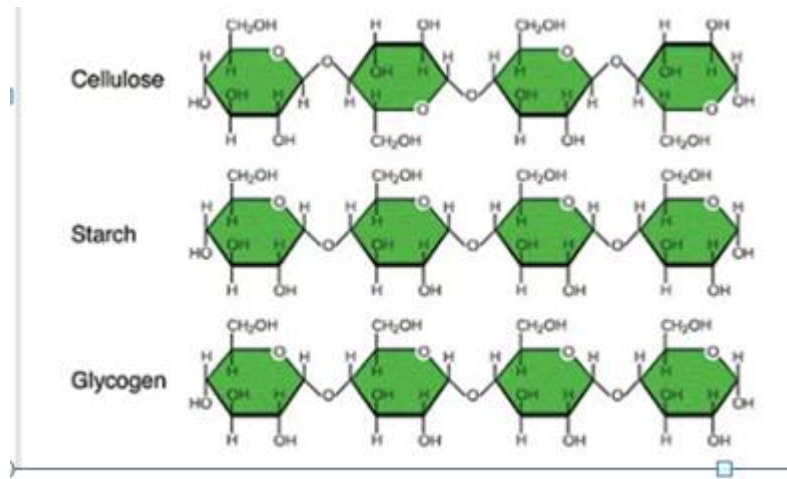
β- Sucrose

Oligo saccharides

*****:- Saccharides that consist from (2-10) molecules of mono saccharides.

Poly saccharides

*****:- Yield more than (10 –molecules) of mono sacchadides such as (starch, Glycogen , cellulose) it has biological & clinical importance , the main unite of starch consist From (amylase & amylopectin) found in plant , while the glycogen found in all animals , cell, Occurring in liver.



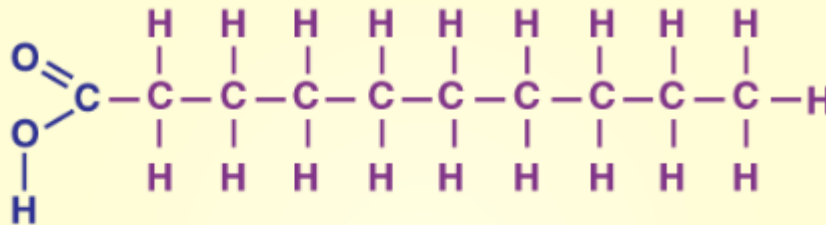
Carbohydrates classified into:-

Wea; (4 - 5)

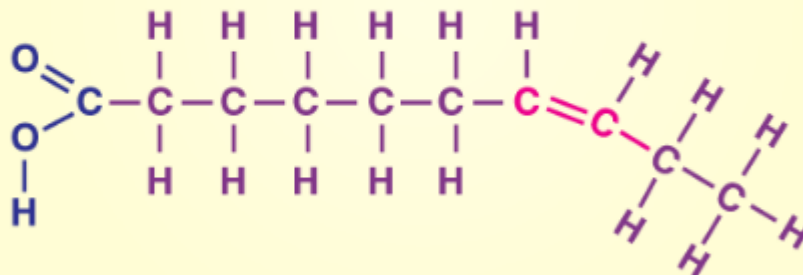
Lipids

***** they are esters of fatty acid are characterized by their insolubility in water but soluble in organic solvent like (ether , chloroform , CCL₄ , benzene , ---ect) the term lipid is used to describe naturally compounds like (fatty acid , oily , waxy) substance of animals or vegetable origin.

(a) Saturated



(b) Unsaturated



Lipid Structure – Saturated and Unsaturated Fatty Acids

Classification:-

1- Simple lipids :- ester of fatty acid with various alcohols;

a- Fats & Oil :- ester of fatty acid with glycerol(glycerides)

b – Waxes :- ester of fatty acid with mono hydroxyl eliphatic alcohol.

2- Compound lipids

***** :- ester of fatty acid of alcohol which also contain other group:

a- phospho lipids .

b- glyc lipids .

c- sulfo lipids.

d- lipo proteins.

e- lipo poly saccharides.

3- Derived lipids

***** :- substances derived from the above group by hydrolysis , they include :

a- fatty acid (saturated & un saturated(

b- alcohols like (glycerol)

c- hydrocarbons.

d- steroids like cholesterol.

Fatty acids

***** :-Higher number of carboxylic acids which can be linear molecules like plasmatic Acid (16- carbon atom) or branch chains.

