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① Proteins, carbohydrates, nucleic acids, and certain important biomolecules are collectively referred to as macromolecules.
In DNA double helix, the backbone of the strands consist of deoxyribose sugar and phosphate groups. They are linked by phosphodiester bonds.
A glycosidic bond is present in disaccharides and polysaccharides (for eg glucose).
Proteins consist of polypeptides as they are polymers of amino acids. The amino acids are linked through peptide bonds.

② Stereoisomers are the isomers that have the same composition (that is, the same parts) but that differ in the orientation of those parts in space. There are two kinds of stereoisomers enantiomers and diastereomers. Enantiomers are mirror images like one's hands and diastereomers are everything else. There is also a special kind of stereoisomer, that is called conformational isomer.

③

Abbreviation	Amino Acid
Y	Tyrosine
K	Lysine
W	Tryptophan
D	Aspartate

(4) Disulphide bond formation involves a reacti between sulphydryl (S-H) side chains of two cysteine residues: an S- anion from one SH group acts as a nucelophile, attacking the side chain of a second cysteine to create a disulfide bond, and in the process releases electrons to transfer.

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(5) An antigen - presenting cell (APC) is an immune cell that detects, engulfs, and informs the adaptive immune response about an infection. When a pathogen is detected, these APCs will phagocytose the pathogen and digest it to form many different fragments of the antigen.

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(6) Denaturation involves the breaking of many of the weak linkages or bonds (e.g hydrogen bonds) within a protein molecule that are responsible for the highly ordered structure of the protein in its natural state. Denatured proteins have a looser, more random structure. most are insoluble.

(7) A chiral center is defined as an atom in a molecule that is bonded to four different chemical species, allowing for optical isomerism. It is a stereocenter that holds a set of atoms in space such that the structure may not be superimposed on its mirror image.

(8)

Primary	Secondary
• It refers to any immune response of the immune system that includes the production of anti-bodies or cell-mediated immunity.	• It refers to any immune response of the immune system that occurs in response to the subsequent exposure to a particular antigen.
• It occurs in response to the primary contact of the antigen.	• It occurs in response to the second and subsequent exposure to the same antigen.
• It takes a longer time to establish the immune response	• It takes a short time to establish the immune response

(9) Memory cells or Memory B lymphocytes are the cells involved in the secondary innate humoral immune response. They also, like other B cells, produce antibodies after the first exposure with an antigen and then produce large amounts of antibodies shortly after another exposure to the same antigen.

(10) In α-helix structure of proteins, the polypeptide chains are stabilized by intra-molecular hydrogen bonding whereas β-pleated sheet structure of proteins is stabilized by intermolecular hydrogen bonding

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(11) The hinge region is a short sequence of the heavy chains (H) of antibodies linking the Fab (Fragment antigen binding) region to the Fc (Fragment crystallisable) region. The functional properties of the four IgG subclasses partly result from the subsequence differences of their hinge regions as some amino acids of the lower hinge region are located within or in the close vicinity of the C1q and FcγR binding sites on the IgG H chains.

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(12)

Innate Immunity	Adaptive Immunity
• Response interval is short / immediate	• Response time is longer (i.e it is slower)
• low potency	• Highly effective against pathogens
• It can be inherited	• Cannot be inherited
• Can not remember pathogens	• It can remember pathogens from the past infections.
• It is general and non specific It is the first line of defence against the pathogens	• It is also called acquired immunity and is built up as we get exposed to pathogens or get vaccinated

(13) The term F_c is derived from the ability of the antibody fragments to crystallise. F_c fragments are generated entirely from the heavy chain constant region of an immunoglobulin. The F_c fragment cannot bind antigen, but it is responsible for the effector functions of antibodies such as complement fixation.

Fab fragments represent the antigen binding fragment of an intact antibody containing both the variable and constant regions of both heavy and light chains.

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(14) Esters are formed when the carboxylic acid is heated ~~is the~~ with an alcohol in the presence of a catalyst. In this reaction, the concentrated sulphuric acid is used as a catalyst, dry form of hydrogen chloride gas is used in some cases. This method is used to convert alcohols into an ester.

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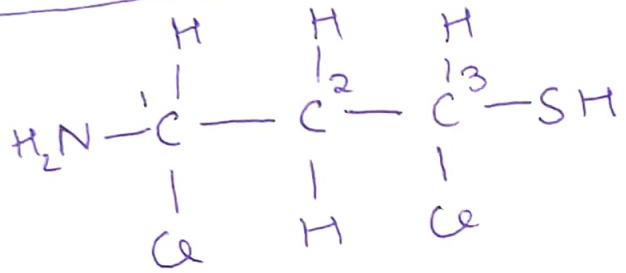
(15)



Carbon 1 and 3 are chiral centers.

A chiral center is defined as ~~an Carbon~~ an atom in a molecule that is bonded to four different chemical species, allowing for optical isomerism.