

Chapter 7

Q1. Which of the following statements is **false** about the concerted model for allosteric behavior of proteins?

- ✓ a) The protein has two conformations R and T
- ✓ b) The conformations of all subunits change simultaneously
- ⓐ c) The equilibrium ratio of the T/R is assumed to be low
- ✓ d) The ratio of  $K_R / K_T$  is called c.

Q2. Which of the following is **true** about AT Case?

- ✗ a) It is made up of three different types of subunits
- ✓ ⓑ b) It catalyzes the condensation of aspartate and carbamoyl phosphate to form carbamoyl aspartate
- ✗ c) It is an example of V system
- ✗ d) It belongs to the Michaelis-Menten model.

Q3. For an allosteric V-type enzyme, which of the following parameters changes?

- a)  $K_m$
- b)  $K_{0.5}$
- c)  $K_R$
- ⓐ d)  $V_{max}$

Q4. The binding of which of the following changes the quaternary structure of allosteric proteins?

- a) Substrate and activators.
- ⓐ b) Activators, inhibitors and substrates
- c) Inhibitors and substrates
- d) Substrate only

Q5. Which of the following statements about the enzyme glycogen phosphorylase is false?

- a) It exists in two forms a and b
- b) The a forms is more active than the b form
- c) It is subject to allosteric control
- d) It catalyzes the synthesis of glycogen

Q6. which of the following enzymes is activated by phosphorylation ?

- a) Chymotrypsin
- b) Carboxypeptidase A
- c) Glycogen phosphorylase
- d) Thrombin

Q7. which of the following is false about the mechanism of chymotrypsin action?

- a) The two amino acids residues serine 195, and histidine 57, are involved.
- b) The oxygen atom of serine 195, acts as a nucleophile.
- c) Histidine 57 acts as a base in the formation of the tetrahedral intermediate.
- d) Histidine 57 acts as an acid in the information of the tetrahedral intermediate.

Q8. The coenzyme thiamin pyrophosphate is involved in which reaction type?

- a) Aldehyde transfer
- b) Transfer of one-carbon units
- c) Oxidation-reduction
- d) Carboxylation

~~Q9.~~ cooperative binding of oxygen by hemoglobin

- a) Is induced by hemoglobin
- b) Is a result of different affinities for oxygen by each subunit protein.
- c) Is induced by oxygenation.
- d) Is a result of interaction with myoglobin.

Q10. Which of the following statements is **true** about the concerted model for allosteric behavior of proteins?

- (a) The protein has two conformations R and T
- b) The conformations of all subunits change at different times
- c) The equilibrium ratio of the T/R is assumed to be low
- d) The ratio of  $K_T / K_R$  is called  $c. \Rightarrow c = \frac{K_R}{K_T}$

Q11. Which of the following is **false** about AT Case?

- a) It is made up of two different types of subunits
- b) It catalyzes the condensation of aspartate and carbamoyl phosphate to form carbamoyl aspartate
- c) It is an example of a Ksystem
- (d) It belongs to the michaelis-Menten model

Q12. Which of the following can regulate the enzyme activity?

- a) Activation of zymogens
- b) Addition or removal of phosphate groups from of the enzyme
- c) Presence of activators
- (d) All of the above regulate enzyme activity

Q13. The saturation curve for aspartyl transcarbamylase has a similar shape to the curve for:

- a) Myoglobin
- b) Hemoglobin
- c) Chymotrypsin
- d) Both hemoglobin and chymotrypsin

Q14. The aspartate transcarbamoylase (ATCase) reaction is controlled by CTP acting as a:

- a) Feedback inhibitor
- b) Allosteric substrate
- c) Heterotropic activator
- d) Homotropic activator

Q15. The first step in the zymogen activation of chymotrypsinogen is:

- a) Cleavage by trypsin
- b) Binding of trypsinogen activator
- c) Folding into the native structure
- d) Self-digestion by the pi-chymotrypsin

Q16. Which of the following statements is false about effects of binding inhibitors with the concerted model for allosteric behavior ?

- a) There is an increase in the number of T-conformers
- b) An inhibitor inhibits association of S and A with R
- c) An inhibitor decreases cooperativity of substrate saturation curve
- d) An inhibitor raises the apparent value of L.

Q17. Which of the following statements about the mechanism of chymotrypsin action is incorrect?

- ↘ a) It is well studied and, in many respects, typical.
- ↘ b) The critical amino acid residues, serine 195 and histidine 57, are involved in it.
- ↘ c) The histidine behaves as a base in abstracting the proton from serine in the first phase.
- ⓐ d) In the second phase, the water is hydrogen-bonded to the serine.

Q18. Which of the following coenzyme transfers one-carbon unit?

- ⓐ a) Tetrahydrofolate
- b) Thiamine pyrophosphate
- c) Pyridoxal phosphate
- d) Coenzyme A

Q19. Allosteric enzymes have all the following properties except:

- ⓐ a) In the K system  $V_{max}$  is changed in the presence of inhibitors
- b) Their  $K_{0.5}$
- c) They show the homotropic effect
- d) They show heterotropic effect

Q20. Which of the following statements about ATCase is false?

- ↘ a) It is an allosteric enzyme.
- ↘ b) It is made up of two different types of subunit (catalytic and regulatory)
- ⓐ c) It is inhibited by ATP
- ↘ d) It is inhibited by CTP

Q21. In the normal state of an allosteric enzyme, it can be described according to the concerted model as:

- a) It exists in one conformational form
- b) It exists in two conformational forms at equilibrium
- c) It exists in two conformational forms at fixed ratio
- d) The T forms is active

Q22. Which of the following statements is **NOT TRUE** for glycogen phosphorylase?

