

# Nucleic Acid

Nucleic acids are long chain biopolymers having a complex structure. It is polymer of nucleotide. It is found in nucleus of the living cells in the form of nucleoproteins (i.e., proteins containing nucleic acid as the prosthetic group.)

Nucleotide - A nucleotide is composed of pentose sugar, heterocyclic nitrogenous base and phosphate group. i.e.,

Base + Sugar + phosphate = Nucleotide.

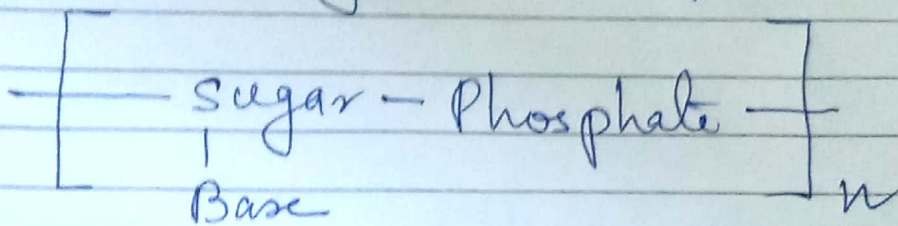


Fig: Simple representation of polymeric chain of nucleic acid.

On hydrolysis nucleic acid gives :

- i) ~~Nitro~~ Heterocyclic nitrogenous base
- ii) Pentose sugar and
- iii) Phosphate group.

Nucleoside - By removal of phosphate group from ~~nucleotide~~ nucleoside nucleotide, the compound obtained is called nucleoside. i.e.,

Base + Sugar = Nucleoside.

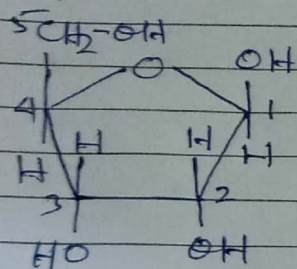
Teacher's Signature \_\_\_\_\_



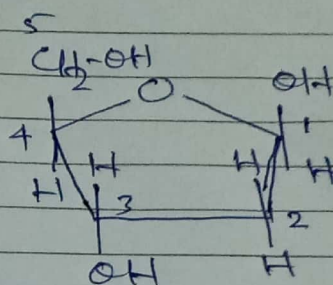
Sugars - Two types of sugars have been isolated from the hydrolysis of nucleic acids. Both of these are pentoses in furanose form.

i)  $\beta$ -D(-)-ribose

ii)  $\beta$ -D(-)-2-deoxyribose.



$\beta$ -D(-)-ribose  
sugar



$\beta$ -D(-)-2-deoxyribose  
sugar

Bases - Two different class of heterocyclic nitrogenous bases have been isolated from the hydrolysis of nucleic acids.

i) Purine - Two most commonly found.

ii) purine bases in nucleic acid are:

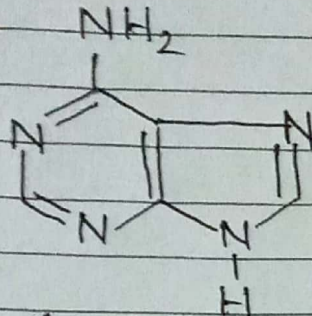
a) adenine (A) and (b) Guanine (G)

ii) Pyrimidine - Three most commonly found pyrimidine bases in nucleic acid are:

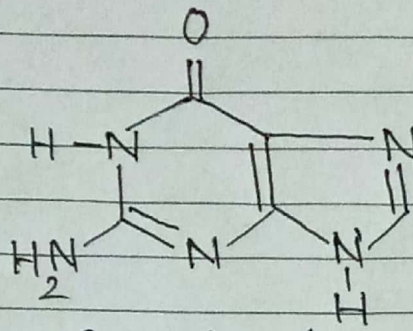
(a) Uracil (U), (b) Thymine (T) and (c) Cytosine (C)

Teacher's Signature \_\_\_\_\_



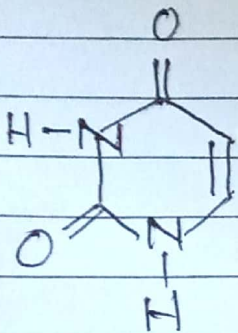


Adenine (A)

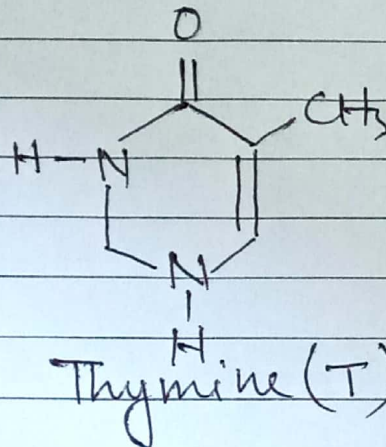


Guanine (G)

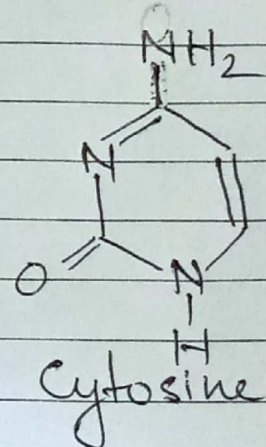
Purine base



Uracil (U)