Introduction of double bonds lead to un saturation the degree of un saturated give rise to

Three classes of lipids of physiological importance , there are:-

1- Oleic acid [$C_n H_{2n-1} COOH$]

2- Linoleic acid [$C_n H_{2n-3} COOH$]

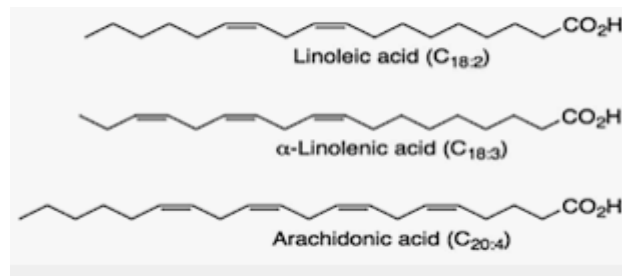
3- Linolenic acid [$C_n H_{2n-5} COOH$]

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Essential fatty acids

***** :- There is fatty acids required from human and animal and cannot be Industries in the body but in take from diet , these are :-

- 1- Linoleic acid ($C_{17}H_{31}COOH$)
- 2- Linolenic acid ($C_{17}H_{29}COOH$)
- 3- Arachidonic acid ($C_{19}H_{31}COOH$)



Hydrogenation

***** :- The difference between the fats and oils that the ratio of unsaturated fatty acid in molecules of glyceride, therefore the oils can be converted into saturated fatty acid. In the presence of catalysts, this process is called (hydrogenation) which the liquid oils are converted into solid fats.

Weak (7 - 9)

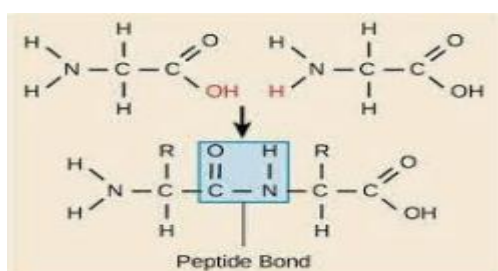
Proteins

*****:- Proteins are complex organic nitrogenous substances (Bio chemical compound) found in the cells of all animals and plants, the proteins have molecular weight approximately 5000 to many millions, all proteins contain C, H, N, O & S, or can be defined as poly amino acids.

Peptide bond

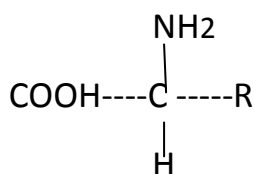
***** :- Amino acids can react one to another to form a peptide by linkage of the amino group with a carboxyl group from another, the amino acids (A.A) are bonded to each other.

By peptide bond to form proteins, therefore (A.A) is the unit building of proteins.

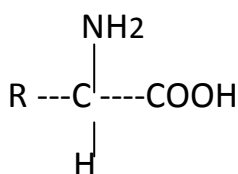


Amino acids

***** :- Amino acids contain an asymmetric carbon atom (α-carbon atom), therefore they form isomers called D & L isomers.



L- amino acid



D – amino acid

General properties of amino acids

***** :-

1- Amino acids are present as free in the cells and bonded to each other to form protein.

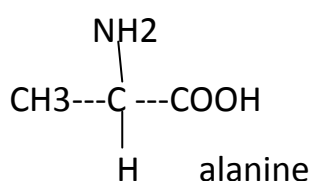
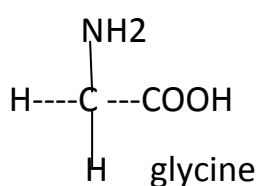
2- Proteins are different in physiological function .

3- Amino acids contain asymmetric carbon atoms because carbon atom conjugate with (H , R , NH₂ , COOH).

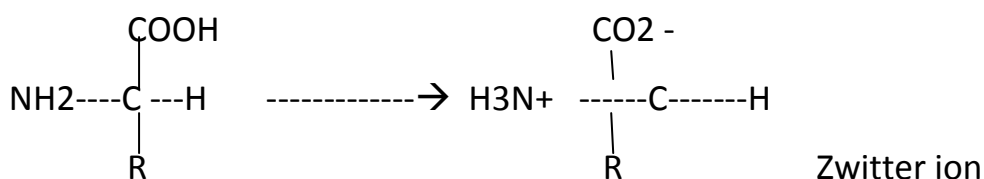
4- Amino acid contain both acidic carboxyl group (---COOH) basic group (---NH₂)

