Biochemistry (Final Material)

Batch of 019

Collected by Nada Mansour

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1- Which of the following membrane lipids does NOT contain a phosphate group?

- a. Phosphatidyl inositol
- b. Lecithin
- c. Ceramide
- d. Phosphatidic acid
- e. Sphingomyelin

2- What is the usual outcome of mutation in the amino acid residues on the surface of hemoglobin?

- a. Reduced oxygen binding
- b. Protein denaturation
- c. Protein aggregation
- d. Protein instability
- e. Usually nothing major

3- What is the turnover number for an enzyme knowing that 3 ug of the enzyme (molecular weight = 3,000,000) gives a Vmax of 1 umol of product per second?

- a. 3 million per micro-second
- b. 30 million per second
- c. 1 million per second
- d. 9 million per second
- e. 3 million per second

- 4- Treatment of a peptide with trypsin generates a dipeptide that is positively charged at pH 7. Further treatment of this peptide with chymotrypsin generates two single amino acids. The dipeptide is:
 - a. Asp-Lys
 - b. Val- Met
 - c. Arg- Trp
 - d. Gly- Val
 - e. Phe-Lys

5- To which class of enzyme does an enzyme that catalyzes this reaction (A+B+ATP \rightarrow A-B + ADP +Pi) belong?

- a. Oxidoreductase
- b. Hydrolase
- c. Ligase
- d. Lyase
- e. Transferase

6- This technique is NOT dependent on size of molecules.

- a. Polyacrylamide gel electrophoresis
- b. Dialysis
- c. Two-dimensional gel electrophoresis
- d. Isoelectric focusing
- e. Gel filtration chromatography

7- This mutation results in reduction of both the stability of hemoglobin protein and its oxygen carrying capacity.

- a. Glu to Val at codon 6
- b. Glu to Lys at codon 26
- c. Glu to Lys at codon 6
- d. Asn (G4) to Thr
- e. His to Leu at codon 143

8- This is how the propionate groups of heme molecules are positioned in both myoglobin and hemoglobin.

- a. They are covalent linked to distal histidine.
- b. They are oriented towards the exterior surface of the protein.
- c. They are covalently linked to proximal histidine.
- d. They are hidden inside the protein.
- e. They are linked to one of the internal alpha helices.

9- The use of reducing agents will NOT affect the bonding pattern in SDS-PAGE of the following protein:

- a. Immunoglobulin G
- b. Keratin
- c. Immunoglobulin M
- d. Hemoglobin
- e. Oxidized glutathione

10- The reason why enzymes need to bind to substrates at, at least, three points is:

- a. To ensure high affinity of binding.
- b. To catalyze reaction faster.
- c. To differentiate isomers of substrates.
- d. To allow binding to more than one substrate.
- e. To allow for electron rearrangement of substrates.

11- The phosphate groups of thiamin pyrophosphate and ATP requires this to bind to active sites of enzymes:

- a. They do not need a mediator.
- b. Coenzyme A
- c. Zinc ion
- d. FADH2 or NADH
- e. Magnesium ion

12- The main purpose of the hinge region of antibodies is:

- a. Antibody clearance
- b. Binding phagocytic cells
- c. Allowing better binding to antigen
- d. Site of sugar binding
- e. Binding to antigenic epitopes

13- The following fatty acid is saturated:

- a. Palmitoleic acid
- b. Arachidonic acid
- c. Palmitic acid
- d. Linoleic acid

14- The following are components of the secondary structure:

- a. Motif
- b. Domain
- c. Amino acid sequence
- d. Prosthetic groups
- e. Turn

15- You have the following molecules: glycine, aspartate, sucrose, collagen, and hemoglobin. One of these statements is NOT correct:

- a. Aspartate is eluted first from anionic exchange chromatography.
- b. Concanavalin A- bound beads in affinity chromatography can be used to purify sucrose.
- c. Dialysis can be used to isolate collagen and hemoglobin from the other molecules.
- d. Sucrose does not bind to beads of cationic exchange chromatography.
- e. Glycine comes out last in size exclusion chromatography.

16- X-ray diffraction of electrons is used to:

- a. Measure the rate of protein movement induced by an electrical current.
- b. Purify cofactors bound to enzymes.
- c. Determine protein structure in solid state.
- d. Calculate distance of chain movement in liquid environment.
- e. Ionize proteins prior to chromatography.

