Delhi Public School Guwahati
"Under the aegis of the Delhi Public School Society, Delhi"

Class XI Session 2022 – 23 Subject: - BIOLOGY

Chapter: - 9 - Biomolecules

Competency based questions

I Case based Questions

The activity of an enzyme can be affected by a change in the conditions which can alter the tertiary structure of the protein. These include temperature, pH, change in substrate concentration or binding of specific chemicals that regulate its activity. Temperature and pH Enzymes generally function in a narrow range of temperature and pH (Figure 9.7). Each enzyme shows its highest activity at a particular temperature and pH called the optimum temperature and optimum pH. Activity declines both below and above the optimum value. Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.With the increase in substrate concentration, the velocity of the enzymatic reaction rises at first. The reaction ultimately reaches a maximum velocity (Vmax) which is not exceeded by any further rise in concentration of the substrate. This is because the enzyme molecules are fewer than the substrate molecules and after saturation of these molecules, there are no free enzyme molecules to bind with the additional substrate molecules (Figure 9.7). The activity of an enzyme is also sensitive to the presence of specific chemicals that bind to the enzyme. When the binding of the chemical shuts off enzyme activity, the process is called inhibition and the chemical is called an inhibitor. When the inhibitor closely resembles the substrate in its molecular structure and inhibits the activity of the enzyme, it is known as competitive inhibitor. Due to its close structural similarity with the substrate, the inhibitor competes with the substrate for the substratebinding site of the enzyme. Consequently, the substrate cannot bind and as a result, the enzyme action declines, e.g., inhibition of succinic dehydrogenase by malonate which closely resembles the substrate succinate in structure. Such competitive inhibitors are often used in the control of bacterial pathogens.

1. _____ is a chemical compound or molecule which is responsible for decreases or stops the enzyme activity by binding to an enzyme .
2. _____preserves the enzyme and keeps them in temporary inactive state
   a. Optimum pH
   b. Low pH
   c. Optimum temperature
   d. Low temperature
3. Explain relation between substrate concentration and enzymatic activity?
4. Give reason why most of the enzymes are destroyed in high temperature condition?
5. Explain competitive inhibition and inhibition.

II. Source based Questions

In a polypeptide or a protein, amino acids are linked by a peptide bond which is formed when the carboxyl (-COOH) group of one amino acid reacts with the amino (-NH2) group of the next amino acid with the elimination of a water moiety (the process is called dehydration). In a polysaccharide the individual monosaccharides are linked by a glycosidic bond. This bond is also formed by dehydration. This bond is formed between two carbon atoms of two adjacent

monosaccharides. In a nucleic acid a phosphate moiety links the 3'-carbon of one sugar of one nucleotide to the 5'-carbon of the sugar of the succeeding nucleotide. The bond between the phosphate and hydroxyl group of sugar is an ester bond. As there is one such ester bond on either side, it is called phosphodiester bond (Figure 9.5). Nucleic acids exhibit a wide variety of secondary structures. For example, one of the secondary structures exhibited by DNA is the famous Watson-Crick model. This model says that DNA exists as a double helix. The two strands of polynucleotides are antiparallel i.e., run in the opposite direction. The backbone is formed by the sugar- phosphate-sugar chain. The nitrogen bases are projected more or less perpendicular to this backbone but face inside. A and G of one strand compulsorily base pairs with T and C, respectively, on the other strand. There are two hydrogen bonds between A and T and three hydrogen bonds between G and C . Each strand appears like a helical staircase.

1. To form polypeptide molecules, number of amino acids joined together by _____ bond.
   a. Covalent bond
   b. Glycosidic bond
   c. Peptide bond
   d. Phosphodiester bond
2. Number of monosaccharides are joined together by ____ to form polysaccharide .
   a. Ester bond
   b. Glycosidic bond
   c. Hydrogen bond
   d. Phosphodiester bond
3. Define N – terminal amino acid and C- terminal amino acid.
4. Name the bond present between nitrogen bases of nucleic acid.
5. Adenine and guanine are _____ and thymine and cytosine are _____

III. Multiple choice questions

1. Many organic substances are negatively charged, while others are positively charged. An amino acid under certain conditions would have both negative and positive charges simultaneously in the same molecule . Such a form of amino acid is called

a. Positively charged form
b. Negatively charged form

2. Fevicolis a synthetic sticky substance insoluble in water. It is a type of

a. Polysaccharide
b. Cellulose
c. Steroids
d. Resins

3. Base pairs found in 5 turns of DNA spirals are

a. 10
b. 100
c. 50
d. 500

4. A proteinaceous product is

a. Terylene
b. Cellulose
c. Polythene
d. Silk and wool

5. The number of substrate molecules changed per minute by a molecule of enzyme is called

a. Turn over number
b. Enzyme rection number]
c. Final number
d. None of these