The simple amino acid is (glycine) , while when instead H in R alkyl group amino acid

Become



5- amphoteric behavior in PH=7 ,the CO₂H dissociated into (CO₂ + H) & (NH₂) takes that proton to give dipolar ion or Zwitter ion



Classification of proteins

*****:- Proteins can be classified according to the solubility and chemical Structure into

1- Fibrous proteins :-This protein insoluble in water and classified into :-

a- collagen b- Elastin c- Keratin

Globular protein

***** :- This protein soluble in water and aqueous medium contain salt , base & ethanol are include :-

a- Albumin.

b- Globulin.

c- Histon.

d- Protamin.

Conjugated protein

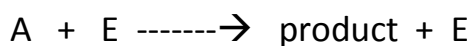
*****:- This protein bond with another substance , there are :-

- a- Nucleo protein .
- b- Muco protein.
- c- Lipo protein.
- d- Glyco protein.

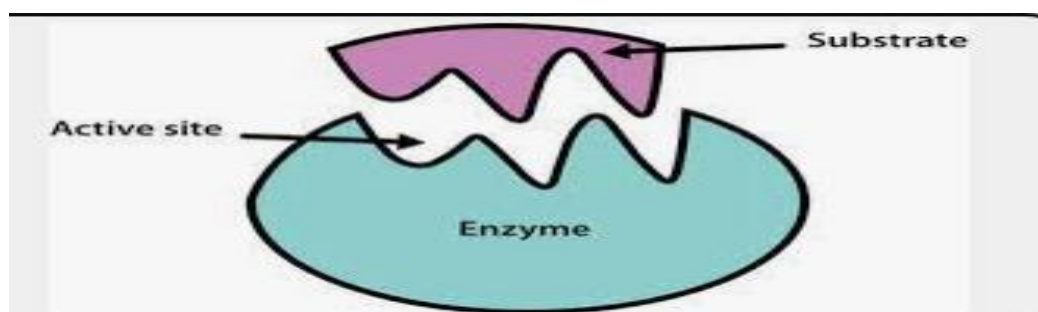
Weak 10

Enzymes (E)

***** :- Are soluble organic biochemical catalyst produced by living tissues which Increase the rate of bio chemical reaction without being used up or appearing as reaction Product.



** All enzymes isolated have been protein.



- Nature of enzymes
***** Enzymes are organic catalyst that have many properties seme As properties of inorganic factors.

Nomenclature of (E)

***** :- Adding suffix (ase) after the name of substrate [S] that which (substance it acts upon) like :-

Substrate	Enzyme
Protein	Proteinase
Carbohydrate	Carbohydratase
Urea	Urease
Lactose	Lactase
Ect.	Ect.

Classification

***** :- Enzymes are classified into six group:-

- 1- Oxido reductases.
- 2- Transferase.
- 3- Hydrolase.
- 4- Lyases.
- 5- Isomerase.
- 6- Ligases (synthetases) ATP.

Factor effecting of rate enzymic reaction

***** :-

- 1- Temperature :- rate of enzymic reaction increase with increasing temp.
- 2- Optimum PH :- which that increase activity of enzyme.
- 3- Concentration of enzymes :- the rate increase by increasing conc. Of (E).
- 4- Concentration of substrate :- at constant PH , temp., conc. Of (E) the rate of reaction Will be effected by changing conc. Of (S).

CO- Enzyme

***** :- All enzymes are substance (protein) found in all living tissues most of this Found as binding with non- proteinous substance that consist from two molecule (apo-enzymes) this part regarded protein and the second part as metal called (activators) , we think that metal lead to bind the substrate to enzymes, or the Part is non-protein regarded organic compound that not strong binding with Apo-enzyme that called (CO- enzymes).

Inhibitors

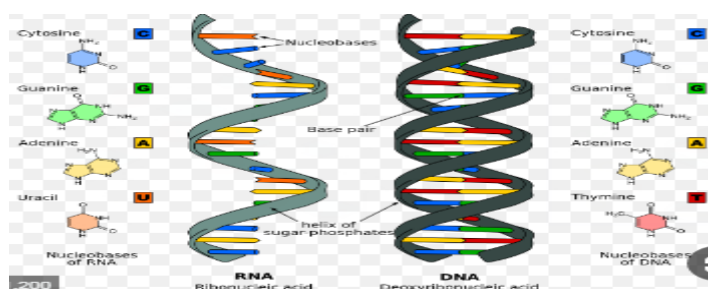
***** :- With close structural similarities of substrate tend to be bound to the substrate Binding site, when react with enzyme due to inhibition and lost of all activity.

