

Biochemistry Final Exam

Doctor 2018

1) Which is the amino acid that can be included in the reaction of phosphatide?

- a) Lysine
- b) serine
- c) asparagine

Answer: b

2) If the $[S]$ is much lower than K_mWhat can u tell?

Answer: the reaction is first ordered with respect to $[S]$

3) At what substrate concentration of an enzyme which has $K_m=0.09$ will it reach the tenth of its maximal rate?

- a) 0.009
- b) 0.01
- c) 0.001
- d) 0.018

Answer: b

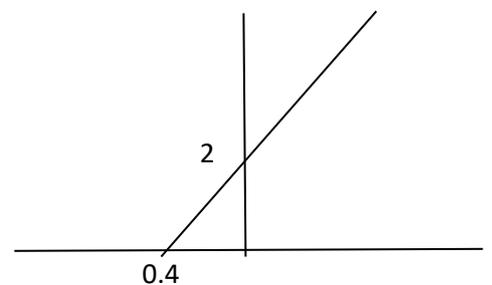
4) A patient has been diagnosed with enteropathy where intestinal bacteria secrete NH_3 and it's transported to blood circulation through the portal vein. What happens to the body?

- a)-Metabolic alkalosis
- b)-Respiratory acidosis
- c)-Respiratory alkalosis
- d)-Metabolic acidosis
- e)-Does not have any effect as the bicarbonate buffer system is not affected.

Answer: a

5) From the following Lineweaver-Burk plot, what are the values of K_m and V_{max} ?

- a) $V_{max} = 2 \setminus K_m = 0.4$
- b) $V_{max} = 0.5 \setminus K_m = 0.4$
- c) $V_{max} = 2 \setminus K_m = 2.5$
- d) $V_{max} = 0.5 \setminus K_m = 2.5$



Answer: d

6) One of the following amino acids not participate in acid base reaction?

- A) Asp
- B) Val
- C) Ser

Answer: b

7) What does sarin do?

- a) Form covalent bond with acetylcholinesterase
- b) Form non-covalent bond with acetylcholinesterase
- c) Form covalent bond with serine protease
- d) Makes a covalent bond with cyclooxygenase

Answer: a

8) The enzyme pyruvate decarboxylase belongs to which family?

- a) Oxidoreductases
- b) Transferases
- c) Ligases
- d) Lyases
- e) Hydrolases

Answer: d

9) A pentapeptide contains one of each of the following amino acids: Met, Phe, Val, Lys, Asp, not in order. When treated with cyanogen bromide, two peptides were obtained: a tripeptide with a positive charge at pH=7, and a dipeptide with a negative charge at pH=7. What is the sequence of this peptide?

- a) Met-Lys-Phe-Asp-Val
- b) Phe-Lys-Met-Asp-Val
- c) Val-Asp-Met-Phe-Lys
- d) Phe-Asp-Met-Lys-Val

Answer: b

10) What is correct about monoclonal antibodies?

- a) Has same constant region, different variable region.
- b) Has different constant region, same variable region.
- c) Has same constant region, same variable region.
- d) Binds to antigens belonging to the same protein family

Answer: c

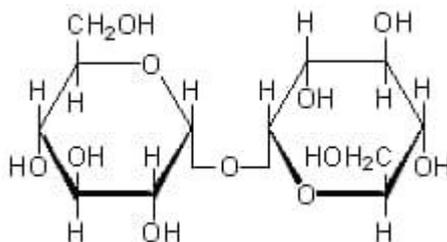
11) What is the coenzyme required for the function of aminotransferases?

- a) Pyridoxal phosphate
- b) biotin
- c) TPP
- d) CoA

Answer: a

12) One of the following is a non-reducing sugar?

