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NET JRF TEST 5

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TEST-5

Enzymes, Coenzymes (Activators, Inhibitors), Thermodynamics, Enzyme Kinetics, Enzyme activity regulation, pH (H.H Equation)

1. Active site is
 - (a) site of binding of activator
 - (b) site of binding of substrate
 - (c) site of binding of inhibitor
 - (d) none
2. Which enzyme hydrolyse sugar to glucose and fructose
 - (a) invertase
 - (b) lipase
 - (c) pepsin
 - (d) maltase
3. An enzyme active site contains only the amino acids with aliphatic side chains (gly, ala, val, leu, ile). The catalytic mechanism of the enzyme CANNOT involve
 - (a) approximation.
 - (b) covalent catalysis.
 - (c) induced fit/substrate strain
 - (d) none
4. If $[s]$ is very small the V_0/s curve becomes
 - (a) linear
 - (b) hyperbola
 - (c) parabola
 - (d) curved
5. The committed step in a metabolic pathway is usually
 - (a) the reaction producing the metabolite unique to the generation of the end product
 - (b) the first step in a process
 - (c) the allosterically regulated step
 - (d) Both a and c
6. Find the pH of 0.0815 M NaOH solution
 - (a) 2.9
 - (b) 2.3
 - (c) 12.9
 - (d) 1.3

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7. Regulatory enzymes

- (a) have hyperbolic V_0/s curve
- (b) are exception of MM equation
- (c) follow mm equation
- (d) none

8. Regulatory enzyme for which substrate and modulators are not identical are

- (a) homotropic
- (b) Homogen
- (c) Homeotropic
- (d) heterotropic

9. True statements concerning the concerted model for an allosteric enzyme include

- (a) the enzyme has more than one subunit
- (b) allosteric effectors change the equilibrium ratio of taut to relaxed forms.
- (c) in one enzyme molecule all the subunits are in the same form
- (d) All of above

10. Enzymatic catalysis

- (a) generally require a fixed or frozen orientation of the substrate(s) on the enzyme surface
- (b) may involve the concerted action of acidic and basic groups
- (c) is usually dependent on pH and temperature
- (d) in mammals is optimal at pH 7.40
- (e) 1, 2 and 3 are correct

11. Suicide inactivators are a class of

- (a) reversible inhibitors
- (b) uncompetitive inhibitors
- (c) irreversible inhibitors
- (d) none

12. Existence of enzyme substrate complex was proposed by

- (a) Louis Pasteur
- (b) Edward buchner
- (c) A. wurtz
- (d) James sumner

13. Structural features which always play a role in determining the specificity of an enzyme for its substrate include

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- (a) a coenzyme must be covalently bound to the enzyme to exclude compounds which are structurally
- (b) the specific bond with which the enzyme interacts must be present on the substrate
- (c) the substrate must interact with specific amino acids for proper positioning within the active site of
- (d) both the enzyme and the substrate must be ionically charged
- (e) 1 and 3 are correct

14. In exergonic reaction Delta G is

- (a) negative
- (b) positive
- (c) 0
- (d) can be both a and b

15. Activation energy signifies

- (a) free energy difference of product and substrate
- (b) free energy difference of ground state and transition state
- (c) energy released by substrate to convert to product
- (d) none

16. Aspartate transcarbamoylase catalyze biosynthesis of

- (a) purine
- (b) pyridine
- (c) ribose
- (d) deoxyribose

17. Relation between free energy and equilibrium constant is

- (a) $\Delta G = -RT \ln K$
- (b) $\Delta G = RT \ln K$
- (c) $\Delta G = -\ln K / RT$
- (d) $\Delta G = -RT / \ln K$

18. Non competitive inhibition affects

- (a) V_{max} but not K_m
- (b) both V_{max} and K_m
- (c) K_m but not V_{max}
- (d) none

19. Which of the following statements about regulatory enzymes is/are generally true?

- (a) Regulatory enzymes usually catalyze reactions which are readily reversible

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- (b) The binding of an activating modifier decreases the concentration of substrate needed to maintain a
- (c) Regulatory enzymes usually catalyze reactions at the end of metabolic pathways.
- (d) none

