

BOTANY

ENTHUSIAST | LEADER | ACHIEVER



EXERCISE

Enzymes

ENGLISH MEDIUM

EXERCISE-I (Conceptual Questions)

Build Up Your Understanding

ENZYME : INTRODUCTION TO THE LIVING STATE

1. An example of competitive inhibition is :
 (1) Succinic dehydrogenase by malonic acid
 (2) Cytochrome oxidase by cyanide
 (3) Hexokinase by glucose - 6 phosphate
 (4) Carbonic anhydrase by carbon dioxide

EZ0005

2. First discovered Enzyme was :-
 (1) Isomerase (2) Transaminase
 (3) Zymase (4) Transferase

EZ0045

3. Enzyme were discovered for the first time in :-
 (1) Bacteria (2) Yeast
 (3) Algae (4) Spinach

EZ0046

4. Who coined the term enzyme ?
 (1) Pasteur (2) Buchner
 (3) Kuhne (4) Sumner

EZ0047

5. Vitamin serves the function of :-
 (1) An enzyme (2) A coenzyme
 (3) A holoenzyme (4) A hormone

EZ0048

6. Which of the following is a coenzyme ?
 (1) NAD (2) NADP
 (3) FAD (4) All the above

EZ0049

7. The first enzyme isolated in crystalline form was :-
 (1) Catalase (2) Urease
 (3) Peroxidase (4) Amylase

EZ0050

8. In plants enzymes are present in :-
 (1) Only in flowers
 (2) Only in leaves
 (3) All the living cells
 (4) Only in parenchyma

EZ0051

9. Which of the following coenzyme is a derivative of Niacin ?

- (1) NAD (2) NADP
 (3) FAD (4) Both (1) and (2)

EZ0052

10. Which of the following is not consumed in a biochemical process ?

- (1) Hormones (2) Enzymes
 (3) Vitamins (4) Nucleotides

EZ0053

11. How the presence of an enzyme affects the activation energy of a reaction ?

- (1) It becomes increased
 (2) It becomes decreased
 (3) It is first increased and then decreased
 (4) It is not affected at all

EZ0054

12. Enzyme inhibition caused by a substrate analogue is :-

- (1) Competitive
 (2) Non competitive
 (3) In competitive
 (4) Semi-competitive

EZ0056

13. At boiling temperature of water, what will be effect on an enzyme :-

- (1) become denatured
 (2) remain unaffected
 (3) become inactivated
 (4) become more active

EZ0057

14. Enzyme have narrow optima for :-

- (1) Light
 (2) Temperature
 (3) pH
 (4) Both (2) and (3)

EZ0058

- 15.** Which enzyme is not a protein ?
 (1) Hexokinase
 (2) Synthetase
 (3) Endonuclease
 (4) Ribozyme
EZ0064
- 16.** Allosteric enzymes have allosteric sites for:-
 (1) Inhibition only
 (2) Activation only
 (3) Reduction in activation energy
 (4) Both inhibition and activation
EZ0070
- 17.** Substrate concentration at which an enzyme attains half of its maximum velocity is ?
 (1) Half life of enzyme
 (2) Km-constant of enzyme
 (3) Concentration ratio
 (4) Turn over number of enzyme
EZ0071
- 18.** Which of the following statements regarding enzyme inhibition is correct ?
 (1) Non-competitive inhibition of an enzyme can be overcome by adding large amount of substrate
 (2) Competitive inhibition is seen, when a substrate competes with an enzyme for binding to an inhibitor protein
 (3) Competitive inhibition is seen, when the substrate and the inhibitor compete for the active site on the enzyme
 (4) Non-competitive inhibitors often bind to the enzyme irreversibly.
EZ0078
- 19.** The catalytic efficiency of two different enzyme can be compared by the :
 (1) The K_m value
 (2) The pH optimum value
 (3) Formation of the product
 (4) Molecular size of the enzyme
EZ0079
- 20.** Which of the following is structural analogue of p-amino benzoic acid?
 (1) Malonate
 (2) Glucose-6-phosphate
 (3) AMP
 (4) Sulpha drugs
EZ0199

