

Biol1000 Section C
Test 2: Thursday November 8, 2012
7:00pm - 7:45pm
Instructor: Dr. Nicole Nivillac

This ENTIRE test package and scantron MUST be submitted to receive a grade. Your **STUDENT NUMBER** and **NAME** must be clearly indicated on this package and scantron sheet to receive a grade.

Your **STUDENT NUMBER** must also be **BUBBLED CORRECTLY** on the scantron sheet to receive a grade.

There are 25 Multiple Choice questions (1 mark each - with one best answer per question) and 1 short answer question worth 5 marks. The entire test is worth 30 marks.

ELECTRONIC AIDS (e.g. calculators, phones iPods etc.) are **NOT PERMITTED!**

Invigilators and instructors will immediately **RELOCATE** anyone or **SUSPEND** the examination for any individual suspected of **ACADEMIC DISHONESTY**.

PLEASE MAKE SURE YOU FILL IN THE ANSWER TO EACH QUESTION ON THE SCANTRON BEFORE THE ALLOTTED TIME FOR THE TEST IS UP. YOU WILL NOT BE GIVEN EXTRA TIME TO DO SO.

If you finish the test before the allotted time then please raise your hand and an invigilator will come and collect your test.

GOOD LUCK!!!!

Last name:	Version B B
First name:	
Student number:	

HAVE YOU CORRECTLY FILLED IN YOUR STUDENT NUMBER ON THE SCANTRON SHEET? PLEASE CHECK

1. You are completing VERSION B. Bubble in “B” beside #1 on your scantron. THIS QUESTION IS NOT WORTH A MARK BUT NEEDS TO BE COMPLETED TO BE GRADED.

A.

B. Pick this one!

C.

D.

2. Which of the following occurs when there are more reactants than products for a reaction?

A. The reaction will be pulled towards generating more reactants

B. The reaction will be pulled in the forward direction by the high concentration of products

C. The greater concentration of reactants pushes the reaction forward generating more products

D. The reaction will be pushed toward the reactants by the low concentration of products

3. Which of the following is an example of positive feedback?

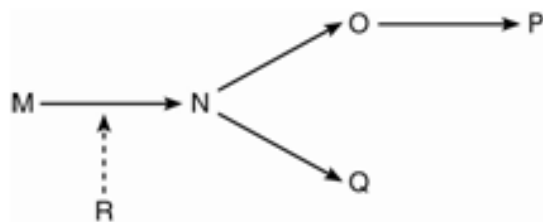
A. You get cut and platelets form a clot. This in turn activates the fibrin clotting system and more blood forms clots.

B. Transcription repressors enter the nucleus to stop mRNA production which in turn results in certain proteins not being translated.

C. Cyanide binds to an enzyme thereby changing the conformation of an enzyme’s active site.

D. All of the above.

4. In the diagram below, solid arrows represent enzyme catalyzed reactions. The dashed arrow represents molecule R interacting with an enzyme. If the enzyme catalyzing the N to O reaction is inhibited by product Q what will be the final products and relative amounts if the reactions are permitted to go to completion? (Assuming all enzymes have equal rates of activity).



A. N only

B. Q only

C. P and Q at first, then more P

D. P and Q at first, then more Q

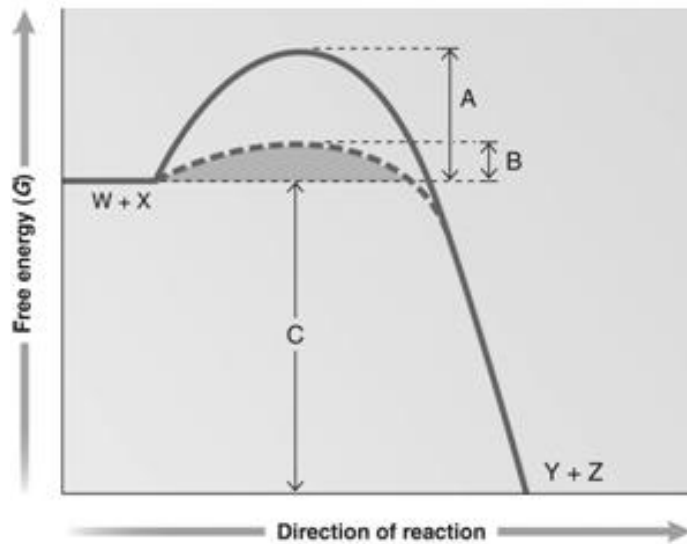
E. N and Q in equal amounts

F. P and Q in equal amounts regardless of time

5. You are studying a particular enzyme catalyzed reaction during one of your 4th year Biology lab courses. This reaction has a ΔG of +12 kcal/mol. If you were to double the amount of enzyme, what will the ΔG be for your reaction?

