



[My sites](#) / [20F-LIFESCI7A-3](#) / [Midterm 1](#) / [LS 7A Fall 2020 Midterm 1 Group Phase](#)

Fall 2020 - **Finals week**

Fall 2020 - LIFESCI7A-3 - MALOY

Started on Friday, 30 October 2020, 9:21 PM PDT

State Finished

Completed on Friday, 30 October 2020, 9:30 PM PDT

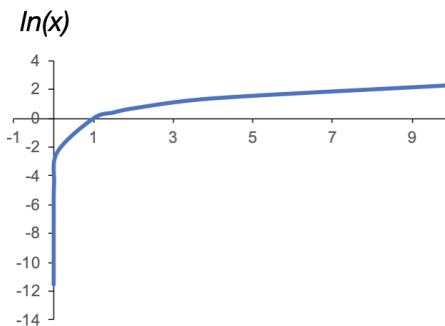
Time taken 9 mins 29 secs

In addition to the figures associated with different problems throughout the exam, you may refer to the following figures if you find them useful:

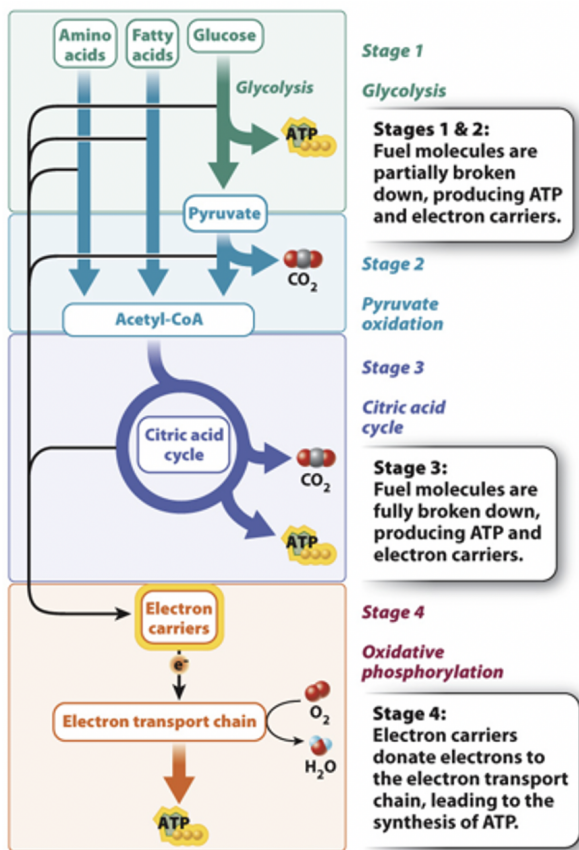
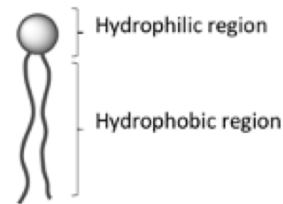
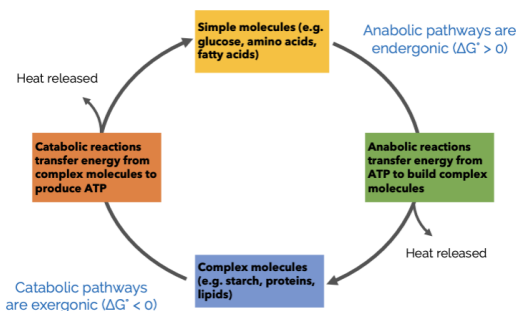
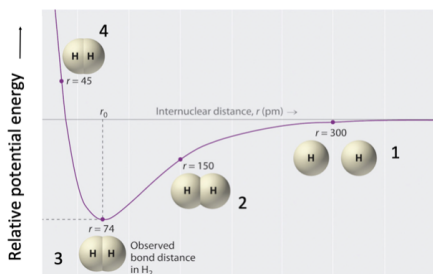
$$\Delta G^0 = \Delta H^0 - T\Delta S^0$$

$$\Delta G = \Delta G^0 + RT \ln Q$$

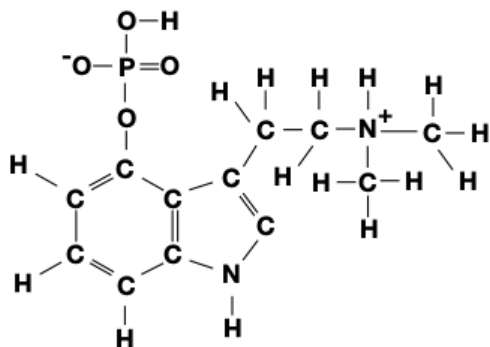
Under physiological conditions, $RT = 2.6 \text{ kJ/mol}$



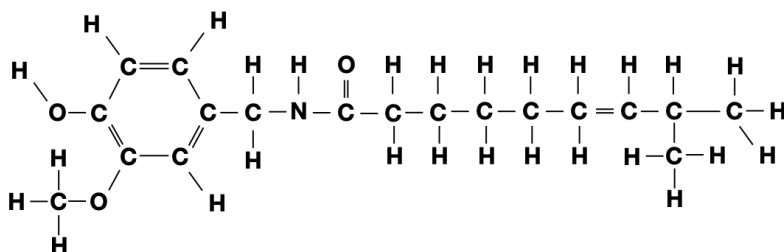
x	ln(x)
100	4.6
10	2.3
1/10	-2.3
1/100	-4.6



[Questions 1-5] Two different molecules are shown below. Use these molecules to answer the following questions.