20. Which of the following statements about coenzymes and vitamins is/are true?

- (a) Biotin is a cofactor for certain enzymatic carboxylations
- (b) Thiamine pyrophosphate functions as a coenzyme in specific enzymatic reactions in carbohydrate
- (c) Pantothenic acid is a vitamin precursor for coenzyme A
- (d) Riboflavin is a vitamin precursor for NAD.
- (e) 1 2 and 3

21. Michaelis menton equation is

- (a) $V_0 = (V_{max} + s) / K_m$
- (b) $V_0 = (V_{max} [s]) / K_m + [s]$
- (c) $V_0 = (V_{max} + s) / K_m [s]$
- (d) $V_0 = (V_{max}) / K_m$

22. Allosteric modulators binds

- (a) reversibly
- (b) irreversibly
- (c) non covalently
- (d) Both a and c

23. If activation energy is high

- (a) rate of reaction is slow
- (b) rate of reaction can be increased by high temperature
- (c) catalyst can be used to decrease it
- (d) all of above

24. Effector mediated regulation is

- (a) reversible
- (b) irreversible
- (c) allosteric
- (d) none

25. Inhibitor binds only to ES complex in

- (a) competitive
- (b) uncompetitive
- (c) mixed

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(d) non competitive

26. An enzyme was assayed in the presence and absence of an inhibitor. Based on the results shown above, which of the following statements is/are correct?"

- (a) The K_m is equal to $1/a$
- (b) Line b is a Lineweaver-Burk plot of the data in the presence of the inhibitor
- (c) The inhibitor acts competitively
- (d) The V_{max} is equal to c

27. The kinetics for the enzymatic reaction $A + B \rightarrow \text{Products}$ was examined at constant, high concentration of B by varying the concentration of A. The results obtained are shown above. Based on these results, which statement(s) about this system are correct?"

- (a) $V_{max} = 10$
- (b) The reaction of substrate B follows Michaelis-Menten kinetics
- (c) A is a homotropic allosteric effector of the enzyme.
- (d) $K_m = 0.8$
- (e) 2 and 4

28. What is the pH of a 0.0115 M HCl solution?

- (a) 1
- (b) 3.5
- (c) 1.9
- (d) 7.8

29. Existence of enzyme substrate complex was proposed by

- (a) Charles-Adophe Wurtz 1880
- (b) Edward buchner
- (c) Sumner
- (d) W kuhne

30. Rate limiting step has

- (a) highest activation energy
- (b) highest amount of substrate
- (c) highest amount of enzyme
- (d) highest amount of free energy

31. Aspirin inhibits enzyme that help in

- (a) none
- (b) activity of prostaglandins
- (c) forming of prostaglandins

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(d) breaking of prostaglandins

32. Which condition is the difference in calculating standard free energy change and biochemical standard free energy change?

- (a) temperature
- (b) partial pressure
- (c) H⁺ concentration
- (d) no difference

33. A molecule reacts with active site of enzyme in case of

- (a) competitive inhibition
- (b) noncompetitive inhibition
- (c) allosteric inhibition
- (d) feedback inhibition

34. The sigmoid substrate saturation curve of an allosteric enzyme reflects

- (a) the action of a heterotropic modulator
- (b) homotropic effects in substrate binding.
- (c) conformational interactions between subunits
- (d) Substrate inhibition.
- (e) both a and c

35. From the transition state which one is true?

- (a) Higher possibility of formation of product
- (b) Higher possibility of breaking down to substrate
- (c) both direction equally likely
- (d) depends on activation energy

36. Unit of K_{cat} =

- (a) M⁻¹
- (b) L⁻¹
- (c) T⁻¹
- (d) S⁻¹

37. In competitive inhibition the reaction can reach normal V_{max} by

- (a) increasing pressure
- (b) decreasing temperature
- (c) increasing temperature
- (d) adding more substrate

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38. Which of the following amino acids, as parts of proteins, are targets for covalent modification by phosphorylation or glycosylation?"