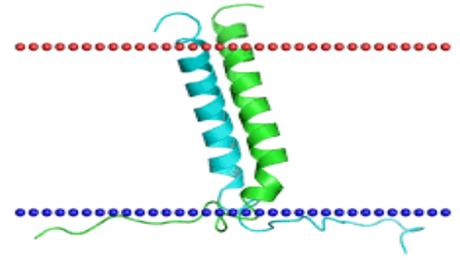
Answer:



13) Which of the following is true regarding the transmembrane domain in the integral protein shown here?

- a) It is amphipathic
- b) It consists of one transmembrane domain.
- c) It consists of hydrophilic amino acids.
- d) It is alpha helix.

Answer: d



14) False about SDS?

- a) It reduces disulfide bonds
- b) give a uniform negative charge to proteins.
- c) breaking non-covalent interactions.

Answer: a

15) Which if the following is not a true difference between aspartate and ATP in ATCase?

- a) Aspartate is an activator while ATP is an inhibitor.
- b) Aspartate changes the enzymes from T to R state while ATP changes it from R to T state.
- c) Aspartate binds to the active site while ATP bind to a regulatory site
- d) Aspartates works by changing $K_{0.5}$ while ATP changes V_{max} .

Answer: a + b + d

16) The purpose of GFP conjugated to protein is:

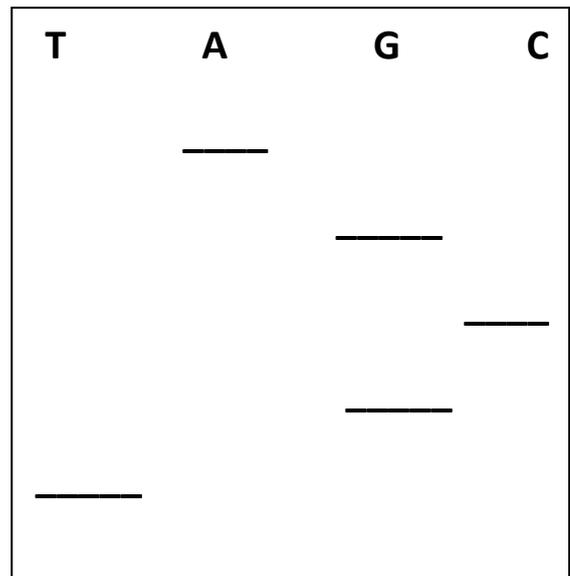
- a) Protein detection
- b) Protein purification
- c) Protein folding
- d) Protein solubility
- e) Protein secretion

Answer: a

17) What is the DNA sequence when we perform premature termination of DNA synthesis by dideoxynucleotide shown here?

- a) 5' – AGCGT – 3'
- b) 5' – TGCGA – 3'
- c) 3' – TGCGA – 5'

Answer: b



18) An experiment made measured the activity of an enzyme (micro mole/time). Knowing that the concentration of the enzyme is 10 nanomoles/volume... What can you tell for sure?

[S].	V°
0.12	0.17
0.10	0.15
0.08	0.13
0.07	0.11

- a) $V_{max} = 0.17$
- b) $K_m = 0.09$
- c) $K_{cat} = 0.017$
- d) $V_{max} = 0.19$ when $[s] = 0.14$
- e) We need farther information about concentration of S to determine the V_{max} and K_m

Answer: e

19) Which of the following is true regarding enzymatic reaction?

- a) It releases energy
- b) It make reaction spontaneous
- c) It changes free energy of the transition state but not reaction nor products

- d) It changes the reaction equilibrium favoring in product formation
- d) It changes the free energy (G) of the transition state to value below reactants free energy

Answer c

20) Why we use DNA adapters in next generation sequencing?

- a) To anneal with primers
- b) To stabilize the DNA strands

Answer: a

21) Which of the following mechanisms doesn't use antibodies?

- a) ELISA
- b) Western plot
- c) Affinity chromatography
- d) Mass spectrometry

Answer: d

22) Taq DNA polymerase is utilized in PCR since it is?