Psilocybin, a naturally occurring psychedelic compound produced by certain mushrooms. Psilocybin has long been consumed in certain indigenous mesoamerican spiritual ceremonies.



Capsaicin, a naturally occurring compound that is the active component of chili peppers responsible for the burning sensation you get when you eat spicy foods.

Question 1

Complete

Not graded

Which of these molecules can form hydrogen bonds with water?

Select one:

- a. Psilocybin
- b. Capsaicin
- c. Both of these molecules **need partial positive H to bind to electronegative end**
- d. Neither of these molecules



Complete

Not graded

Which of these molecules could form Van der Waals interactions with another identical molecule?

Select one:

- a. Psilocybin
- b. Capsaicin
- c. Both of these molecules
- d. Neither of these molecules
- e. None of the above

Question 3

Complete

Not graded

Which of these molecules would be least likely to cross a pure lipid bilayer (no transport proteins are involved)?

Select one:

- a. Psilocybin **polar molecule**
- b. Capsaicin
- c. Both molecules would be equally likely to cross a pure lipid bilayer.

Question 4

Complete

Not graded

T/F: Capsaicin is partially held together by hydrogen bonds.

Select one:

- a. True
- b. False

Question 5

Complete

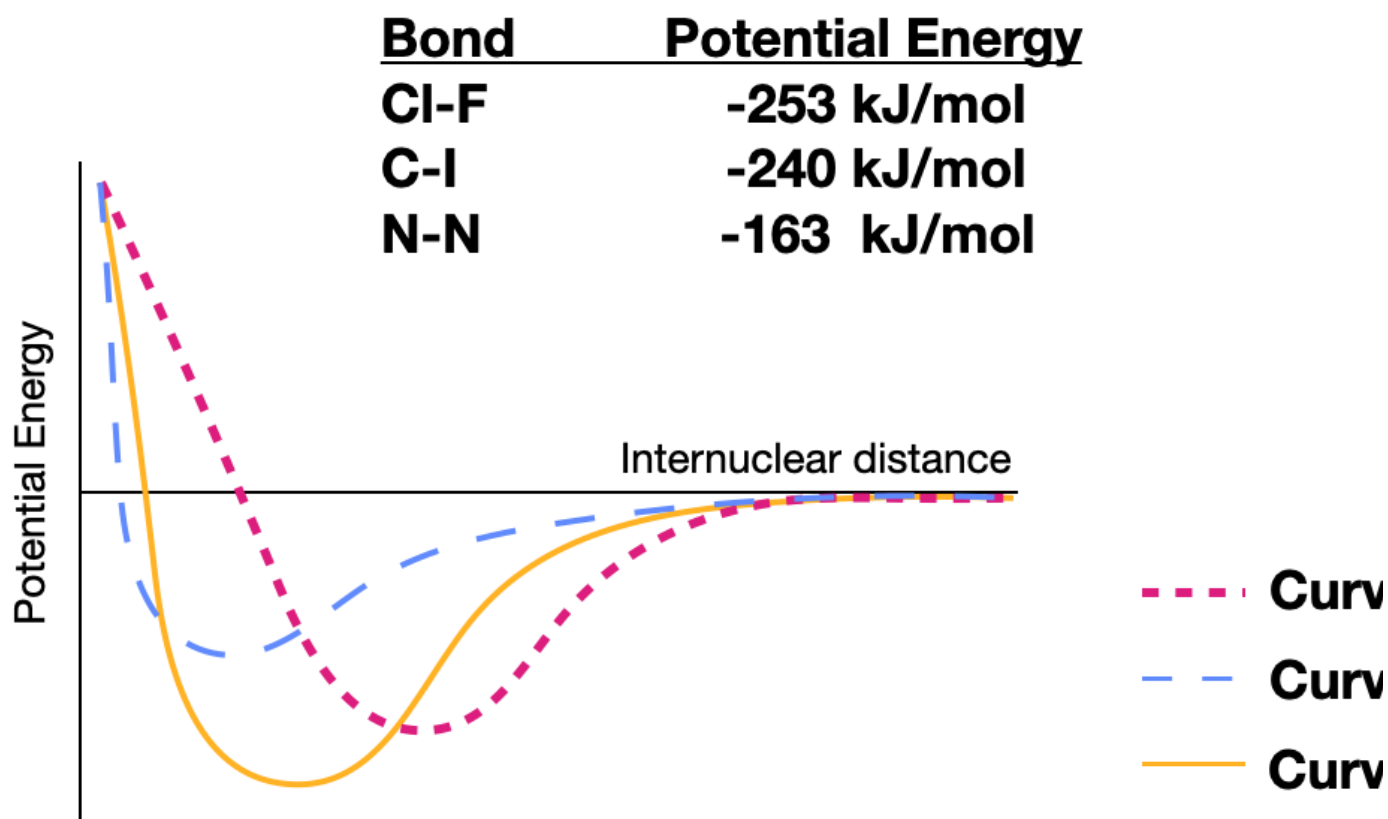
Not graded

T/F: Psilocybin could form hydrogen bonds with another identical psilocybin molecule.