- (a) Serine
- (b) asparagine
- (c) threonine
- (d) All of above

39. Find the pH of 0.00372M Ba(OH)₂ solution

- (a) 2.9
- (b) 11.9
- (c) 12.9
- (d) 1.3

40. Conversion of L threonine to L-isoleucine is catalysed initially by threonine dehydratase, which one inhibits the reaction

- (a) isoleucine
- (b) arginine
- (c) aspartine
- (d) threonine

41. pH of 0.255 M NH₄OH is ?

- (a) 6.8
- (b) 11.3
- (c) 12.9
- (d) 1.3

42. $K_{cat} =$

- (a) V_{max}/V_o
- (b) V_o/V_{max}
- (c) $V_{max}/[ET]$
- (d) $V_{max}/[S]$

43. Process observed only with enzyme having 2 or more substrate

- (a) competitive
- (b) uncompetitive
- (c) mixed
- (d) Both a and c

44. In most multienzyme how many acts as regulatory enzyme

- (a) 2
- (b) 3

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- (c) 1
- (d) 4

45. Which one is dietary precursor of coenzyme A in mammals?

- (a) biotin
- (b) Vit B 12
- (c) Pantothenic Acid
- (d) Riboflavin

46. Enzymes which display cooperativity

- (a) Do not obey Michaelis-Menten kinetics.
- (b) often are responsive to the concentration of some molecules that is not a substrate
- (c) are switched on and off by phosphorylation or other covalent modification
- (d) both a and b

47. Enzyme Ptyalin is present in

- (a) blood
- (b) adrenal gland
- (c) saliva
- (d) intestine

48. Regulation by proteolytic cleavage in enzyme is

- (a) reversible
- (b) irreversible
- (c) allosteric
- (d) none

49. Binding in feedback inhibition is

- (a) noncovalent
- (b) covalent
- (c) irreversible
- (d) Both a and c

50. If 2 enzymes have same K_{cat} , then the rate enhancement brought about by enzymes will be

- (a) always same
- (b) always different
- (c) may differ
- (d) none

51. Regulatory enzymes for which substrate and modulators are identical are

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- (a) homotropic
- (b) Homogen
- (c) Homeotropic
- (d) homeostatic

52. Consider plots of $1/v$ (Y axis) versus $1/[S]$ (X axis) for an enzyme (E) catalyzing a single-substrate (S) reaction in the presence or absence of an inhibitor (I). If the lines of best fit have identical intercepts on the X axis then this suggests that

- (a) the equilibrium constants for binding of I to E and to ES are equal
- (b) The inhibitor is acting competitively.
- (c) the inhibitor binds to enzyme but not to enzyme substrate complex
- (d) both 1 and 5
- (e) the inhibitor binds with enzyme and also with enzyme substrate complex

53. Second law of thermodynamics says

- (a) energy can never be created nor destroyed
- (b) In all natural process ,entropy of universe increase
- (c) In all natural process ,entropy of universe decrease
- (d) none

54. Compared to non-allosteric enzymes allosteric enzymes are

- (a) smaller
- (b) very small
- (c) larger
- (d) equal

55. Which one is not a class of enzymes?

- (a) oxdoreductase
- (b) phosphotransferase
- (c) Hydrolases
- (d) lyases

56. Which group is transferred by Flavin adenine dinucleotide?

- (a) electron
- (b) Amino Group
- (c) CO₂
- (d) Hydride ion

57. Find the pH of 1.25 M acetic acid and 0.75 M potassium acetate?

- (a) 0.8
- (b) 4.5

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- (c) 12.9
- (d) 1.3

58. What is the steady state assumption?

- (a) rate of formation of ES=rate of breakdown of ES
- (b) rate of formation of ES=rate of formation of ES
- (c) rate of breakdown of ES=rate of formation of ES
- (d) rate of breakdown of ES=rate of breakdown of ES

59. Function of lyses

- (a) addition of groups to double bond
- (b) formation of double bond
- (c) formation of C-C , C-S bonds by condensation reaction
- (d) both 1 and 2