Weak(11 - 12)

Nucleic acids (RNA , DNA)

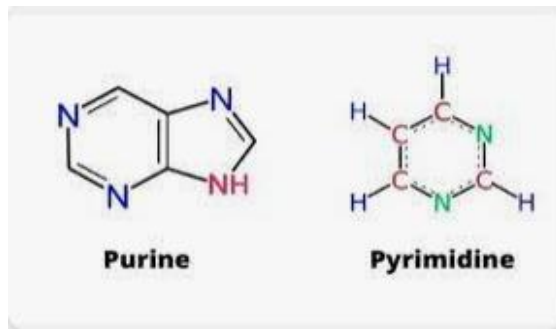
***** :- The nucleic acids DNA ,RNA are poly nucleotide the monomer Units (nucleotide) are made up of three types are:-

- 1- A purine or pyrimidine (base) that structure:-
- 2- A sugr , either D- ribose or D-2, deoxy ribose .
- 3- phosphoric acid.



Nitrogenous bases

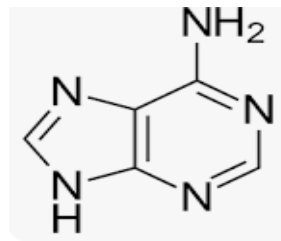
***** :- Are compound that contain Nitrogen element and presence in Nucleic Acid combine with pentoses & phosphoric acid , then presence into (purine & pyrimidine),
Purine = (pyrimidine + Imidazole).



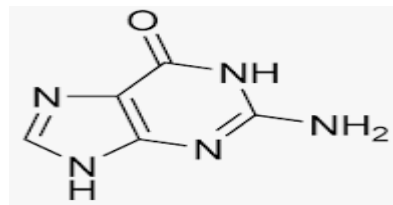
The type of purine are

-----:-

1- Adenine (6- amino purine)



2- Guanine (2- amino, 6- oxy purine)

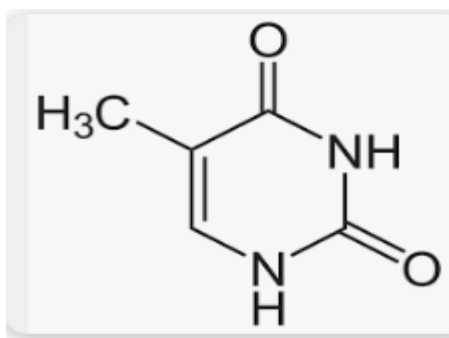


While type of pyrimidine are :-

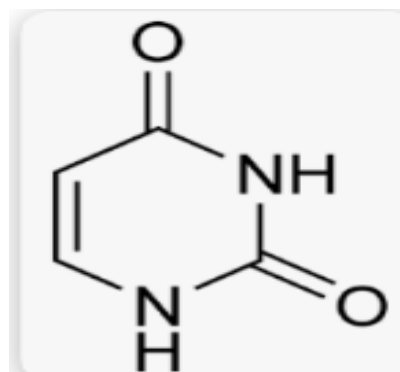
1- Thymine (5- methyl, 2,4-dioxy pyrimidine) presence in DNA.

2- Uracil (2,4- dio pyrimidine) presence in RNA.

3- Cytosine (2- oxy amino pyrimidine)

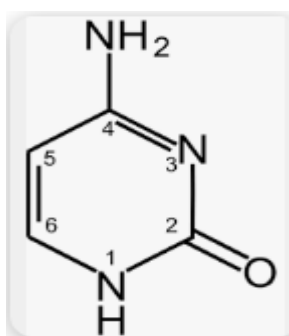


Wikipedia 
Thymine - Wikipedia



Simple Wikipedia 
Uracil - Simple Engli...