Select one:

- True **both partial +H and neg ends**
- False

[Questions 6-9] The table below shows the potential energy associated with three different bonds. The graph shows three curves (Curve A, Curve B, and Curve C), each representing the interaction of one of the atom pairs in the table. Use these diagrams to answer questions 6-9.



Question 6

Complete

Not graded

Which curve represents the interaction between two nitrogen atoms?

Select one:

- a. Curve A
- b. Curve B
- c. Curve C
- d. It depends; more information needed



Complete

Not graded

Which atom pair forms the strongest bond?

Select one:

- a. Cl-F
- b. C-I
- c. N-N
- d. It depends; more information needed

Question 8

Complete

Not graded

Which atom pair forms a bond with the greatest internuclear distance?

- a. Cl-F
- b. C-I
- c. N-N
- d. Can't tell; more information needed

Question 9

Complete

Not graded

T/F: Breaking the bond formed by atom pair A releases energy.

Select one:

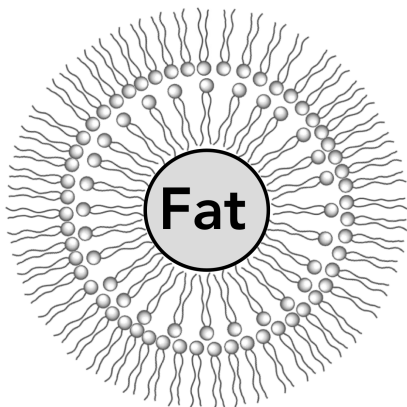
- a. True
- b. False
- breaking a bond REQUIRES energy**



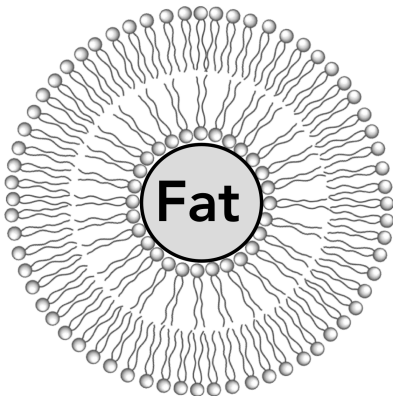
Bile acids are important compounds secreted by your liver to aid in digestion of fat molecules. Bile acids consist of a polar head group and a nonpolar tail group, allowing them to surround fat droplets in your intestine during digestion and help make the fats soluble in the hydrophilic intestinal environment so that they can be digested. Which of the diagrams below represent the configuration of bile acids as they surround a droplet of fat in your intestine? (Note: each of these images is a cross-section of a sphere)

Select one:

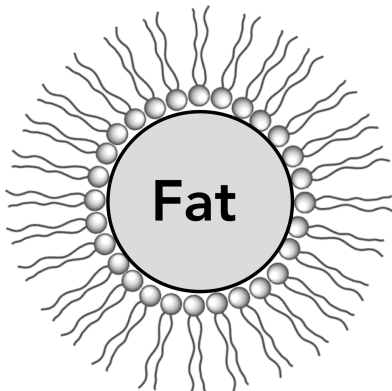
a.



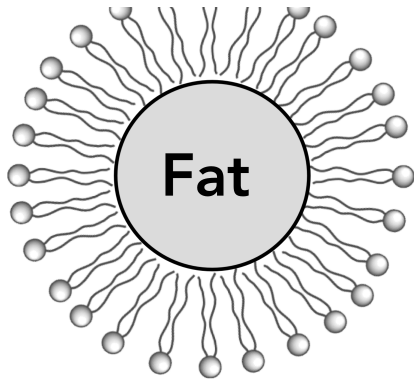
b.



c.



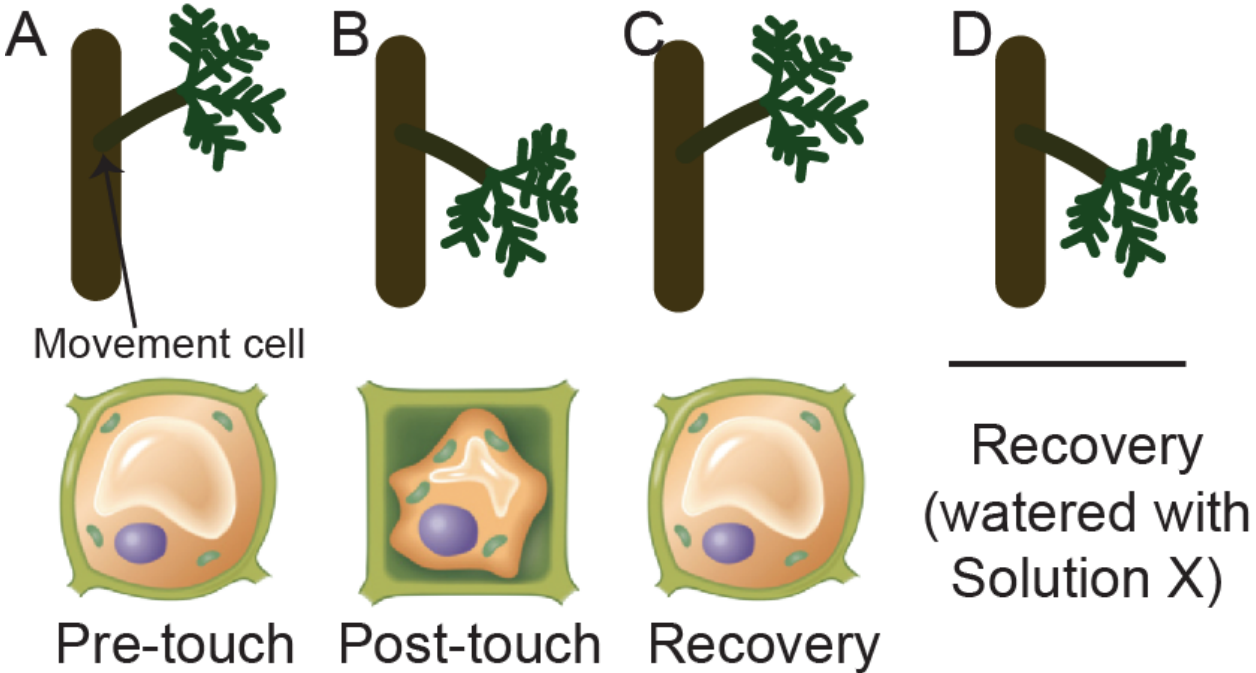
d.