EXERCISE-I (Conceptual Questions)

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	1	3	2	3	2	4	2	3	4	2	2	1	1	4	4
Que.	16	17	18	19	20										
Ans.	4	2	3	1	4										

EXERCISE-II (Previous Year Questions)

AIPMT/NEET

AIPMT 2006

1. An organic substance bound to an enzyme and essential for its activity is called
 (1) Apoenzyme (2) Isoenzyme
 (3) Coenzyme (4) Holoenzyme

EZ0084

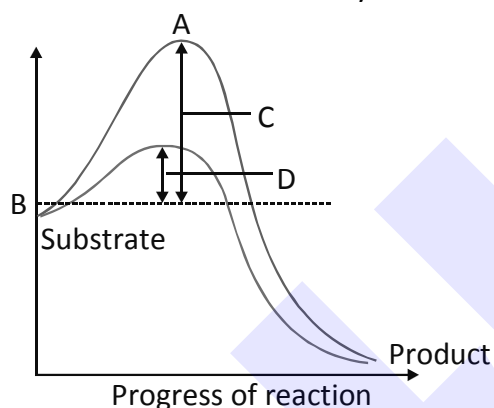
AIPMT 2008

2. A competitive inhibitor of succinic dehydrogenase is :-
 (1) α - ketoglutarate (2) Malate
 (3) Malonate (4) Oxaloacetate

EZ0088

AIPMT-Mains 2010

3. The figure given below shows the conversion of a substrate into product by an enzyme. In which one of the four options (1-4) the components of reaction labelled as A, B, C and D are identified correctly?



Options :

	A	B	C	D
(1)	Transition State	Potential energy	Activation energy without enzyme	Activation energy with enzyme
(2)	Potential Energy	Transition state	Activation energy with enzyme	Activation energy without enzyme
(3)	Activation energy with enzyme	Transition state	Activation energy without enzyme	Potential Energy
(4)	Potential Energy	Transition state	Activation energy with enzyme	Activation energy without enzyme

EZ0094

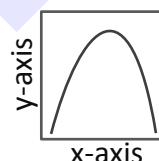
4. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?

- (1) Enzymes are denatured at high temperatures but in certain exceptional organisms they are effective even at temperatures 80°-90°C
 (2) Enzymes are highly specific
 (3) Most enzymes are proteins but some are lipids
 (4) Enzymes require optimum pH for maximal activity

EZ0095

AIPMT-Pre 2011

5. The curve given below shows enzymatic activity with relation to three conditions (pH, temperature and substrate concentration)



What do the two axes (x and y) represent ?

x-axis

y-axis

- (1) Enzymatic activity pH
 (2) Temperature Enzyme activity
 (3) Substrate concentration Enzymatic activity
 (4) Enzymatic activity Temperature

EZ0096

AIPMT-Mains 2012

6. For its activity, carboxypeptidase requires :-
 (1) Niacin (2) Copper (3) Zinc (4) Iron

EZ0098

NEET-UG 2013

7. Transition state structure of the substrate formed during an enzymatic reaction is :
 (1) permanent and stable
 (2) transient but stable
 (3) permanent but unstable
 (4) transient and unstable

EZ0099

8. The essential chemical components of many coenzymes are :

- (1) Vitamins
- (2) Proteins
- (3) Nucleic acids
- (4) Carbohydrates

EZ0101

AIPMT 2015

9. Which one of the following statements is incorrect?

- (1) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme.
- (2) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex.
- (3) The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate.
- (4) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex.