- a) The phosphorylated form of the T state is more active than phosphorylated form of the R state.
- b) Its activity can be affected by allosteric regulation
- c) Glucose-6-phosphate is an inhibitor of the enzyme
- d) Its phosphorylation requires the enzyme phosphoprylas kinase

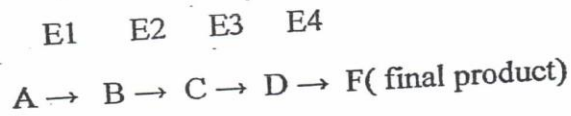
Q23. Which of the following enzymes is not a member of the serine protease family?

- a) Papain
- b) Trypsin
- c) Chymotrypsin
- d) Elastase

Q24. Enzyme activity can be regulated by all of the following, **except**:

- a) Feedback inhibition by final product
- b) Addition or removal of phosphate groups from of the enzyme
- c) Presence of activators
- d) All these regulate enzyme activity

Q25. Many metabolic pathways involve multistep reactions. Consider the following pathway.



Feedback inhibition is usually associated with:

- a) The final product of the pathway, F, interacting with E1
- b) F interacting with an allosteric site in E4
- c) B interacting with an allosteric site in E1
- d) All of the intermediates or products in the reaction interacting with the active site in E1

Q26. The concerted model for allosteric enzymes was proposed by:

- a) Koshland
- b) Monod
- c) Wyman and Changeux
- d) Monod, Wyman and Changeux

Q27. Phosphorylation of enzymes

- a) Has no effect on their catalytic activity
- b) Does not require ATP
- c) Takes place on serine, threonine, and tyrosine residues at enzyme's active sites
- d) Is not easily characterized

Q28. Nicotinamide adenine dinucleotide (NAD<sup>+</sup>) is:

- a) An enzyme inhibitor used in smoking cessation programs
- b) An inhibitor of ATP production
- c) A coenzyme in reactions that transfer acyl groups
- d) A coenzyme in oxidation-reduction reactions

Q29. The behavior of allosteric enzymes

- a) Does not play any role in feedback inhibition in metabolic pathways
- b) Is strongly dependent on the presence of metal ions
- c) Is related to their ability to hydrolyze themselves
- d) Depend on changes in their quaternary structure on binding of substrates or inhibitors

Q30. Zymogens are particularly important in which of these processes?

- a) Blood clotting
- b) Activation of digestive enzymes
- c) Activation of proteins which are hormones
- d) All of these processes

Q31. According to the concerted model of allosteric behavior, an allosteric activator

- a) Favors the taut (tight) form of the enzyme
- b) Favors the relaxed form of the enzyme
- c) Can only bind to the enzyme if substrate is already bound
- d) Can only bind to the enzyme if substrate has not already bound.

Q32. A velocity curve (V vs [s]) for a typical allosteric enzyme will be:

- a) A rectangular hyperbola
- b) A sigmoid curve
- c) A straight line
- d) Parabola



Q33. The sodium-potassium ion pump is an example of which type of control?

- a) Allosteric
- b) Covalent bond
- c) Substrate cycles
- d) Genetic control

Q34. Which of the following is true about the mechanism of chymotrypsin action?

- a) The two amino acid residues Ser195, and His57, are involved.
- b) The oxygen atom of Ser195 acts as a nucleophile.
- c) Water acts as a nucleophile.
- d) All of these are correct

Q35. Which coenzyme is involved in decarboxylation reactions?

- a) TPP
- b) biotin
- c) coenzyme A
- d) FMN

Q36. Allosteric effectors:

- a) induce a conformational change in the protein to alter its activity
- b) convert the enzyme either to the R or the T state
- c) can be very different in structure than the substrates of the enzyme
- d) All of the these are correct

Q37. Which of the following statements is TRUE for glycogen phosphorylase?

- a) its activity can be affected by allosteric regulation
- b) the phosphorylated form of the T state is more active than the phosphorylated form of the R state
- c) glucose-6-phosphate is an activator of the enzyme
- d) its phosphorylation requires the enzyme phosphoprotein phosphatase

Q38. Allosteric enzymes have all the following properties EXCEPT

- a) can be affected by feedback inhibition
- b) can be activated and inhibited by effectors
- c) can be described by Michaelis-Menten kinetics
- d) their kinetics follow a sigmoidal curve

Q39. Which of the following statements is **CORRECT** for the enzyme carboxypeptidase A?

- a) its action involves metal-ion catalysis
- b) its action requires Mg(II) ion
- c) its activated by phosphorylation
- d) it catalyzes the hydrolysis of amylose

| Question | Answer    | Question | Answer |
|----------|-----------|----------|--------|
| 1        | C         | 21       | B      |
| 2        | B         | 22       | A      |
| 3        | D         | 23       | A      |
| 4        | B         | 24       | D      |
| 5        | D         | 25       | A      |
| 6        | C         | 26       | D      |
| 7        | D         | 27       | C      |
| 8        | A         | 28       | D      |
| 9        | غير مطلوب | 29       | D      |
| 10       | A         | 30       | D      |
| 11       | D         | 31       | B      |
| 12       | D         | 32       | B      |
| 13       | B         | 33       | B      |
| 14       | A         | 34       | D      |
| 15       | A         | 35       | A      |
| 16       | C         | 36       | D      |
| 17       | D         | 37       | A      |
| 18       | A         | 38       | C      |
| 19       | A         | 39       | A      |
| 20       | C         |          |        |