- a) Cheap
- b) Available in high amounts
- c) Stable at high temperatures

Answer: c

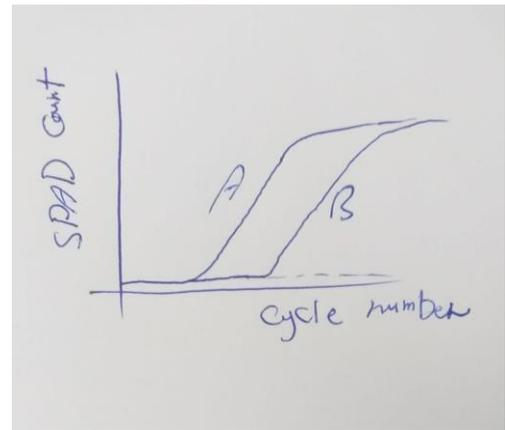
23) True about enzyme active site?

- a) Amino acids outside the active site determine the structure of the active site
- b) The initial structure of enzyme must match the substrate
- c) The amino acids of the active site are next to each other in the primary structure
- d) The activation energy is the energy required to fit the substrate in the active site

Answer: a

24) A quantitative, error free, SYBR green real-time PCR assay is performed for two avian flu patients as shown in the chart, you can tell:

Answer: A-Patient A has more viral content in his body than patient B.



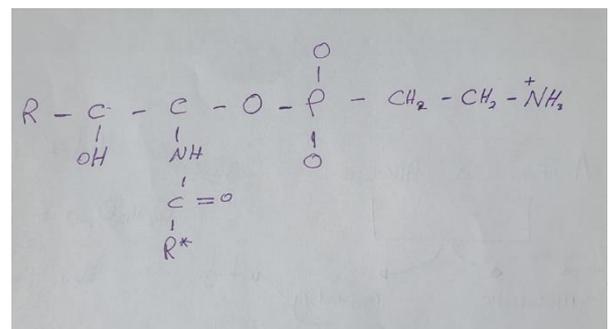
25) Myoglobin is not used in myocardial infarction, why?

- a) Does not have an enzymatic activity.
- b) Lactate dehydrogenase is a better biomarker.
- c) It is not expressed in enough quantities.
- d) It is not specific for MI.
- e) It gets secreted immediately.

Answer: d

26) What is this molecule?

- a) Bile acid.
- b) Prostaglandin.
- c) Monoacylglycerol
- d) Glycerophospholipid.
- e) Sphingophosphocholine.



Answer: e

*Note: the question got deleted since the head group (choline CH₂CH₂N(CH₃)₃) wasn't correctly drawn.

27) Which of the following is not required in expression vectors ?

- a) Cloning site.

- b) Promoter region.
- c) Ribosome binding region.
- d) Tagging sequence.
- e) A selectable marker.

Answer: d

28) The following figure represents D- sorbose.. which of the following statements is wrong ?

- a) It is a furanose.
- b) It is an alpha sugar.
- c) Carbon no.1 is the anomeric carbon.
- d) It is a ketose.
- e) It can re-open up into the chain form.



Answer: c

29) Which of the following is true regarding allosteric enzymes?

- a) They are monomeric.
- b) The allosteric inhibitor competes with the substrate at the active site.
- c) The binding of a substrate in an active site makes the substrate binding to other active sites easier.
- d) They follow a hyperbolic plot

Answer: c

30) What is an abzyme?

- a) An antibody that binds to active sites and activate them.
- b) An antibody that has an enzymatic activity.
- c) An enzyme that binds to antibodies and degrade them

Answer: b

31) One of the following cannot be hydrogenated?

- a) Arachidonic acid.
- b) Palmitic acid.

- c) Oleic acid.
- d) Linoleic acid.
- e) Linolenic acid.

Answer: b

32) We want to make an affinity chromatography to separate "avidin", which of these molecules can be bound to the beads?