60. Find the pH of 0.12 M HC₂H₃O₂

- (a) 2.8
- (b) 11.9
- (c) 12.9
- (d) 1.3

61. Which is incorrect?

- (a) enzymes are catalyst
- (b) enzymes are in colloidal state
- (c) urease is an enzyme
- (d) denature on high temperature

62. Which enzyme is the most extensively found in nature?

- (a) Rubisco
- (b) hexokinase
- (c) Transacetylase
- (d) Phosphotransferase

63. What is apoenzyme

- (a) prosthetic group
- (b) co factor
- (c) protein part
- (d) holo enzyme

64. Function of catalyst is 70

- (a) increase activation energy

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- (b) increase rate of return
- (c) direction of equilibria

65. k_1 , k_2 for an enzyme reaction $E + S \rightleftharpoons ES \rightarrow E + P$ that follows k_{-1} Michaelis-Menten kinetics

- (a) V_{max} is independent of the value of k_2 .
- (b) K_m is approximately equal to the dissociation constant of ES when k_{-1} is much smaller than when $[S] \ll K_m$, the reaction is zero order.
- (c) it is assumed that the concentration of ES does not change appreciably during assay measurements
- (d) none

66. Unit of entropy is

- (a) J/mole
- (b) cal/mole
- (c) J/mole.K
- (d) J.K/mole

67. in the diagram which point is called the transition state

- (a) a
- (b) b
- (c) c
- (d) d

68. The best way to compare catalytic efficiencies of different enzymes is to compare their

- (a) $K_m/[s]$
- (b) K_{cat}/K_m
- (c) K_m
- (d) K_{cat}
- (e) none

69. If $K_m = 10^{-3}$, $V_o = 10 \text{ M/s}$ and $S = 10 \text{ moles}$ find V_{max}

- (a) 10.01
- (b) 0.01
- (c) 1.01
- (d) 1.00

70. Calculate the pH of $0.0000135 \text{ M H}_3\text{BO}_3$

- (a) 6.8
- (b) 11.9

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- (c) 12.9
- (d) 1.3

71. Ratio of K_{cat}/K_m at which the enzyme is said to have achieved catalytic perfection

- (a) 10^8 to 10^9
- (b) 10^3 to 10^4
- (c) 10^1 to 10^2
- (d) 10^{15} to 10^{20}

72. Who wrote the treatise entitled "enzymes"

- a) Louis Pasteur
- b) J. Sumner
- c) W. Kuhne
- d) J. B. S. Haldane

73. A positive charge near Lysine

- (a) increase pK_a
- (b) decrease pK_a
- (c) does not affect pK_a
- (d) alters the structure

74. Which is wrong for enzyme?

- (a) increase activation energy
- (b) works best at optimum pH
- (c) works best at optimum temperature
- (d) highly specific

75. Which inhibitor method is used in studying key active sites?

- (a) reversible inhibitors
- (b) uncompetitive inhibitors
- (c) irreversible inhibitors
- (d) none

76. Reactions catalyzed by enzymes

- (a) Have a constant K_m , which is directly related to how strongly the substrate binds to the enzyme.
- (b) may appear to be zero order if the substrate concentration is completely saturating
- (c) are fundamentally second order reactions
- (d) . Always show Michaelis-Menten kinetics (i.e., obey the Michaelis-Menten velocity expression).
- (e) 1 and 3 are correct

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77. For allosteric enzyme plots of V_o v/s S is

- (a) hyperbola
- (b) parabola
- (c) sigmoid
- (d) straight line

78. Noncompetitive inhibitors of enzyme catalyzed reactions:

- (a) displace substrate from the active sites at high inhibitor concentrations
- (b) alter the V_{max} of the reaction
- (c) decrease the Gibbs free energy of activation for the reaction
- (d) increase the slope of the Lineweaver-Burk plot as the inhibitor concentration decreases