cytosine

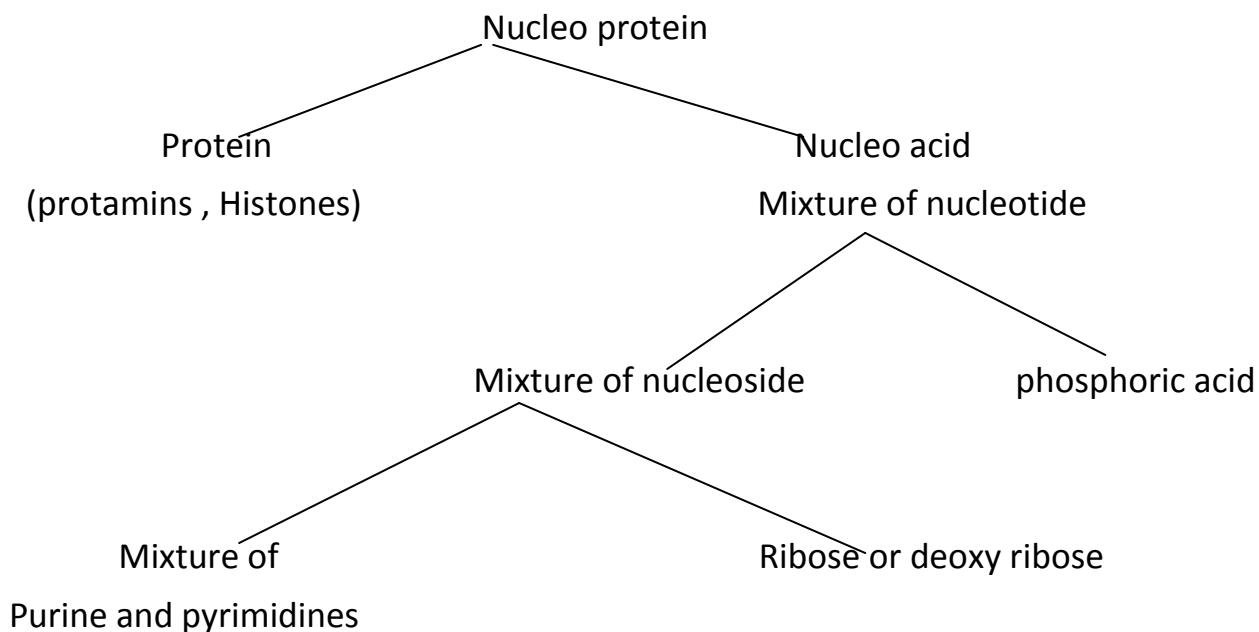


DNA ----- (adenine , guanine , thymine , cytosine).

RNA ----- (adenine , guanine , uracil , cytosine).

Analysis of Nucleo proteins

*****:-



Weak(13 - 15)

Hormones

***** :- The term (Hormones) called to chemical substance that secreted (endocrine glands) carried through the blood stream to another body where they exert their Action.

Properties

***** :-

- 1- Hormones synthesized and carried to the blood stream in small amount (10 gm/100ml).
- 2- The range of secreted hormone depend on needed to their hormone.
- 3- Hormones stores inside the glands.
- 4- Secreted to the blood stream under active effect like (insulin).
- 5- Hormones not effect on cells which that secreted .
- 6- Hormones specific action & physiological function.

Hormones classification

***** :- Hormones can be classified into three groups:-

1- Proteinous hormones :- produced by pancreas, parathyroid gland, pituitary gland.

2- Amino acid derivatives :- produced by thyroid gland like (thyroxin).

3- Steroidal hormones :- include steroid nuclei like (adrenal cortical hormones).

Note// The function of pancreas in (Islets Langerhans) contain three types of cell (α , β ,)

-(β - cell) secretes (Insulin) which lead to decrease the sugar level in blood ,while the

(α - cell) secretes (glucagon) which increase the sugar level in blood.

vitamins

***** :- Are organic compound are also necessary for the growth & health , occurring
In natural food which are required in minute amount for normal growth most
Of the vitamins are supplied by the diet .



The vitamins have been classified into :-

1- Fat soluble vitamins :- they are soluble in fat solvent vitamin in this group are(A , D , E & K)

2- Water soluble vitamins :- They are water soluble and include ;-

a- Vitamin C (ascorbic acid) deficiency of Vitamin(C) causes scurvy disease .

b- Vitamin of B – complex :-

- Thiamine (B1) causes Beri – Beri disease
-
- Riboflavin (B2)
-
- Nicotinic acid (B5)
-
- Pyridoxine (B6)
-
- Biotin (B9)
-
- Folic acid

Deficiency of V (A) causes night blindness.

= of V (D) give rise to rickets in children .

= of V (E) give rise to chronic xanthomatous cirrh

= of V (K) causes to hemorrhagic disease of new born