EZ0104

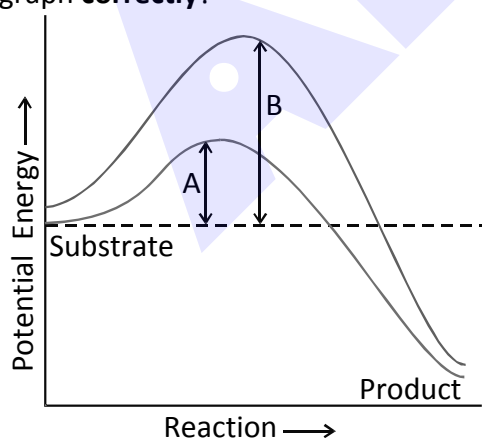
NEET-II 2016

10. A non-proteinaceous enzyme is :-

- (1) Ligase
- (2) Deoxyribonuclease
- (3) Lysozyme
- (4) Ribozyme

EZ0106

11. Which of the following describes the given graph **correctly**?



- (1) Endothermic reaction with energy A in absence of enzyme and B in presence of enzyme

- (2) Exothermic reaction with energy A in absence of enzyme and B in presence of enzyme
- (3) Endothermic reaction with energy A in presence of enzyme and B in absence of enzyme
- (4) Exothermic reaction with energy A in presence of enzyme and B in absence of enzyme.

EZ0107

NEET(UG) 2017

12. Which one of the following statements is **correct**, with reference to enzymes ?

- (1) Holoenzyme = Apoenzyme + Coenzyme
- (2) Coenzyme = Apoenzyme + Holoenzyme
- (3) Holoenzyme = Coenzyme + Co-factor
- (4) Apoenzyme = Holoenzyme + Coenzyme

EZ0111

NEET(UG) 2019

13. Consider the following statements :

- (A) Coenzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group.
- (B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme.

Select the **correct** option.

- (1) Both (A) and (B) are true.
- (2) (A) is true and (B) is false.
- (3) Both (A) and (B) are false.
- (4) (A) is false and (B) is true.

EZ0197

NEET(UG) 2019 (Odisha)

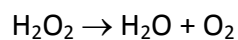
14. Prosthetic groups differ from co-enzymes in that :-

- (1) they require metal ions for their activity.
- (2) they (prosthetic groups) are tightly bound to apoenzymes.
- (3) their association with apoenzymes is transient.
- (4) they can serve as co-factors in a number of enzyme-catalyzed reactions.

EZ0198

Re-NEET(UG) 2022

15. In the enzyme which catalyses the breakdown of:



the prosthetic group is :

- (1) Nicotinamide adenine dinucleotide
- (2) Haem
- (3) Zinc
- (4) Niacin

EZ0227

EXERCISE-II (Previous Year Questions)

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	3	3	1	3	2	3	4	1	3	4	4	1	2	2	2

EXERCISE-III

Master Your Understanding

EXERCISE-III(A) NCERT BASED QUESTIONS

1. Enzymes, which catalyse the transfer of hydrogen (H) between two substrates, are called:-

(1) Transferases (2) Oxidoreductases
(3) Isomerases (4) Hydrolases

EZ0176

2. Which of the following statements is correct ?

(1) All the proteins are enzymes
(2) All enzymes are proteins
(3) Almost all enzymes are proteins
(4) All enzymes are nucleic acids

EZ0174

3. Low temperature preserves the enzyme in a ...'A'... state whereas high temperature destroys enzymatic activity because proteins are ...'B'... by heat.

Choose the **correct** option:-

(1) A = temporarily inactive, B = denatured
(2) A = permanently inactive, B = temporarily inactive
(3) A = permanently inactive, B = denatured
(4) A = denatured, B = temporarily inactive

EZ0175

4. Which of the following is not correct?

(1) Catabolic pathways lead to the release of energy
(2) Anabolic pathways consume energy
(3) The living state and metabolism are synonymous
(4) CO₂ dissolving in water is an uncatalysed reaction in living systems

EZ0200

5. Which of the following is not a correct match?

(1) Acetic acid → Cholesterol = Anabolic
(2) Hydrolysis of glycosidic bond = Catabolic
(3) Amino acid → Protein = Anabolic
(4) Glucose → Lactic acid = Anabolic

EZ0201

6. A general rule of thumb is that rate of enzymatic reactions doubles or decreases by half for every ____ change in either direction.