hydrophilic environment → hydrophilic heads point out to interact with aqueous solution
 fat environment → hydrophilic tails surround lipid

Information

[Questions 11-15] You've recently become a "plant person" to kill some time during quarantine, and you have discovered an amazing new friend - *Mimosa pudica*, the sensitive plant. When a leaf on this plant is touched, it will quickly lower itself for protection (Pre-touch (A) vs Post-touch (B), below). After some time has past, if there is no new touch, the leaf will slowly raise itself again (Recovery (C), below). The rapid lowering and slow raising of the leaf is due to water moving in and out of a special cell (Movement cell) located under the leaf-stem (petiole) where it attaches to the plant stem (Cell diagrams in A-C, below). You know that the Movement cell's membrane is permeable to water and solutes. One day you water your *Mimosa* plant with a glass of clear fluid (Solution X) you find in the kitchen, and you notice that the leaf recovery doesn't happen after touch (D)!



Complete

Not graded

The tonicity of the movement cell cytosol Post-touch (Diagram B) is _____ compared to the cytosol Pre-touch (Diagram A).

Select one:

- a. Hypertonic
 b. Hypotonic
 c. Isotonic

when comparing 2 solutions, the solution with the greater amount of solute is HYPERTONIC

if a cell is placed into a hypertonic solution, water will rush out of the cell and cell will shrivel up bc concentration of solute outside cell is lower than the solution it's in

Question 12

Complete

Not graded

The tonicity of the movement cell cytosol after Recovery (Diagram C) is most likely _____ to the cytosol Pre-touch (Diagram A).

Select one:

- a. Hypertonic
 b. Hypotonic
 c. Isotonic

concentration inside the cell and the solution are the same

Question 13

Complete

Not graded

The observations above in D suggest that Solution X was likely:

Select one:

- a. A Solution that was similar in solute concentration to the cytosol of the plant cells Pre-touch.
 b. A very highly concentrated salt and sugar solution.
 c. Pure water

if concentration of solution environment is higher than inside the cell, adding a highly concentrated salt and sugar solution will make water rush OUT of the cell, not into the cell

Question 14

Complete

Not graded

You have another plant in your room that is not a sensitive plant. You happen to know that its cell membranes are permeable to water and solutes. When you watered your *Mimosa* with Solution X, you also watered your other plant with Solution X too. The next day you notice that this other plant is wilted and droopy. You predict that the cells of this plant look similar to the cell shown in:

Select one:

- a. A (Pre-touch Movement cell)
 b. B (Post-touch Movement cell)
 c. Impossible to predict



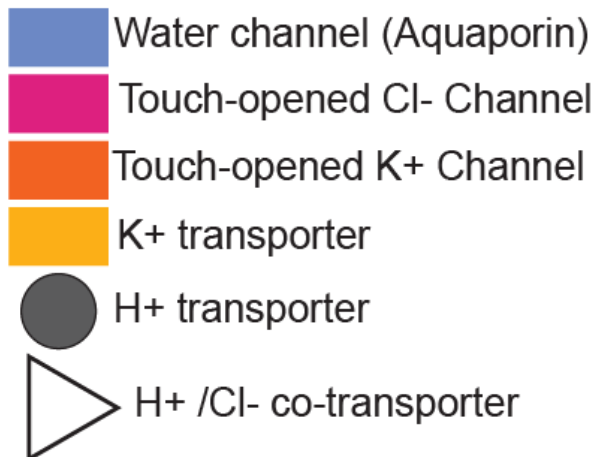
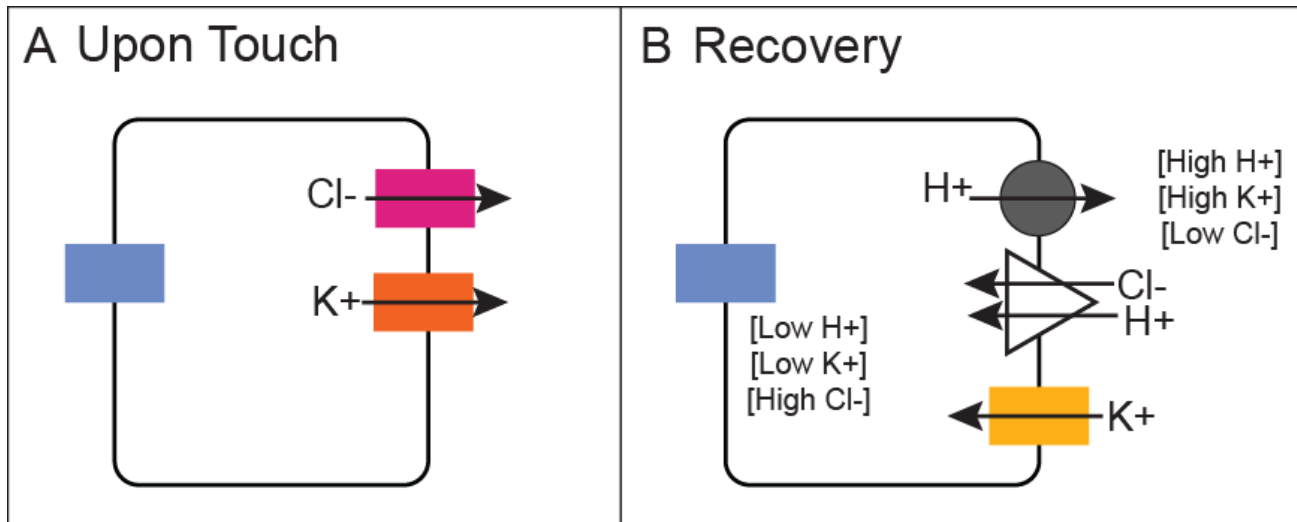
T/F: After Recovery (Diagram C), there is no longer any water moving in or out of the Movement cell.

