

chp 3

Lesson "Enzymes" Short Q/A

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

Q1- What are ribozymes?

Ribozymes are the only which consist of RNA and are found in ribosomes for example, peptidyl transferase is a ribozyme which forms peptide bond during protein synthesis.

Q2- What is structure of an enzyme?

The enzyme consists of linear chain of amino acids which form the three dimensional structure of an enzyme.

Q3- Explain the enzyme pepsin which does not require a cofactor

When pepsinogen is exposed in HCl the additional polypeptide fragment is removed as a result inactive pepsinogen is changed into its active form, the pepsin.

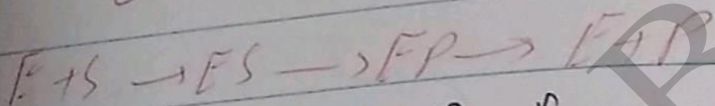
What is prosthetic group? Give an example.

A prosthetic group is covalently bonded part of an enzyme which is permanently attached to enzyme and does not detach after the completion of reaction.

Ethyl alcohol $\xrightarrow{\text{alcohol dehydrogenase} + \text{NAD}^+}$ Acetaldehyde

What is the mechanism action?

The substrate first binds to the active site of the enzyme to form an enzyme-substrate complex. Then the substrate is converted into product while it is attached to the enzyme. Finally the product is released, thus allowing the enzyme to start all over again.



What is the role of free energy of activation in a chemical reaction?

The role of activation energy in a chemical reaction is to start the reaction by arranging the reactants appropriately and breaking their existing bonds. Activation energy is the energy needed to start a reaction and is required in all chemical reactions.

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

List the external conditions which affect the rate of enzyme reaction.

Enzyme activity is affected by a number of factors including the concentration of the enzyme, the concentration of the

the substrate, the temperature, the pH and the concentration.

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

Q8- Compare the optimum temperatures of enzymes of human and thermophilic bacteria.

All human-enzymes have a optimum temperature of about $37-38^{\circ}\text{C}$ but bacteria living in hot springs may have an optimum temperature of 70°C or higher.

- Describe the range of pH at which human enzymes function :

The optimum pH values for most enzymes fall in the range of pH 6-8 but there are exceptions. Protein digestion enzyme pepsin is active in acidic medium ^{at} pH 2 and trypsin is inactive at this pH but shows maximum activity in alkaline medium at pH 8.

- What are enzymes inhibitors? Name the molecules which act as enzyme inhibitors

The molecules which act as inhibitors include poisons, cyanides, antibodies, anti-metabolites, penicillin, sulpha drugs etc.

Q-11 What is the importance of competitive enzyme inhibitors?

The importance of competitive inhibitors is :

- (a) it supports lock and key hypothesis
- (b) it shows that ^{transition} substrate that are similar to substrate are not acted upon enzyme.
- (c) Competitive inhibitors are used as drugs in the control of bacterial pathogens. Antibiotics known as sulphonamides are used to combat bacterial infection.

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

Q-12 Describe cyanides as irreversible non-competitive inhibitors.

Cyanides are potent poisons of living organisms because they can kill an organism inhibiting cytochrome oxidase essential for cellular respiration. They block the action of these enzymes by combining with iron which may be present in the prosthetic group.

Q-13 Describe ions of heavy metals as irreversible non-competitive inhibitors.

An irreversible non-competitive enzyme inhibitor destroys enzyme by alternating its shape so that it can not bind with the active site. Ions of heavy ~~materials~~ metals such as mercury, silver

and copper combine with thiol (-SH) groups in the enzyme breaking the disulphide bridges. These bridges are important in maintaining tertiary structure. When these bridges are broken, the enzyme becomes denatured and inactive.

Write the difference between :

① Active site and Binding site

Active site

Definition

* A region on an enzyme to which the substrate of a chemical reaction bind in order to undergo a catalyzed chemical reaction.

Binding site

A region on a protein DNA or RNA to which ligands can bind.

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

Occurance

* Exist on enzymes

Exist on proteins
DNA or RNA -

Function

* Responsible for the reduction of activation energy of a chemical reaction thereby increase the reaction rate

Responsible for the binding of a specific substrate or ligand with a molecule

Q. b - apoenzyme and holoenzyme

Apoenzyme

* Apoenzyme refers to the inactive form of the enzyme which activates upon the binding of a cofactor.

* Catalytically - active form of the enzyme

* Complete and complex enzymes

* Consists of the apo-enzyme and one or several cofactors.

* Ex: multi-subunit complex of DNA polymerase is considered as the holoenzyme.

Holoenzyme

Holoenzyme refers to the apoenzyme along with the cofactor which is complete and catalytically - active.

inactive form of the enzyme

incomplete enzymes that are less complex

Consists of the protein part of the enzyme

Ex: catalytic component of DNA polymerase enzyme are considered as apoenzyme.

c- prosthetic group and coenzyme :

Prosthetic group

* Prosthetic groups are a type of cofactors that are tightly bound to enzyme or proteins.

Can be either metal ions or small organic molecule.

Tightly - bound or stably associated with the enzyme.

Either coenzymes or metal ions may serve as prosthetic group.

Coenzyme

Coenzyme is an organic non-protein compound that binds with an enzyme to catalyze a reaction.

organic molecules

Bind loosely with the enzyme.

Can be removed from the enzyme easily.

GET ADMISSION IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353

Q d- inorganic cofactor and organic cofactor

Inorganic Cofactor

* The inorganic cofactors are different metallic ions.

* These are only attached to the enzyme when substrate gets bind.

Q * eg : Fe^{++} , Mg^{++} , Cu^{++}

Organic Cofactor

The organic cofactors are either co-enzyme or prosthetic group.

They are only attached to the enzyme when substrate gets bind.

eg : ATP, NAD^+ , FAD

e- lock and Key model, induced fit

Lock and Key model

In the lock and Key model, the active site of the enzyme is precisely fits to the substrate

Shapes are ~~not~~ complem before binding

induced fit

In the induced fit model, active site of the enzyme does not completely fit to the substrate

Shapes are ^{not} complem^{ent} before binding.

sheet range

very strong
~~flexible~~

Binding is flexible

Binding is very strong
flexible

The archive site is
static

The archive site is
not static.

GET **ADMISSION** IN OUR ONLINE INSTITUTE

SOCH BADLO BY MAK

Contact WhatsApp Number: +92 331 5014353