Choose correct option for above blank.

(1) 50° (2) 5°C
(3) 100°C (4) 10°C

EZ0202

7. Non proteinaceous part of holoenzyme can be :-

(1) metal ion
(2) prosthetic group
(3) Coenzyme
(4) All of the above

EZ0203

8. Which of the following can have catalytic power?

(1) Protein
(2) Nucleic acid
(3) Fat
(4) Both (1) and (2)

EZ0204

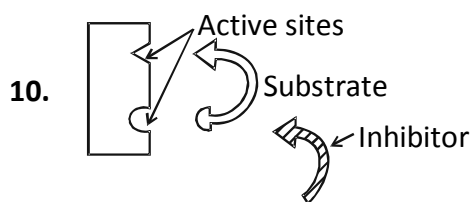
9. Catalytic activity is lost when the co-factor is removed from the enzyme. It testifies that :-

(a) Cofactors form one or more coordination bonds with enzymes.
(b) Cofactors play a crucial role in the catalytic activity of the enzyme
(c) Cofactors are not made up of proteins
(d) Cofactors show permanent association with enzymes

Options :

(1) (a) and (d)
(2) Only (b)
(3) (b) and (c)
(4) (a), (b) and (c)

EZ0205



Above diagram is the indicative diagram of a type of inhibition. Choose the **correct match**:-

	Type of inhibition	Substrate	Inhibitor
(1)	Non competitive reversible	Malonate	Succinate
(2)	Competitive	Succinic dehydrogenase	Malonate
(3)	Non competitive irreversible	Succinic dehydrogenase	Succinate
(4)	Competitive	Succinate	Malonate

EZ0206

11. On the basis of type of reactions they catalyse, enzymes are divided into _____ classes each with _____ subclasses. Choose the **correct** numbers for above blanks respectively from the following options :-
- (1) 6, 6 (2) 6, 4-13
(3) 4-13, 6 (4) 4, 13

EZ0207

12. Inorganic catalysts work efficiently at high temperatures while enzymes get damaged at high temperatures (above 40°C). This feature of enzymes is not applicable to :-
- (1) the enzymes which are made up of proteins
(2) The enzymes isolated from thermophilic organisms
(3) the enzymes which have active sites
(4) the enzymes of organisms who live in hot vents

EZ0208

13. In the absence of any enzyme, reaction $\text{CO}_2 + \text{H}_2\text{O} \longrightarrow \text{H}_2\text{CO}_3$ is very slow, formation of 200 molecules of H_2CO_3 per hour. However by the use of carbonic anhydrase enzyme reaction speeds with about :-

- (1) formation of 6×10^5 molecules of H_2CO_3 every second
(2) formation of 36×10^5 molecules of H_2CO_3 every minute
(3) formation of 36×10^6 molecules of H_2CO_3 every second
(4) formation of 6×10^6 molecules of H_2CO_3 every minute

EZ0209

14. Stability is something related to energy status of the molecule. Transition state is high energy state as compare to substrate. So we can conclude that :-
- (1) Transition state is more stable than substrate
(2) substrate is more stable than transition state
(3) Both substrate and transition state are very much unstable
(4) Stability can not be compared

EZ0210

15. The activity of an enzyme can be affected by a change in the conditions which can alter the :-
- (1) tertiary structure of nucleic acids
(2) primary structure of fats
(3) tertiary structure of proteins
(4) secondary structure of carbohydrates

EZ0211

16. Which of the following statements is **not correct** regarding enzymes ?
- (1) They are specific in nature
(2) They are used up in reaction
(3) They are proteinaceous in nature
(4) They speed up the rate of biochemical reactions.