Select one:

- a. True
 b. False

Information

[Questions 16-20] The diagram below represents a *Mimosa pudica* Movement cell. As we learned in the previous question, the Movement cell is responsible for the fast lowering of the leaf upon touch and the slow raising of the leaf during recovery from touch. The raising and lowering of the leaf by the Movement cell is possible because proteins in the Movement cell membrane make it selectively permeable to water and ions. The ions responsible for the Movement cell's function are Cl^- , K^+ , and H^+ . Upon touch (A) two channels open to allow diffusion of Cl^- and K^+ ions out of the Movement cell. The water channels (Aquaporins) are always open. Once recovery begins (B) a different set of ion transporters are responsible for ion movement as shown below. The water channels (Aquaporins) are always open.





Complete

Not graded

Based on this diagram, the H⁺/Cl⁻ transporter is an example of what type of transport?

Select one:

- a. Primary active transport
- b. Secondary active transport
- c. Passive transport (diffusion or facilitated diffusion)
- d. No way to tell from the information given

uses the electrochemical gradient from H⁺ high—>low to power the Cl going against its concentration gradient from low—>high concentration

Question 17

Complete

Not graded

Based on this diagram, the H⁺ transporter is an example of what type of transport?

Select one:

- a. Primary active transport
- b. Secondary active transport
- c. Passive transport (diffusion or facilitated diffusion)
- d. No way to tell from the information given

uses ATP to power H⁺ going against its concentration gradient from low —> high concentration

Question 18

Complete

Not graded

ASK WHY

Based on the Upon Touch diagram (A), the concentration of K⁺ outside the cell is likely _____ than that inside the cell.

Select one:

- a. Lower
- b. Higher
- c. Similar
- d. No way to tell from the information given



Complete

Not graded

ASK WHY

Water is likely moving _____ the cell Upon Touch (A) and _____ the cell during Recovery (B).

Select one:

- a. into/into
- b. into/out of
- c. out of/ into
- d. out of/ out of

Question 20

Complete

Not graded

During Recovery (B), the H⁺/Cl⁻ transporter couples the _____ movement of Cl⁻ from outside to inside the cell with the _____ movement of H⁺ from outside to inside the cell.

Select one:

- a. Endergonic; Exergonic
- b. Exergonic; Endergonic
- c. Endergonic; Endergonic
- d. Exergonic; Exergonic
- e. No way to tell from the information given

endergonic (requires nrg) movt Cl bc going low → high
exergonic (releases nrg) movt H+ bc going high → low

Information

[Questions 21-22] The Touch-opened channels for K⁺ and Cl⁻ required physical force to open them. This occurs by stretching of the cell membrane upon touch, which pulls the channels open. You have a drug (Stiffenex) that stiffens the K⁺ and Cl⁻ touch-opened channels. You have a second drug (Protonex) that stops the movement of H⁺ ions by the H⁺ transporter.

Question 21

Complete

ASK WHY

Not graded

How would you expect Stiffenex treatment to alter the speed of leaf drop upon touch?

Select one:

- a. Speeds up
- b. Slows down
- c. Unaffected



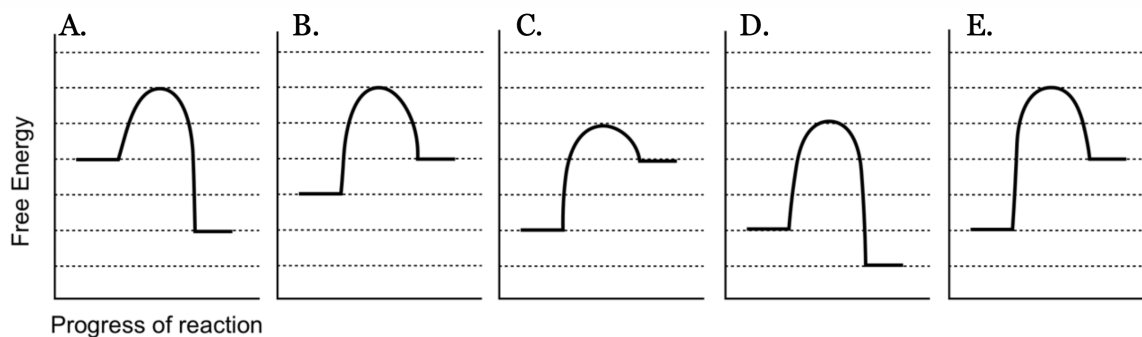
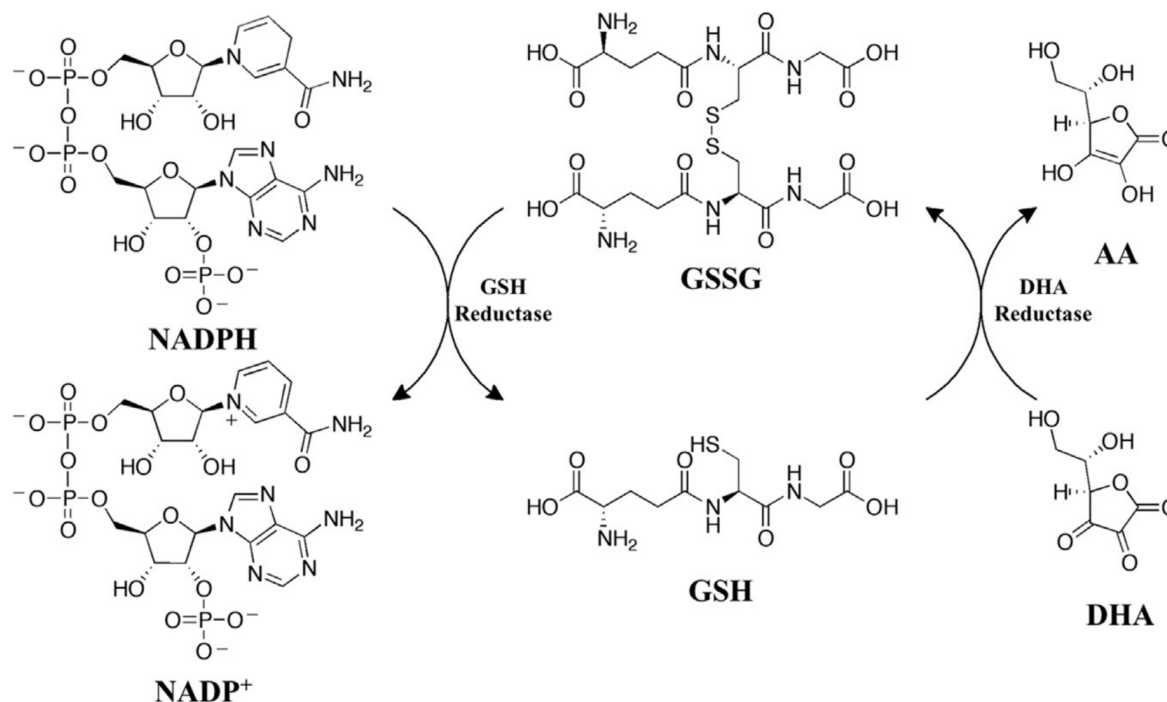
How would Protonex treatment affect movement of water out of the cell upon touch?

Select one:

- a. Increases
- b. Decreases
- c. Does not change

**if H⁺ ions can't move out of the cell,
Cl⁻ ions can't move back into the cell
so there'd be a higher concentration
of solute outside the cell → water
would still leave the cell upon touch**

[Questions 23–28] Your circadian rhythm is a natural, internal process that regulates your sleep/wake cycle over repeated 24 hour periods. This natural rhythm is controlled in part by a series of redox reactions! The following diagram depicts a series of redox reactions involved in regulating your circadian rhythm. Enzyme names are drawn next to the arrows, and names of each molecule are shown beneath the drawing of each molecule. NADPH/NADP⁺ are molecules that are very similar in structure to NADH/NAD⁺. Use this diagram and the free energy diagrams below to answer the following questions. You may assume that the y-axis is the same for all of the graphs. Each of these graphs may or may not relate to any of the reactions shown below.



Question 23

NAD⁺→NADH+ oxidation reaction is exergonic

Complete

Not graded

T/F: Free energy diagram B could represent the conversion of GSH to GSSG.

Select one:

- a. True
- b. False

GSH→GSSG is a reduction rxn so it's endergonic



Complete

Not graded

T/F: Free energy diagram E could represent the conversion of NADP+ to NADPH.

Select one:

- a. True **yes, reduction rxns are endergonic so it requires nrg**
- b. False

Question 25

Complete

Not graded

Based on this diagram, AA has _____ free energy compared to DHA.

- a. Higher
- b. Lower **higher, it has accepted electrons and is reduced**
- c. Equal
- d. Cannot tell from the given information

Question 26

Complete

Not graded

T/F: Compared to GSH, GSSG is more reduced.

Select one:

- a. True
- b. False

Question 27

Complete

Not graded

T/F: The reaction depicted in free energy diagram A could be coupled to the reaction depicted in free energy diagram B to produce an exergonic reaction.