17- One of the following does NOT favor R- to T-state transition of glycogen phosphorylase:

- a. ATP
- b. Phosphorylation
- c. Glucose-6-phosphate
- d. AMP
- e. Glucose

18- Mutating the internal Phe (at codon 42) to Ser in beta hemoglobin results in:

- a. Inability to reduce iron once oxygen is released.
- b. Stabilization of the T state of hemoglobin
- c. Protein denaturation
- d. Inability to release oxygen.
- e. Unstable binding of heme to the protein

19- Lysine, allysine, and hydroxylysine are important in cross-linking collagen molecules, but in elastin, cross-linking occurs due to:

- a. Hydroxyproline
- b. Lysine and allysine only.
- c. All three molecules as well.
- d. There is no cross-linking in elastin fibers.
- e. Cysteine residues

20- Lactate dehydrogenases 1 (all H) and 5 (all M) differ in all of the following EXCEPT:

- a. Tissue distribution
- b. Isoelectric point
- c. Regulation
- d. Substrate preference
- e. Overall quaternary structure

21- It is thought that we can take advantage of our knowledge in regulation of gamma globin gene expression to treat this disease:

- a. Methemoglobinemia
- b. Beta thalassemia
- c. Sickle cell anemia
- d. Hereditary persistence of fetal hemoglobin (HPFH)
- e. Alpha thalassemia

22- Glycogen is composed of ______ that are connected by ___

_____ and branched at

- a. Glucose residues, alpha-1,4 linkage, carbon number 6
- b. galactose residues, alpha-1,4 linkage, carbon number 1
- c. Glucose residues, beta-1,4 linkage, carbon number 1
- d. ribose residues, alpha-1,4 linkage, carbon number 6
- e. galactose residues, alpha-1,4 linkage, carbon number 6

23- Class switching involves:

- a. Changing the hypervariable region of antibodies.
- b. Changing the constant region of antibodies only.
- c. Changing the variable region of antibodies only.
- d. Changing the B cells that produces the antibodies.
- e. Changing both the variable and constant regions of antibodies.

24- Cholesterol is composed of:

- a. Steroid nucleus and a side chain that contains an amine group.
- b. Sphingosine connected to a hydroxyl group and an unsaturated fatty acid.
- c. Four fused hexagonal rings and several hydrocarbon side chains and a carbonyl carbon.
- d. Four fused rings and several hydrocarbon side chains and a hydroxyl group.
- e. Steroid nucleus and a side chain that contains a carboxyl group.

25- An enzyme inhibitor binds to a regulatory site and alters the active site preventing the substrate from binding. What is true about this inhibitor?

- a. It decreases both Km and Vmax.
- b. It is a non-competitive inhibitor.
- c. It increases Km and decreases Vmax.
- d. It is a suicide inhibitor.
- e. It is an uncompetitive inhibitor.

26- An enzymatic reaction proceeds through 3 transition states. They have free energy (G) values of 2.3, 4.2, and 1.2 kcal/mol in order of appearance. If you know that G of substrate is 1.9 kcal/mol and G of product is 3.6 kcal/mol. What is the activation energy?

- a. 8 kcal/mol
- b. 0.4 kcal/mol
- c. 2.3 kcal/mol
- d. 1.7 kcal/mol
- e. -0.7 kcal/mol

27- Although creatine phosphokinase MB (CPK-MB) is not the predominant enzyme in cardiac muscle cells, it is an excellent biomarker of myocardial infarction because:

- a. It is a zymogen.
- b. It is exclusively present in cardiac muscle cells and not in other cell types.
- c. It is released in large quantities.
- d. It lasts in blood for a relatively long time.
- e. The ration CPK-MB/CPK-MM is flipped and becomes more than 11.

28- Although carbon dioxide (CO2) is generated in metabolically active tissues resulting in formation of protons (H+), pH is not altered greatly due to a phenomenon known as isohydric shift. This is because:

- a. Excess protons are taken up by surrounding cells like endothelial cells.
- b. Hemoglobin acts as a buffer.
- c. Excess CO2 molecules bind to hemoglobin forming carbamates.
- d. Chloride ions balance out the increased protons in tissues.
- e. The bicarbonate system is very efficient inside red blood cells.