EZ0212

17. Which of the following statements regarding cofactors is **not correct** ?
- (1) Every coenzyme is a cofactor but every cofactor is not a coenzyme
(2) Catalytic activity is lost when the cofactor is removed from the enzyme
(3) Every coenzyme is a cofactor and every cofactor is a coenzyme
(4) In the catalase enzyme, haem group work as a cofactor

EZ0213

18. The prosthetic group can be distinguished from other cofactors of enzymes because prosthetic groups :-

- (1) are organic in nature
- (2) are tightly bound to the apoenzyme
- (3) Both (1) and (2)
- (4) are inorganic in nature and are loosely bound to the apoenzyme

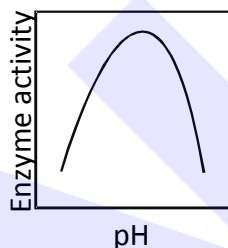
EZ0214

19. Ribozymes are :-

- (1) Enzymes with tertiary structure of protein
- (2) Fragments of endoplasmic reticulum those contain ribosomes
- (3) Inorganic enzymes
- (4) Nucleic acids that behave like enzymes

EZ0215

20. Represented below is the effect of change in pH on enzyme activity. Which one of the following conclusions can be made by this diagram ?



- (1) Enzyme show its highest activity at a particular pH, both below and above this pH, activity declines
- (2) With increasing pH, activity increases upto a limit then it become constant
- (3) At a particular pH, activity is minimum, both below and above this pH, activity increases
- (4) Enzyme activity is affected by temperature not by pH so it is completely a hypothetical graph

EZ0216

21. Match the column-I with column-II :-

	Column-I (Example)		Column-II (Type of cofactor)
(A)	NAD with dehydrogenase enzyme	(i)	Metal ion
(B)	Zn with carboxypeptidase enzyme	(ii)	Prosthetic group
(C)	Haem group with catalase enzyme	(iii)	Coenzyme

Choose the option from the following which denotes correct match of column-I with column-II :-

- (1) A-i B-ii C-iii
- (2) A-iii B-ii C-i
- (3) A-iii B-i C-ii
- (4) A-ii B-iii C-i

EZ0217

22. $\text{CO}_2 + \text{H}_2\text{O} \xrightarrow{\text{B}} \text{A}$

Choose the correct option for A and B in the given reaction :-

- (1) B-Product of this reaction, A-Enzyme of this reaction
- (2) A-Product of this reaction, B-Rate of formation of product of this enzyme is 360 lakh molecules/sec.
- (3) A-Carbonic acid, B- Rate of formation of product of this enzyme is 6,00,000 molecules/sec.
- (4) A-Transient state, B-Enzyme of this reaction

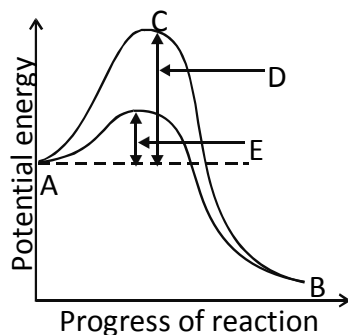
EZ0218

23. Which of the following statements is not correct ?

- (1) Enzymes bring down the activation energy of the processes
- (2) Enzymes are preserved in a temporary inactive state at high temperature
- (3) Enzymes isolated from thermophilic organisms have thermal stability
- (4) Enzymes are differ from inorganic catalysts because enzymes get *damaged* at high temperature.

EZ0219

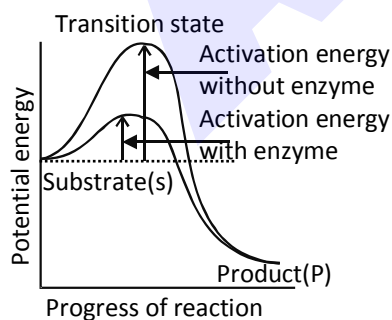
24.