Select one:

- a. True
- b. False



Of the reactions depicted in the free energy diagrams above, which would occur most quickly in a cell (assuming no enzymes are involved)?

- a. Reaction depicted by diagram A
- b. Reaction depicted by diagram B
- c. Reaction depicted by diagram C
- d. Reaction depicted by diagram D
- e. Reaction depicted by diagram E
- f. Not enough information provided

Question 29

Complete

Not graded

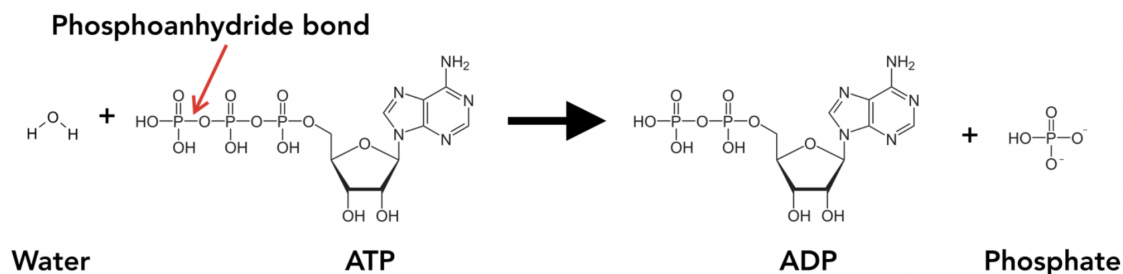
T/F: NADPH is an important energy management molecule in the cell. Therefore, in this diagram free energy is flowing from DHA to NADPH.

Select one:

- a. True
- b. False

Information

[Questions 29-34] The following diagram shows the ATP hydrolysis reaction. During ATP hydrolysis, the phosphoanhydride bond shown is broken, resulting in the production of ADP and inorganic phosphate.



You have two hypotheses about this reaction:

- (1) The hydrolysis of ATP has a positive standard free energy change (ΔG^0)
- (2) The hydrolysis of ATP has a negative standard free energy change (ΔG^0)

To try and distinguish between your hypotheses, you make some observations about this reaction. For questions 29-32, determine whether each observation is consistent with hypothesis 1 only, hypothesis 2 only, or both hypothesis 1 and hypothesis 2. Consider each observation independent of any other observation.



Complete

Not graded

Observation 1: The hydrolysis of ATP can occur spontaneously in a cell.

spontaneous=exergonic, releases energy, -G

Select one:

- a. This observation is consistent with hypothesis 1 only.
- b. This observation is consistent with hypothesis 2 only.
- c. This observation is consistent with both hypothesis 1 and hypothesis 2.

Question 31

Complete

Not graded

Observation 2: Energy is released during the formation of new bonds in ADP and inorganic phosphate.

Select one:

whether or not the rxn is endergonic or exergonic, nrg is required to break a bond and doesn't affect the overall delta G value

- a. This observation is consistent with hypothesis 1 only.
- b. This observation is consistent with hypothesis 2 only.
- c. This observation is consistent with both hypothesis 1 and hypothesis 2.

Question 32

Complete

Not graded

Observation 3: The standard enthalpy change (ΔH^0) for ATP hydrolysis is negative.

Select one:

- a. This observation is consistent with hypothesis 1 only.
- b. This observation is consistent with hypothesis 2 only.
- c. This observation is consistent with both hypothesis 1 and hypothesis 2.

Question 33

Complete

Not graded

Observation 4: The standard entropy change (ΔS^0) for ATP hydrolysis is +22, and the standard enthalpy change (ΔH^0) for ATP hydrolysis is -14.

Select one:

if you don't know the value of deltaH, you don't know if the rxn is going to be exergonic or endergonic so the value of deltaS isn't enough to explicitly imply an exergonic or endergonic rxn

- a. This observation is consistent with hypothesis 1 only.
- b. This observation is consistent with hypothesis 2 only.
- c. This observation is consistent with both hypothesis 1 and hypothesis 2.



Complete

Not graded

Which of the above observations allows you to distinguish between your two hypotheses?

Select one:

- a. Observation 1
- b. Observation 2
- c. Observation 3
- d. Observation 4
- e. None of these

only one question has “hypothesis 2” as the answer (observation 1) so it lets you distinguish between the 2 hypotheses

Question 35

Complete

Not graded

In a human muscle cells at rest, the concentration of ATP is around 4mM and the concentration of ADP is around 0.009 mM. In these cells, the ΔG of ATP hydrolysis is -64 kJ/mol.