29- A single point amino acid change from His143 in HbA to serine in fetal hemoglobin (HbF) results in higher affinity of HbF to oxygen. This is because:

- a. Reduced formation of carbamates
- b. Stabilization of R form of hemoglobin
- c. Reduced chloride shift
- d. Reduced binding to 2,3-bisphodsphoglycerate
- e. Reduced Bohr effect

30- The disaccharide that can produce galactose when digested is:

- a. Amylose
- b. Sucrose
- c. Lactose
- d. Maltose
- e. Cellobiose

31- The amino group of histidine is titrated at a lower pH than the amino group of the backbone.

- a. False
- b. True

32- Repeated and frequent blood transfusions results:

- a. Decreased production of globin genes.
- b. Accumulation of iron in tissues, thus, increased toxicity.
- c. Clustering of red blood cells
- d. Hydrops fetalis
- e. Denaturation and aggregation of globin proteins

33- Reducing enzymes concentration in a reaction by half results in:

- a. Increasing Km of enzyme by double.
- b. No effect on Kcat, Vmax or Km.
- c. Decreasing Vmax of the reaction by half.
- d. Decreasing Kcat of the enzyme by half.
- e. Decreasing Km of the enzyme by half.

34- Protofibrils are composed of?

- a. Two protofilaments
- b. Two alpha keratin chains
- c. Two intermediate filaments
- d. Two alpha keratin tetramers
- e. Two coiled coil keratin dimers

35- One of the following is TRUE in regard to covalent inhibitors.

- a. They are transition analogs.
- b. They allow enzymes to start reactions then they bind to their active sites.
- c. They compete with substrates in binding to active sites of enzymes.
- d. They chemically modify active sites of enzymes.
- e. They bind to and chemically modify regulatory sites of enzymes.

36- One of the following is TRUE in regard to carbon monoxide (CO) binding to heme/hemoglobin:

- a. The affinity of oxygen binding to hemoglobin increases when CO is bound to at least one heme of hemoglobin.
- b. CO can form carbamates with hemoglobin.
- c. The affinity of binding of CO to hemoglobin becomes less than that of oxygen's when heme is part of hemoglobin.
- d. Proximal histidine forces CO to form a bent bond with heme.
- e. CO influences the pKa of His146 of the beta chain of hemoglobin.

37- One of the following is NOT true in regard to small monomeric G proteins:

- a. They are active when GTP replaces GDP.
- b. GTP-exchange factors activate the proteins.
- c. GTPase activating proteins inhibit these proteins.
- d. GDP dissociation inhibitors are activators of the proteins.
- e. They get inactivated when GTP is released and replaced by GDP.

38- One of the following is NOT true in regard to rate-limiting reactions:

- a. They are reversible.
- b. They are driven by highly regulated enzymes.
- c. They are driven by consuming energy.
- d. They are slow reactions.
- e. They are driven by enzymes with relatively low affinity to their substrates.

39- One of the following is NOT true in regard to flavin adenine dinucleotide (FAD):

- a. It is needed for the function of lactate dehydrogenase.
- b. It forms a radical during reactions.
- c. It binds covalently to enzymes.
- d. It accepts two electrons sequentially.
- e. It works with oxidoreductase enzymes.

40- One of the following is NOT true in regard to aspartate transcarbamoylase (ATcase):

- a. Binding of an inhibitor shuts off enzyme activity completely.
- b. Regulation occurs through altering affinity of binding, not maximal activity.
- c. CTP is a homotropic allosteric inhibitor.
- d. ATP is a homotropic allosteric activator.
- e. It is composed of multiple active sites.

Good luck 😊!

♥ ANSWERS:

1	2	3	4	5	6	7	8	9	10
C	E	C	E	С	D	В	В	D	С
11	12	13	14	15	16	17	18	19	20
E	С	C	E	Α	С	D	E	В	E
21	22	23	24	25	26	27	28	29	30
В	Α	В	D	В	С	С	В	D	С
31	32	33	34	35	36	37	38	39	40
В	В	C	Α	D	Α	E	Α	Α	D

الإجابات هي إجابات الطلبة ولكن ليست بالضرورة الإجابة المعتمدة من الدكتور، حاولنا قدر المستطاع أن تكون صحيحة ومجمع عليها من أكثر من طالب..

أعذرونا إن وجدتم أي خطأ فقد جل من لا يسهو..

بالتوفيق 🙏 🎔 🎔

اللهم إني أستودعك ما قرأت و ما حفظت و ما تعلمت، فرده عند حاجتي إليه، إنك على كل شيء قدير، حسبنا الله و نعم الوكيل🌍