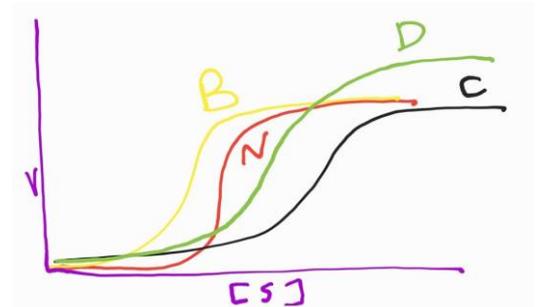
- a) Biotin
- b) Egg yolk (the yellow part)
- c) Glucose
- d) Pyridoxal

Answer: a

33) N represents an allosteric enzyme with no activator bound. We added an activator to N, which of the following is a possible plot for the result?

- B only.
- C only.
- D only.
- C and D

Answer: B only



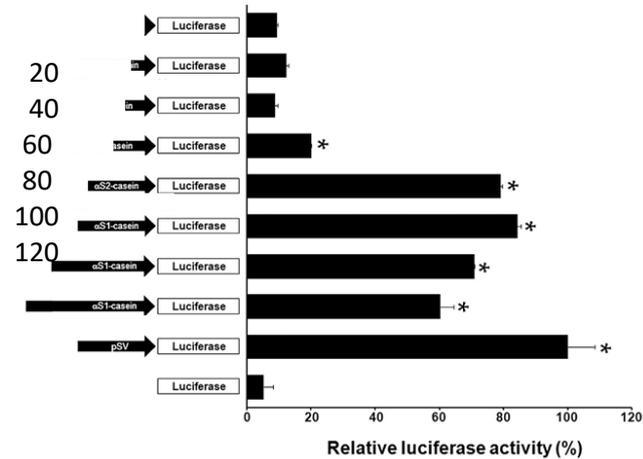
34) What type of enzyme converts chymotrypsinogen into chymotrypsin?

- a) Oxidoreductases
- b) Transferases
- c) Ligases
- d) Lyases
- e) Hydrolases

Answer: e

35) The promoter of a specific gene only is placed upstream of a “reporter gene” luciferase gene in a plasmid, the plasmid is transfected (inserted) into the cells, and the expression level of luciferase is measured, what can you tell?

- a) There is inhibitor region within 80 and 100.
- b) There is repressor region within 100 and 120.
- c) Blue color indicates that the promoter doesn't work, while brown color indicates good promoter.
- d) Gene transcribed at best when there is no promoter.
- e) Promoter does NOT affect the transcription.



Answer: b

36) Which of the following is true about GAGs?

- a) They are positively charged
- b) Heparin is an example

Answer: b

37) Which of the following is not true about the CRISPR/CAS9 system?

- a) Cas9 is guided by an RNA molecule
- b) Breaking double stranded DNA can be repaired by the system
- c) Breaking double stranded DNA can cause a mutation
- d) CRISPR is a bacterial genetic that constitutes the immune system of bacteria against phages

Answer: b

38) What's true about SDS-PAGE?

- a) It consists of acrylamide polymer cross-linked by methylenebisacrylamide

- b) Smaller proteins are closer to the top
- c) Proteins move from the anode to the cathode
- d) Proteins are separated according to shape, mass and charge

Answer: a

39) The substrate binds to the active site at 3 points at least, this helps in:

- a) Binding isomers
- b) Distinguishing chirality

Answer: b

40) Mass spectrometry separates proteins depending on:

- a) Mass only
- b) Charge only
- c) Mass and charge
- d) Mass, charge and shape

Answer: c

41) Increasing an enzyme concentration:

- a) Increases K_m
- b) Increasing K_m and V_{max}
- c) Increases V_{max} only

Answer: c

42) Which of the following can't be detected by the RNA-seq mechanism?

- a) RNA Stability
- b) Amount of transcripts
- c) Significant transcripts

Answer: a

43) The role of Zn^{+2} in alcohol dehydrogenase is:

- a) Donating electrons
- b) Neutralization of the intermediate
- c) Drawing the proton of the Serine residue

Answer: b

44) Where can we find nitrogen?

- a) Dextran
- b) Glycogen
- c) Chitin

Answer: c

45) Which of the following is not true about Glycogen Phosphorylase?

