LIPIDS :→ Lipids is a category of cellular components that are water-insoluble but which can be extracted from the cell with organic solvents like ether, benzene and chloroform. A major part of a lipid extract however consists of substances that on hydrolysis yield long-chain aliphatic acids with no aromatic ring called fatty acids

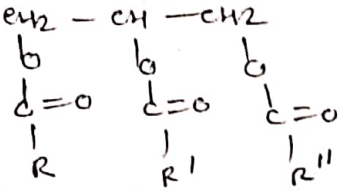
① Simple lipids – include fats. ie esters of fatty acid and glycerol, $CH_2OHCHOHCH_2OH$, and waxes. in which fatty acids are esterified, un-esterified with alcohols of high M.W.

② Compound lipids – this includes fatty-acid esters of sugar molecule and mineral in which glycerol is esterified with fatty acid and phosphoric acid.

ie the most abundant unsaturated fatty acid..

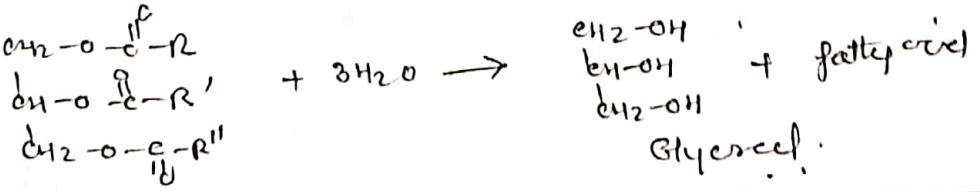
$$RCH=CH(CH_2)_7COOH.$$

ie. Nearly 10% of the body weight of a mammal may be in the form of fats, or triglyceryl esters of fatty acid..



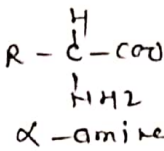
Waxes are also esters of fatty acids, but the alcohol is a long chain ($\sim C_{30}$) aliphatic primary or secondary alcohol.

$$CH_3(CH_2)_{14}-\overset{O}{\overset{\|}{C}}-OH(CH_2)_{29}CH_3.$$

ie 

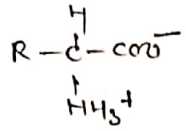
PROTEINS :→ Proteins constitute most of the noncarbon components of the cell. Enzyme molecules, which are such specific catalysts for the many synthetic and degradative reactions of the life cycle, are proteins as are many of the regulatory hormones. Proteins are components of the peri- and intracellular membranes, serve as antibodies to foreign antigens, transform the oxygen carrying protein in the blood, and constitute some of the chromosomal material. Thus the transmission, regulation and reproduction of living things are dominated by proteins..

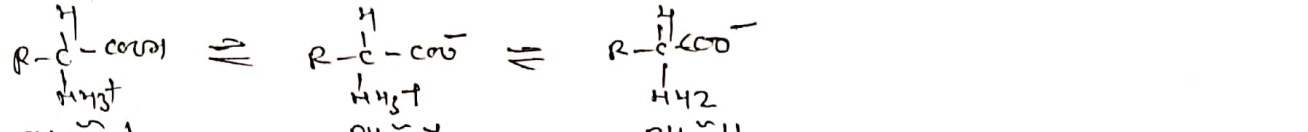
Proteins are polymers of α-amino acids.



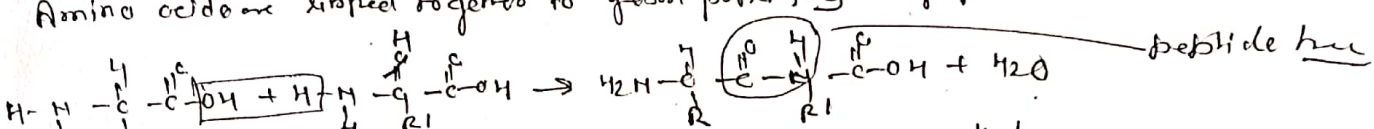
α-amino acid.

There are 20 amino acid that occurs in protein molecule, and the individual properties of these acids are dictated by the nature of the R groups.





Amino acids are linked together to form protein by the peptide bond.