Thymine (T)



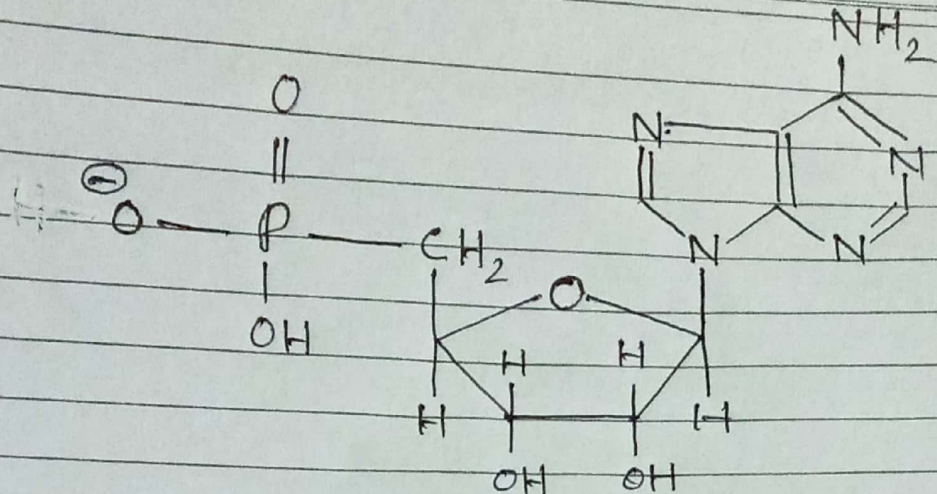
Cytosine (C)

Pyrimidine bases.

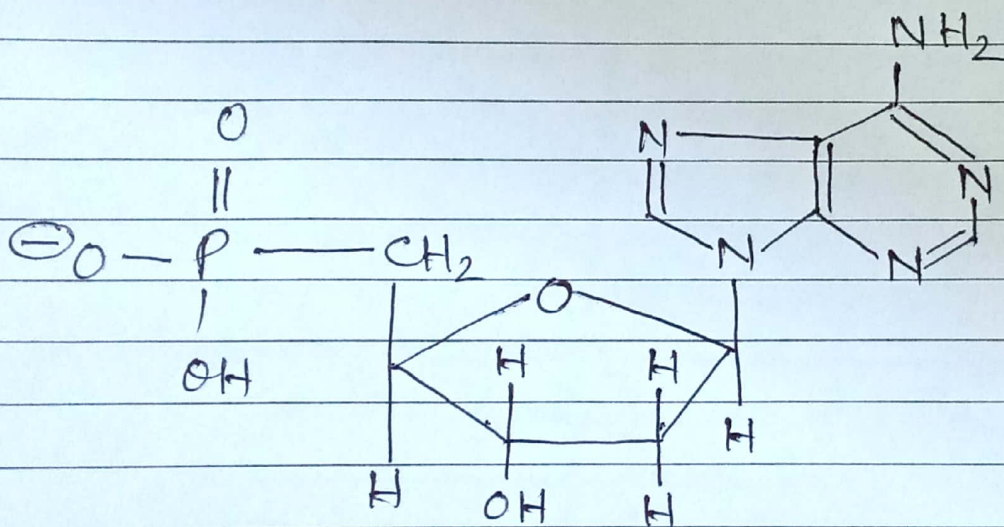
Nucleotides - Nucleotides are abbreviated by three capital letters, preceded by d- in case of deoxy series. Example -  
 AMP → Adenosine monophosphate  
 dAMP → Deoxyadenosine monophosphate  
 UDP → Uridine diphosphate  
 ATP → Adenosine triphosphate.

Teacher's Signature \_\_\_\_\_





Adenosine monophosphate (AMP)  
or Adenosine ribosephosphate



Adenosine deoxymonophosphate (dAMP)  
or Adenosine deoxyribose phosphate

Teacher's Signature \_\_\_\_\_



## Classification of nucleic acids.

Depending upon types of sugar present, nucleic acids are classified as:

- 1) Deoxyribonucleic acid (DNA)
- 2) Ribonucleic acid (RNA)

## Difference between DNA and RNA.

### DNA

### RNA

1) It is a high molecular weight nucleoprotein. Its weight vary from 6 million to 16 million.

It is relatively a smaller molecular weight protein. Its weight vary from 20 thousand to 40 thousand.

2) It contains deoxy ribose sugar

It contains ribose sugar.

3) It contains Adenine (A), Guanine (G), Cytosine (C) and Thymine (T) bases.

It contains Adenine (A), Guanine (G), Cytosine (C) and Uracil (U) bases.

4) It has double strand structure coiled spirally.

It has single strand structure coiled itself.

5) It is a store house of genetic information and controls the transmission of heredity.

It controls the protein synthesis.

6) It has unique property of replication.

It does not replicate.

7) It mainly occurs in the nucleus of the cell.

It mainly occurs in <sup>the</sup> cytoplasm of the cell.

Teacher's Signature