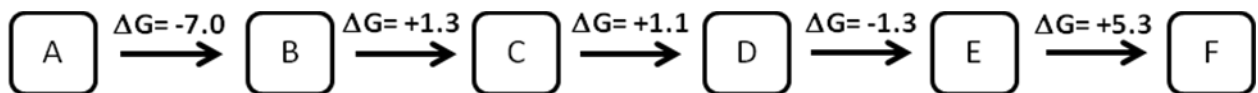
- A. -24 kcal/mol
- B. +24 kcal/mol
- C. +12 kcal/mol
- D. -12 kcal/mol
- E. 0 kcal/mol

6. In the figure below, which portion represents the activation energy in an uncatalyzed reaction?



- A. A
- B. B
- C. C
- D. W+X
- E. Y+Z

7. The metabolic pathway in the figure below is



- A. Anabolic; endergonic
- B. Catabolic; endergonic
- C. Anabolic; exergonic
- D. Catabolic; exergonic

8. Succinate dehydrogenase catalyzes the conversion of succinate to fumarate. The reaction is inhibited by malonic acid. Increasing the concentration of succinate relative to malonic acid reduces the inhibitory effect of malonic acid. Based on this information, which of the following is correct?
- A. Succinate dehydrogenase is the enzyme, and fumarate is the substrate.
 - B. Fumarate is the product, and succinate is a competitive inhibitor.
 - C. Fumarate is the substrate and malonic acid is a competitive inhibitor.
 - D. Fumarate is the product, and malonic acid is a competitive inhibitor.
 - E. Succinate dehydrogenase is the enzyme, and malonic acid is the substrate.
9. Which of the following statements about membrane structure is true?
- A. Unsaturated fatty acids only occur on the cytoplasmic side of the bilayer.
 - B. Unsaturated fatty acids only occur on the extracellular side of the bilayer.
 - C. There is regular flipping of phospholipids from the extracellular to the cytoplasmic side.
 - D. The two sides of the lipid bilayer can differ substantially in composition.
 - E. All of the above are true
10. The fluidity of a membrane will decrease as a result of which one of the following changes?
- A. Increasing the average length of the fatty acids
 - B. Increasing the number of double bonds in the fatty acids
 - C. Increasing the temperature of the surrounding environment
 - D. Answers A and B
 - E. Answers B and C
 - F. Answers A and C
11. You are a student in a lab making two sucrose solutions, one of 0.5M and one of 2M. You make the solutions and go out for lunch. When you come back you realize that you forgot to label the beakers and now you have no idea which solution is which. You decide to make each solution again but you still try to guess which beaker was which. You remember the rules of tonicity and decide to fill two balloons (having semi-permeable membranes permeable to water but not to sucrose) with a solution of 0.75M sucrose and then immerse one of these balloons in each beaker to see what happens. After completing your experiment you saw that the balloon in the beaker with the 2M solution _____ while the balloon in the beaker with the 0.5M solution _____ meaning that the 2M solution was _____ relative to the balloon while the 0.5M solute solution was _____ relative to the balloon.
- A. Swelled, Shriveled, hypertonic, hypotonic
 - B. Shriveled, Swelled, hypertonic, hypotonic
 - C. Swelled, Shriveled, hypotonic, hypertonic
 - D. Shriveled, Swelled, hypotonic, hypertonic

12. Rhodopsins are light-sensitive molecules composed of a protein (opsin) and a pigment (retinal).

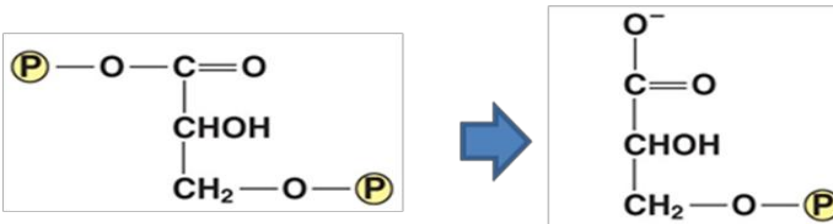
The opsin portion of rhodopsin is an example of a

- A. Peripheral protein
- B. Monotopic integral membrane protein
- C. Polytopic integral membrane protein
- D. Phospholipid

13. Two ATP molecules are expended (used) in the energy investment phase of glycolysis. Why is this energy necessary to begin the process of glucose catabolism?

- A. It isn't; glucose contains 686 kcal/mole in its chemical bonds, so its catabolism is spontaneous.
- B. Glucose is a stable molecule; thus, some energy must be invested to make the molecule unstable and begin the process of catabolism.
- C. It is directly needed to move the electron carriers NAD^+ and FAD^+ towards the electron transfer chain so these carriers can change the conformation of ATP synthase thereby activating it.
- D. It is needed to destabilize the enzymes involved in glycolysis so that all reactions can proceed.