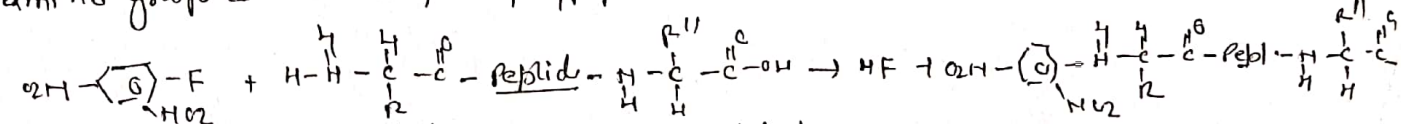
Amino acids:

Amino acid

Some Proteins:

Glycine, Alanine, Valine, Leucine, Isoleucine, Serine, Threonine, Tyrosine

Primary Protein Structure → One of the important reagents used is dinitrofluorobenzene. This molecule attaches itself to the free amino group at the end of a polypeptide.



N-terminal acid

C-terminal acid

NUCLEIC ACID → Biologists have long known that genetic information is carried by structures called chromosomes, which are located in the nucleus of the cell and chose subunits are the genes. It is known that genes are made up of the macromolecule deoxyribonucleic acid (DNA), and that this molecule carries the information needed to direct protein synthesis, and that it preserves and transmits this information during cell division. Another molecule RNA

is present throughout the cell, and is even more directly involved in protein synthesis. Nucleic acids are polymers in which the repeating units are sugar molecules linked by phosphate bridges. (3)

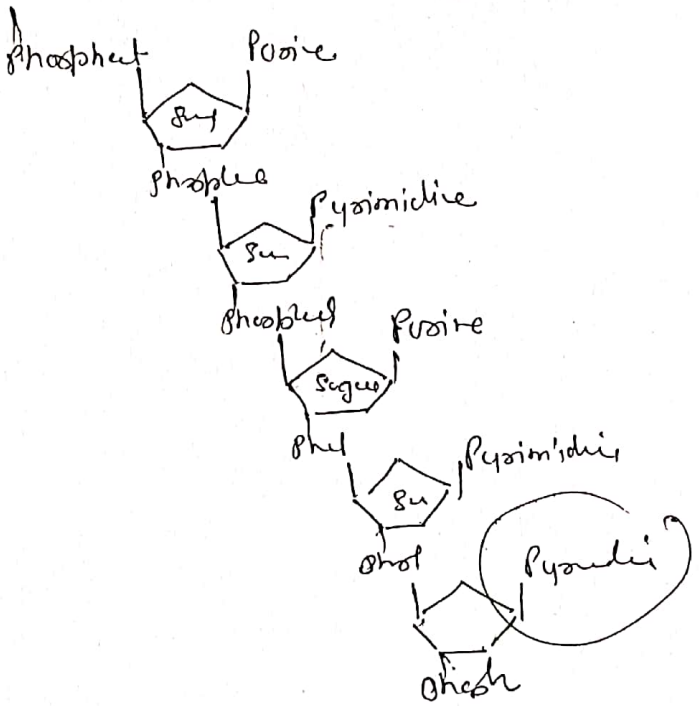
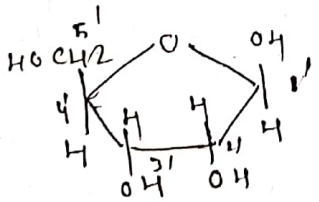
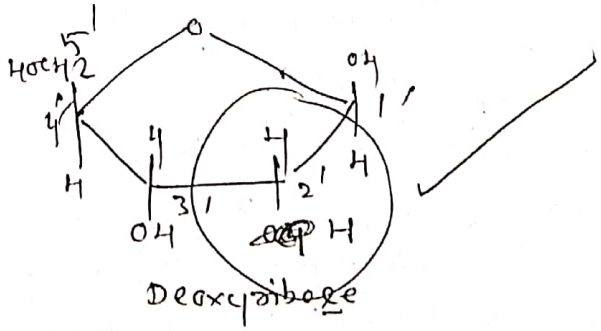
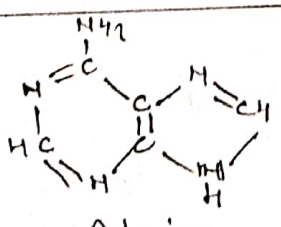


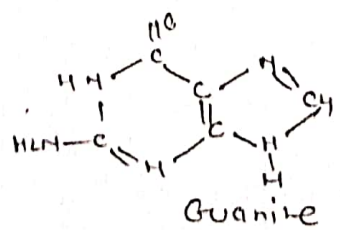
Fig Basic structure of RNA and DNA.

In ribonucleic acid the sugar is ribose, and in deoxyribonucleic acid the sugar is deoxyribose.

