MISSION M.B.BS

Date: 06/07/2022

Subject: ZOOLOGY

Topic : BIOMOLECULES - L6 Class: Standard XI

Instructions:

A

1. Which one of the following statements is correct?

   ✔ **A.** Holoenzyme = Apoenzyme + Coenzyme

   ✘ **B.** Coenzyme = Apoenzyme + Holoenzyme

   ✘ **C.** Holoenzyme = Coenzyme + Cofactor

   ✘ **D.** Apoenzyme = Holoenzyme + Coenzyme

   Holoenzyme is made up of two parts. It consists of a protein part called apoenzyme and a non-protein part called the cofactor. Cofactor can be of three kinds - prosthetic groups, coenzymes and metal ions. So, coenzyme with apoenzyme forms holoenzyme.

2. Which of the following statement(s) is/are correct ?

   ✘ **A.** Every chemical reaction of metabolism is a catalysed reaction

   ✘ **B.** The process of formation or breaking down of substances through chemical reactions in living organism is called metabolism

   ✘ **C.** The proteins with catalytic power are called enzymes

   ✔ **D.** All of these

   The process of formation or breaking down of substances through chemical reactions in living organisms is called metabolism. Catalysts are substances that alter the rate of metabolic activity but most of the catalysts are used to increase the rate of reaction. All the chemical reactions of metabolism that happen in the living system involve catalysts. The proteins which act as catalysts in the biochemical reactions are called enzymes.

3. Which of the following is true regarding the active site of an enzyme?

- ✗ **A.** The active site is formed by the foldings and crevices in the tertiary structure
- ✗ **B.** The substrate binds to the active site
- ✗ **C.** The enzyme catalyzes a reaction through its active site
- ✓ **D.** All the above

In the tertiary structure of the protein, the polypeptide chain folds upon itself and forms many crevices and pockets. Active site is one such crevice or pocket in which the substrate fits and binds to an enzyme. With the binding of substrate, the active site activates the enzyme and the enzyme catalyzes the reaction. Hence, all the given statements are true.

4. Which of the following is an organic compound?

- ✗ **A.** Prosthetic group
- ✗ **B.** Coenzymes
- ✗ **C.** Metal ions
- ✓ **D.** Both a and b

An enzyme consists of a protein part called apoenzyme and non-protein part called cofactor. The apoenzyme and cofactor together form holoenzyme.
There are three kinds of cofactors - prosthetic groups, coenzymes and metal ions.
The organic cofactor includes the prosthetic group and coenzymes while metal ions are inorganic cofactors.

5. Identify the organic compound which is associated with the apoenzyme transiently.

- ✗ **A.** Prosthetic group
- ✓ **B.** Coenzymes
- ✗ **C.** Metal ions
- ✗ **D.** Both a and b

An enzyme consists of a protein part (apoenzyme) and non-protein part (cofactor). The apoenzyme and cofactor together form the holoenzyme.

There are three kinds of cofactors - prosthetic groups, coenzymes and metal ions. The organic co-factor includes the prosthetic group and coenzymes while metal ions are inorganic cofactors.

The coenzymes are transient organic groups which are not attached to the apoenzyme permanently like the prosthetic group.
The non-protein but organic part which is permanently attached to the enzyme is called prosthetic group.

6. Find the odd one out of the following.

- ✓ **A.** Keratin
- ✗ **B.** Glycoprotein
- ✗ **C.** Nucleoprotein
- ✗ **D.** Lipoprotein

Based on the composition, proteins are classified into two categories - simple proteins and conjugated proteins.

Those proteins which are only made up of amino acids are called simple proteins, for example - keratin.
Whereas those proteins that are composed of aminoacids as well as other molecules are called conjugated proteins. For example - glycoprotein (carbohydrate and protein), nucleoprotein (nucleic acids and protein) and lipoprotein (lipid and protein).
Thus keratin is the odd one out in the given options as it is a simple protein, whereas the rest of the proteins given are conjugated proteins.