- a) The conformational states determine the active/inactive states
- b) Glucose is an inhibitor for Phosphorylase A only
- c) Phosphorylase A is the phosphorylated form while phosphorylase b isn't
- d) ATP can activate Phosphorylase A

Answer: d

46) Which of the following is true about the LacZ system?

- a) It gives a white colour when activated
- b) It tests the binding of two proteins together
- c) It tests the binding of a protein with a DNA molecule

Answer: b

47) Which of the following is found in the spots of the DNA microarray technique?

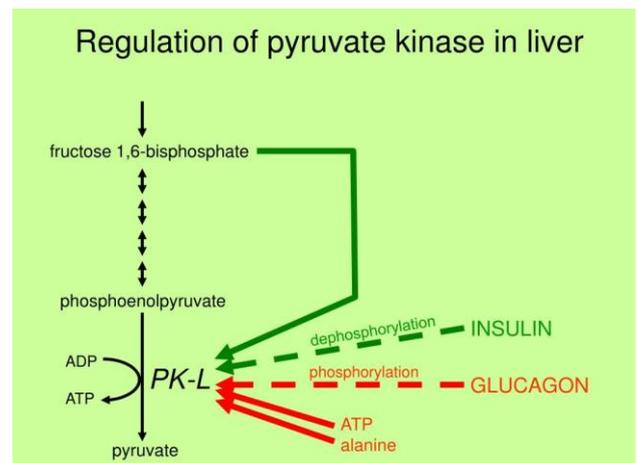
- a) Small DNA fragments that are complementary to an individual gene

Answer: a

48) The regulation mechanism of FBP on PK in the following diagram is:

- a) Feedback activation
- b) Feedback inhibition
- c) Feedforward activation

Answer: c



*Note: the diagram in the exam had more factors regulating the enzyme

49) Which of the following sequences can the enzyme Trypsin cleave?

- a) Phe-Leu-Asp-Asn
- b) Tyr-Ser-Val-Arg
- c) Arg-Pro-Lys-Pro
- d) Ala-Gln-Lys-Pro
- e) Trp-Pro-Arg-Cys

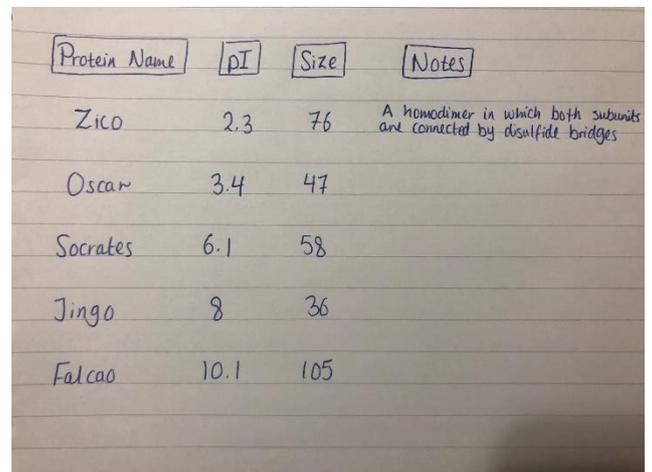
Answer: e

50) The following table contains the PI and sizes of different proteins (Zico, Oscar, Socrates, Jingo and Falcao), which of the statements below is false?

- a) The order of elution in an anion exchange chromatography at pH=7.1 is (Zico, Oscar, Socrates)
- b) The proteins Jingo and Falcao are bounded to the column in a cationic exchange chromatography
- c) When the protein Zico is placed in a reducing environment and separated by SDS-PAGE, it will appear as a one band

Answer: a

*Note: the notes about the other proteins had the two remaining choices about them



Protein Name	pI	Size	Notes
Zico	2.3	76	A homodimer in which both subunits are connected by disulfide bridges
Oscar	3.4	47	
Socrates	6.1	58	
Jingo	8	36	
Falcao	10.1	105	

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