- (1) Energy level of A is low as compared to B
- (2) Energy level of B is high as compared to C
- (3) Energy level of D is high as compared to E
- (4) Energy level of C is low as compared to A and B

EZ0220

25.



Above diagram showing the concept of activation energy. If in this diagram energy

level of 'P' become higher than the energy level of 'S' then which of the following will not apply for this diagram ?

- (1) The process will be endothermic
- (2) Activation energy with enzyme will be less than activation energy without enzyme
- (3) Energy difference between transition state and product will be more than activation energy
- (4) The substrate will go through the transition state

EZ0221

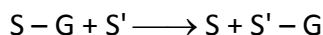
26. (i) Transient association with the protein part of conjugated enzyme
(ii) Non protein organic substance
(iii) Usually made up of vitamins

All the above characters are applicable to :-

- (1) Apoenzyme
- (2) Holoenzyme
- (3) Coenzyme
- (4) Isoenzyme

EZ0222

27. An enzyme catalysing a transfer of a group, G between a pair of substrate S and S' as follows :



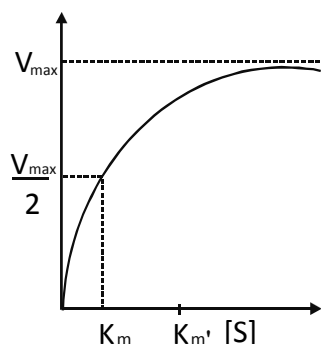
G = phosphate or hydrogen or any other group, the enzyme is related with which of the following class?

- (1) Transferases
- (2) Dehydrogenases
- (3) Both (1) and (2)
- (4) Either (1) or (2)

EZ0223

EXERCISE-III(B) ANALYTICAL QUESTIONS

28.

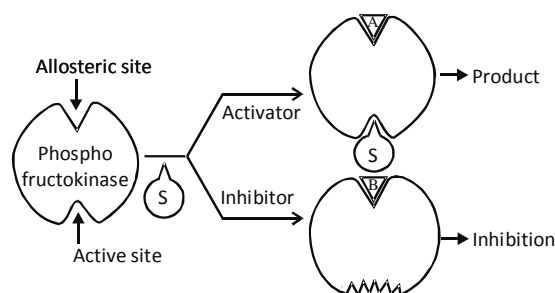


Above graph is showing the effect of substrate concentration (S) on enzymatic activity. If due to change in enzymatic activity K_m value changes to K_m' , then which of the following can be conclude on the basis of this change?

- (1) There is a significant increase in enzymatic activity
- (2) Entry of positive allosteric modulator in enzymatic activity
- (3) Entry of non competitive inhibitor in enzymatic activity
- (4) In enzymatic activity, entry of inhibitor which closely resembles the substrate in its molecular structure

EZ0224

29.



In the following digrametic representation A and B is :-

- (1) $A \rightarrow G-6P$, $B \rightarrow ATP$
- (2) $A \rightarrow AMP$, $B \rightarrow ATP$
- (3) $A \rightarrow Fructose\ 6P$, $B \rightarrow ATP$
- (4) $A \rightarrow ATP$, $B \rightarrow ADP$

EZ0225

30. One molecule of enzyme convert 5 molecules of substrate into product in 5 minutes. 20 molecules of substrate and two molecules of enzyme are mixed in a test tube. After 10 minutes the test tube will have :-

- (1) products and 10 unreacted molecules of substrate
- (2) only products
- (3) 10 unreacted molecules of substrate, enzymes and products
- (4) products and enzymes

EZ0226

EXERCISE-III

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	2	3	1	4	4	4	4	4	2	4	2	4	1	2	3
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	2	3	2	4	1	3	3	2	3	3	3	4	4	2	4