14. The following reaction occurs as part of glycolysis. What has occurred between the two molecules shown in the figure below?



- A. Hydrolysis of ATP
- B. Dephosphorylation
- C. Phosphorylation
- D. Creation of NAD^+

15. What process generates the most ATP (in total; not net) by substrate level phosphorylation from a single molecule of glucose?

- A. Glycolysis
- B. The conversion of pyruvate to Acetyl-CoA
- C. The citric acid cycle
- D. The electron transport chain

16. During the Krebs Cycle (Citric Acid Cycle), oxaloacetate and acetyl CoA interact. Choose the description that would best describe this interaction.

- A. Oxaloacetate and acetyl CoA join to form a 6 carbon molecule
- B. Oxaloacetate catalyzes the hydrolysis of acetyl CoA into a 6 carbon molecule
- C. Oxaloacetate and acetyl CoA join to form a 4 carbon molecule
- D. Oxaloacetate and two acetyl CoA join to form a 6 carbon molecule

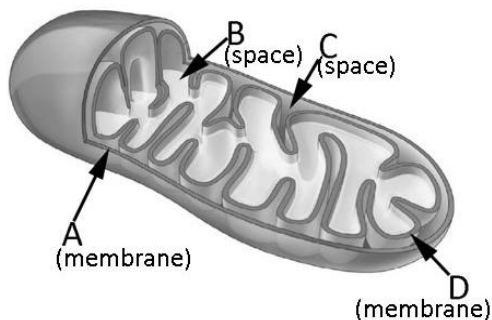
17. If all of the NADH inside the cell was depleted, which part(s) of the cellular respiration would be affected the least?

- A. Glycolysis
- B. Pyruvate oxidation
- C. Electron Transport Chain
- D. Krebs Cycle
- E. A, B and D
- F. B, C and D

18. You have a friend that has decided to try beer brewing. To start he adds baker's yeast, malt, hops, and sugar into a gallon of water. He then puts this mix into a gallon bucket without a lid, puts the bucket on the kitchen counter and says that he will leave it there to start the fermentation process. Seeing this, you know that he will never get any alcohol or carbonation (CO₂ production). You mention this to your friend and he replies "Why? I've added the right amounts of yeast and sugar so it should start fermenting any time now". You tell him it's because

- A. Yeast will only perform fermentation under aerobic conditions and so because he left the lid off the bucket, alcohol and CO₂ production will never occur.
- B. The yeast produce lactic acid instead of alcohol and CO₂.
- C. The fact that the lid was left off the bucket means that the yeast keep replenishing their supply of NADP⁺ which means that they will never enter the fermentation pathway.
- D. Yeast will only perform fermentation under anaerobic conditions and so because he left the lid off the bucket, alcohol and CO₂ production will never occur.

19. In the figure below, where would the H⁺ proton gradient be created?



- A. A
- B. B
- C. C
- D. D

20. A metabolic pathway, glycolysis, is inactive when cellular energy levels are _____ and the regulatory enzyme, phosphofructokinase, is _____ by AMP.

- A. low; activated
- B. low; inhibited
- C. high; activated
- D. high; inhibited

21. What are the functions of cytochrome *c* and ubiquinone?

- A. They translocate protons from the matrix to the inner mitochondrial space
- B. They synthesize water from molecular oxygen
- C. They shuttle electrons between the protein complexes
- D. They produce ATP by substrate-level phosphorylation

22. The majority of the G3P produced during the Calvin cycle is used to make

- A. NADPH
- B. Glucose
- C. Rubisco to continue the cycle
- D. RuBP to continue the cycle

23. When ATP is split into ADP and Pi,

- A. Energy is released in the form of heat
- B. Energy is directly transferred to a target molecule by an unknown mechanism
- C. The remaining phosphates acquire energy that was present in the bonds of the three phosphates
- D. The binding of ADP or Pi to the target molecule allows the energy of ATP hydrolysis to be transferred to the target molecule

24. If you put chloroplasts in the dark in an air-tight container, they could continue to make glucose if you provided them with

- A. NADPH, ATP and CO₂
- B. O₂ and ATP
- C. NADPH, ATP and O₂
- D. NADH, ATP and CO₂
- E. CO₂ and ATP

25. Which is NOT involved in the Calvin Cycle?

- A. ATP
- B. CO₂
- C. Acetyl CoA
- D. Rubisco

26. Choose the most correct statement about the two phases of photosynthesis.

- A. Light-dependent reactions occur in the cytosol; light-independent reactions occur in the stroma.
- B. The light-dependent reactions produce water as a by-product; the light-independent reactions produce carbon dioxide as a waste product.
- C. The products of the light-dependent reactions are ATP, NADPH and O₂; the products of the light-independent reactions are ADP, NADP⁺ and sugar.
- D. None of the above are correct.