7. Which of the following is false with respect to prosthetic groups?

A. Proteins

B. Non-proteins

C. Tightly bound to enzymes

D. Organic compounds

Enzymes are proteins which play a significant role in catalytic reactions as the catalysts in the living system. An enzyme consists of a protein part (apoenzyme) and non-protein part (cofactor). The apoenzyme and cofactor together are called holoenzymes.

There are three kinds of cofactors - prosthetic groups, coenzymes and metal ions.
The non-protein but organic part which is permanently attached to the enzyme is called the prosthetic group.
The coenzymes are transient organic groups which are not attached to the apoenzyme permanently like the prosthetic group.
Metal ions are the inorganic cofactors.

8. The role of an enzyme in a reaction is to

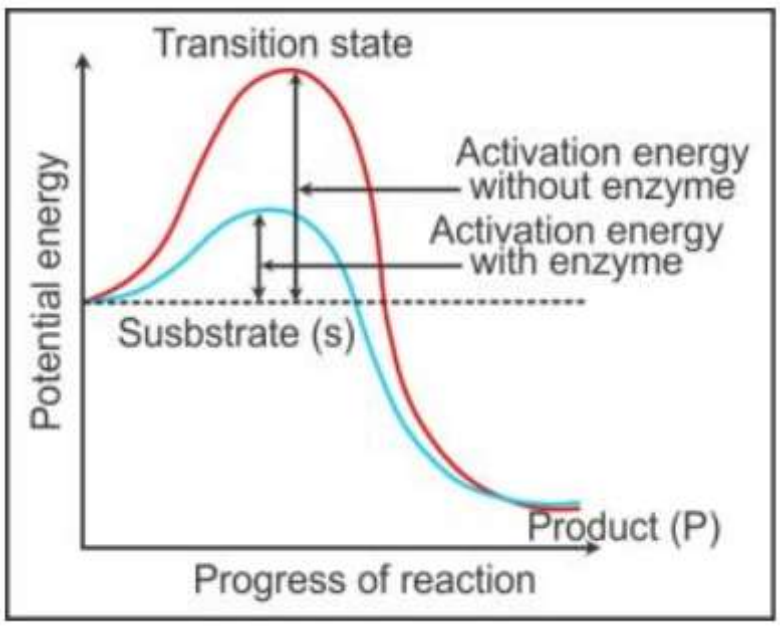
✔ **A.** decrease activation energy

✘ **B.** increase activation energy

✘ **C.** both a and b depending on the substrate

✘ **D.** increase potential energy

The minimum amount of energy provided for a chemical reaction to happen is called activation energy. The rate of reaction increases with decrease in activation energy. The role of an enzyme is to decrease the activation energy of the reaction making the transition of substrate (S) to product (P) more easily as shown below.



9. Which of the following is a type of structural protein?

- ✔ **A.** Collagen
- ✘ **B.** Enzymes
- ✘ **C.** Antibody
- ✘ **D.** Casein

Proteins which are involved in providing structural support to the cell are called structural proteins. For example - collagen is the protein which is present in the fibrous tissues such as tendon, ligament and skin.

Enzymes are proteins that catalyze biochemical reactions.

Antibody is a type of defence protein that is produced by the immune system and helps in removing them from the body.

Casein is a nutritional protein found in milk.

10. Transition state structure of the substrate formed during an enzymatic reaction is:

- ✘ **A.** Temporary but stable
- ✘ **B.** Permanent but unstable
- ✔ **C.** Temporary and unstable
- ✘ **D.** Permanent and stable

The substrates bind with enzymes to form an intermediate enzyme-substrate complex (also known as transition state). This complex/state is highly unstable and temporary. The complex dissociates to form the products.

E (Enzyme) + S (Substrate) → ES (Enzyme-Substrate Complex) → E (Enzyme) + P (Product)