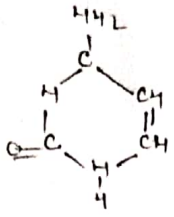




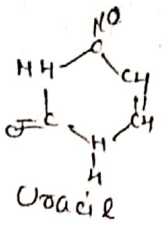




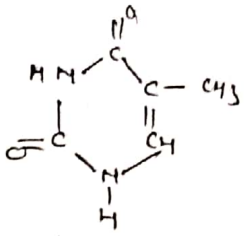
(a) Purine



Cytosine



Uracil

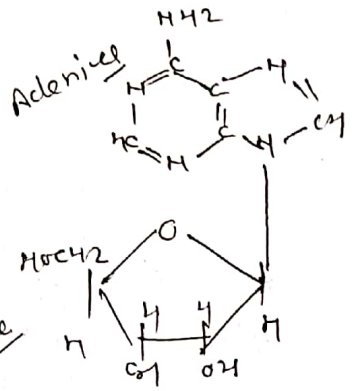


Thymine

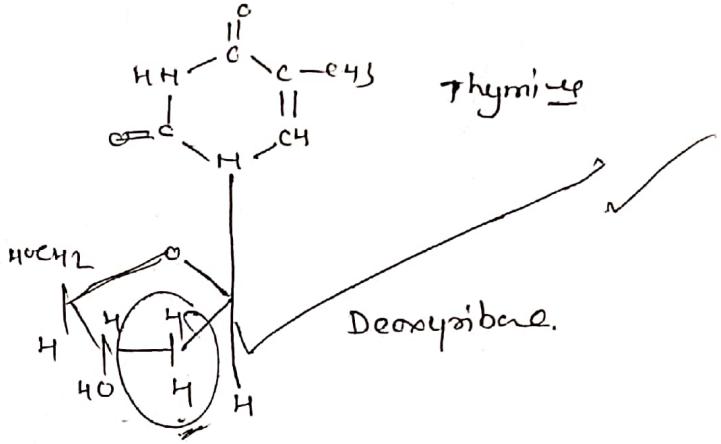
(b) ⇒ Pyrimidine bases

Ans → Structure of the (a) Purine and (b) Pyrimidine bases found in DNA and RNA :

The base uracil occurs only in RNA, thymine is found in DNA. Cytosine is present in both nucleic acids. The two purine bases, adenine and guanine, occurs in both DNA and RNA. A sugar molecule combined with a purine or pyrimidine base makes up a unit called a nucleoside.



Adenosine



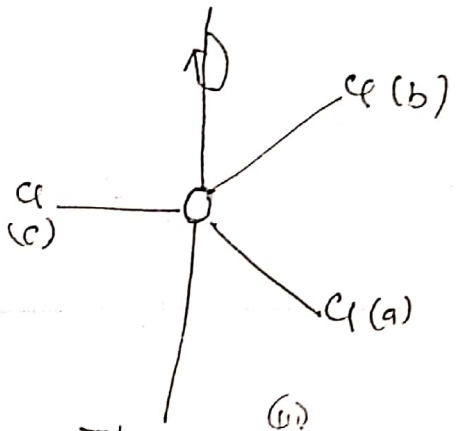
Deoxythymidine.

Genome : → In genetic code, there are only four different kinds of bases in DNA molecules, and that the sequence of these bases must be able to determine uniquely the sequence of 20 amino acids in a protein chain. Since there are fewer types of bases than amino acids, various groupings of bases must constitute the genetic code "words" for the different acids. How many bases are necessary to make up a code word

(ii) Consider the molecule of BCl_3, ie. triangular plane. If we choose an axis normal to the plane of molecule and passing through the boron atom will generate an equivalent appearance after every rotation of 120°. Thus this axis is 360/120 = 3 fold axis and there are three such 2 fold axis. (ii)

(iii) $PtCl_4^{2-}$ — four fold axis.

(iv) In case of benzene, there is six fold axis of rotation passing through centre of symmetry, six fold axis means the original appearance is repeated after an angle of 60°. A hexagonal crystal has six fold axis of symmetry.



(v) Three fold axis of symmetry

. In general, if the same appearance of a crystal is repeated on rotating through an angle of 360°/n around an imaginary axis, the axis is called an n-fold axis. The axis of symmetry can be denoted by rotation C_n, where n is the order of axis.

Order of Axis (n)	Type of Axis	Degree of rotation	Symbol.
1	Identity	360	I or E
2	Two fold	180	C_2
3	Three fold	120	C_3
4	Four fold	90°	C_4
6	Six fold.	60	C_6

(vi) Centre of Symmetry :— It is point at the centre of the crystal so that any line drawn through it will meet the surface of the crystal at equal distances on either side. It is noteworthy that a crystal may have a number of planes of symmetry or axis of symmetry but it can have only one centre of symmetry.