79. Which enzyme hydrolyse triglyceride to fatty acid

- (a) Amylase
- (b) lipase
- (c) pepsin
- (d) maltase

80. In enzyme assays, it is preferable to measure initial velocities in order to

- (a) avoid substrate inhibition.
- (b) avoid product inhibition.
- (c) avoid the reverse reaction.
- (d) Both a and c

81. Modulators binding causes

- (a) conformational changes in allosteric enzymes
- (b) degradation of competitive substrate
- (c) both A and B
- (d) none

82. Hexokinase is common name of

- (a) glucose phosphotransferase
- (b) tetrahydrofolate
- (c) pyrophosphatase
- (d) thiamine

83. Enzyme that catalyze conversion of glucose to ethanol

- (a) zymase

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- (b) invertase
- (c) maltase
- (d) diastase

84. Some enzymes require calcium ion as a cofactor. This ion

- (a) could participate in the binding of substrate to enzyme
 - (b) would generally be called a coenzyme if it is loosely bound
 - (c) is likely to catalyze the same reaction as the enzyme even when it is not bound to the enzyme
 - (d) Could exert its influence by helping the protein to maintain its native conformation.
- 2 and 4

85. Which one is specific for a enzyme

- (a) well defined crystalline compound
- (b) specific catalyst action
- (c) increased activity with increase in temperature
- (d) inert to UV rays

86. Precursor of NAD in mammals is

- (a) nicotinic acid
- (b) nicotine
- (c) nicotylone
- (d) none

87. At [s] very high $V_o =$

- (a) V_{max}
- (b) $K_m/[s]$
- (c) $1/2 V_{max}$
- (d) $[S]/K_m$

88. If velocity is half of V_{max} and $K_m = 10$ find S

- (a) 10.01
- (b) 10
- (c) 20
- (d) 32

89. For non regulatory enzymes the V_o V/S S curve is

- (a) hyperbola
- (b) parabola
- (c) sigmoid
- (d) straight line

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90. Which act as a competitive inhibitor for methanol?
- (a) propanol
 - (b) glucose
 - (c) ethanol
 - (d) none
91. Allosteric enzymes for binding of modulators has
- (a) 1 active site
 - (b) 1 or more regulatory site
 - (c) both A and B
 - (d) none
92. Who isolated & crystallized ureasae?
- (a) Louis Pasteur
 - (b) Edward buchner
 - (c) W. Kuhne
 - (d) James sumner
93. If V_o is increased from 10 to 20 % of V_{max} how many fold increase of $[s]$ will be required
- (a) 18/19
 - (b) 19/20
 - (c) 20/19
 - (d) 19/18
94. What is the pH of 0.16 M HCl and 0.072 M phosphoric acid?
- (a) 0.8
 - (b) 11.3
 - (c) 12.9
 - (d) 1.3
95. Henderson Hasselbalch equation is
- (a) $pOH = pK_A - \log\left(\frac{[A^-]}{[Ha]}$
 - (b) $pH = pK_A - \log\left(\frac{[Ha]}{[A^-]}\right)$
 - (c) $pH = pK_A - \log\left(\frac{[A^-]}{[Ha]}\right)$
96. NAD and NADP
- (a) have identical oxidation/reduction potentials (that is, they are equally good oxidizing agents)

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- (b) are identical in structure except NADP has a third phosphate on the adenosine group
- (c) are usually treated as distinct cofactors by enzymes
- (d) All of above

97. FAD is a prosthetic group in

- (a) pyruvate dehydrogenase
- (b) glyceraldehyde 3-phosphate dehydrogenase
- (c) malate dehydrogenase
- (d) succinate dehydrogenase
- (e) 1 and 3

98. Only one active site and no regulatory site is same in which regulatory enzyme

- (a) homotropic
- (b) Homogen
- (c) Homeotropic
- (d) homeostatic

99. In EC No. 2711 what does 2 stand for

- (a) Oxidoreductase
- (b) lyases
- (c) transferase
- (d) hydrolases

100. Who coined the term "enzyme?"

- (a) Louis Pasteur
- (b) Edward Buchner
- (c) W. Kuhne
- (d) James Sumner

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