

Name (Last, First): _____

Chem 355 Test 3 Form A, Professor David L. Huffman, Monday, 11/03/2003

Questions for TEST FORM A. THIS EXAM WILL BE COLLECTED AT 12:50 PM. PAGE 5 IS FOR SCRATCH WORK. DO NOT USE YOUR OWN PAPER.

Number 1 through 15 are worth 6 points each.

1. Eukaryotic post-translational protein processing may include . . .
 - A. glycosylation
 - B. removal of a signal sequence
 - C. A and B above
 - D. None of the above
2. Glucagon is a . . .
 - A. hormone
 - B. polymer of sugar
 - C. A and B above
 - D. None of the above
3. Malate . . .
 - A. can be reduced to oxaloacetate by a dehydrogenase
 - B. can be transported across the inner mitochondrial membrane
 - C. can shuttle cytosolic NADH electrons into the mitochondrial matrix
 - D. A and B above
 - E. B and C above
4. The production of fructose-1,6-bisphosphate from glucose requires . . .
 - A. one mole of ATP
 - B. two moles of ATP
 - C. three moles of ATP
5. The production of oxaloacetate from pyruvate requires . . .
 - A. one mole of ATP
 - B. one mole of NADH
 - C. one mole of FADH₂
6. Aconitase
 - A. acts on citrate
 - B. contains iron atoms
 - C. oxidizes its substrate
 - D. A, B, and C above
 - E. A and B above
7. In the liver, phosphofructokinase . . .
 - A. catalyzes a reversible reaction
 - B. is activated by fructose-2,6-bisphosphate
 - C. activity is enhanced by higher glucagon concentrations
 - D. A, B, and C above
 - E. A and B above
8. Pyruvate kinase . . .
 - A. produces NADH
 - B. produces acetylCoA
 - C. has lipoamide as a cofactor
 - D. A and B above
 - E. None of the above
9. Succinate dehydrogenase
 - A. reduces FAD to FADH₂
 - B. is part of the electron transport chain
 - C. is a membrane-bound enzyme
 - D. B and C above
 - E. A, B, and C above
10. Pyruvate dehydrogenase and α -ketoglutarate dehydrogenase . . .
 - A. reduce NAD⁺ to NADH
 - B. contain an E₃ component
 - C. activate acyl groups via attachment to coenzyme A
 - D. A, B, and C above
 - E. None of the above
11. The pentose phosphate pathway (also phosphogluconate pathway) . . .
 - A. produces citrate
 - B. produces NADPH
 - C. produces precursors for nucleotide synthesis
 - D. A and B above
 - E. B and C above
12. NADH . . .
 - A. donates electrons to Complex I
 - B. accepts electrons from Complex II
 - C. is the oxidized form of the cofactor
 - D. A and C above
 - E. B and C above
13. Complex IV . . .
 - A. accepts electrons from cytochrome *c*
 - B. contains one copper atom
 - C. accepts electrons from O₂
 - D. None of the above
14. ATP synthesis is carried out by . . .
 - A. pyruvate kinase
 - B. phosphoglycerate kinase
 - C. the F₀-F₁ ATP synthase complex
 - D. A, B, and C above
 - E. None of the above
15. Which of the following molecules **cannot** traverse the inner mitochondrial membrane?
 - A. acetyl CoA
 - B. oxaloacetate
 - C. pyruvate
 - D. A and B above
 - E. A and C above

**SHORT ANSWER PORTION OF TEST. VARIABLE NUMBER OF POINTS.
TELL ME WHAT YOU KNOW. DO NOT LEAVE ANSWERS BLANK.**

16. Discuss regulation mechanisms for only **ONE** of the following: glycolysis or gluconeogenesis or the citric acid cycle; mention key enzymes and allosteric effectors. (15 points)

16.

17. Discuss only **ONE** of the following (15 points)
- How cytosolic NADH electrons are shuttled into the mitochondria – mention enzymes and intermediates
 - How electrons flow down the electron transport chain – mentions sources of electrons and pathways.
 - The mechanism of protein synthesis in the ribosome
 - Regulation of protein synthesis via transcriptional control

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EXTRA SPACE FOR PAGE 2 ANSWERS

18. Discuss only **ONE** of the following. (15 points)
- The entry and exit of at least three metabolites from the citric acid cycle and the impact this has on other pathways
 - The initial steps of gluconeogenesis up to the metabolite PEP. Mention organelles and transport mechanisms.
 - The hormonal regulation of blood glucose and the effect it has on glycolysis, gluconeogenesis, and glycogen metabolism.

18.

19. The malate dehydrogenase reaction has a positive value for the change in standard free energy. What does this mean and how does it affect subsequent reactions. (10 points)

19.

20. Draw the structure of a sugar or heme (10 points).

20.

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EXTRA SPACE FOR PAGE 4 ANSWERS

21. Discuss a topic of your choice from metabolism that is unrelated to your previous answers. Give at least three main points. Don't make your answer too general. (15 points)

21.

22. Itemize only **ONE** of the following. (10 points)

- a. The cofactors in pyruvate dehydrogenase and their purpose
- b. Three metabolic fates of glucose-6-phosphate – what controls which path will be followed?
- c. Three different polysaccharides and their purpose

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SCRATCH PAPER or A PAGE TO PLACE ADDITIONAL ANSWERS. THIS FORM MUST BE RETURNED WITH YOUR EXAM. DO NOT DETACH.