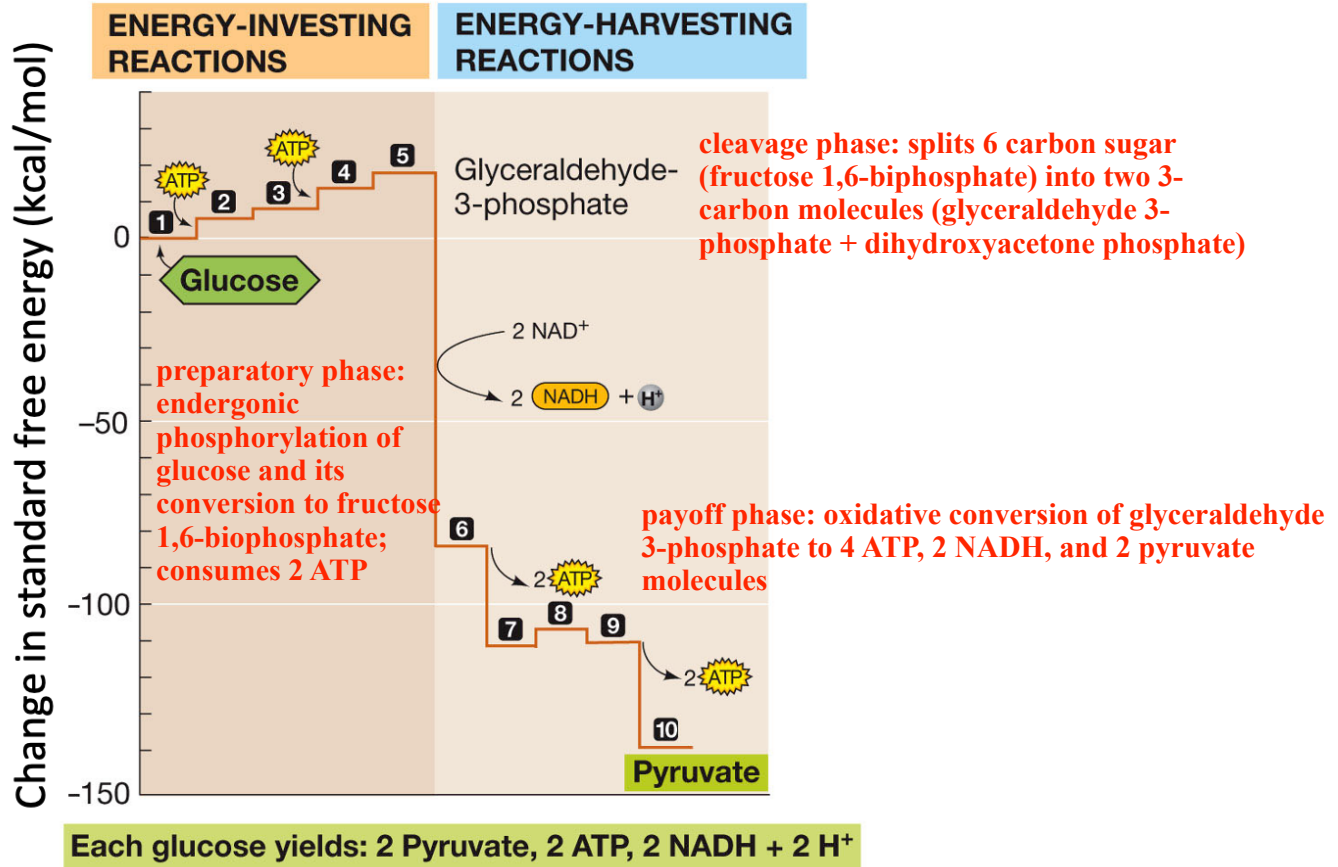
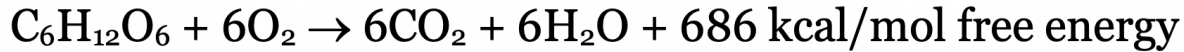
After you exercise, the concentration of ATP in your muscle cells drops to around 1mM. Assuming no other changes occur in the cell, what could be the ΔG of ATP hydrolysis in these conditions?

Select one:

- a. -70 kJ/mol
- b. -64 kJ/mol
- c. -58 kJ/mol
- d. 0 kJ/mol
- e. +64 kJ/mol

ratio of products/reactants $\sim 0.009/4$ is $< 0.009/1$, so taking the natural log of the first will be more negative than the second while the answer is still negative, it's not as negative as the original so it has to be -58kJ/mol

[Questions 35-41] Use the chemical equation for cellular respiration and the diagram of glycolysis below to answer the following questions.



Question 36

Complete

Not graded

T/F: Glucose has higher free energy than pyruvate.

Select one:

- a. True **glucose is higher on the graph than pyruvate**
- b. False



Complete

Not graded

T/F: Glycolysis is an example of a catabolic pathway. Over the course of glycolysis, heat is released.

Select one:

- a. True **catabolism is complex—>simple molecules
-releases energy (exergonic), increases entropy (heat)
because releasing energy**
- b. False

Question 38

Complete

Not graded

T/F: Two steps of glycolysis are coupled to ATP hydrolysis to overcome a positive ΔG value. The other steps of glycolysis have negative standard free energy changes (ΔG^0).

Select one:

- a. True **the other steps of glycolysis don't solely have
negative standard free energy changes, some
have positive standard free energy changes**
- b. False

Question 39

Complete

Not graded

T/F: The conversion of intermediate 5 to intermediate 6 is a redox reaction.

Select one:

- a. True **NAD+—>NADH
reduction**
- b. False

Question 40

Complete

Not graded

T/F: The ΔG for the reaction that converts intermediate 7 to intermediate 8 during glycolysis will become more negative as the concentration of intermediate 7 increases in a cell.

Select one:

- a. True **if concentration
increases, rxn will
become exergonic
so more negative**
- b. False



Complete

Not graded

T/F: Conversion of intermediate 6 to intermediate 7 and conversion of intermediate 9 to intermediate 10 are both coupled to the production of ATP. Therefore, these are the steps of glycolysis that are the most exergonic.

Select one:

- a. True
- b. False

Question **42**

Complete

Not graded

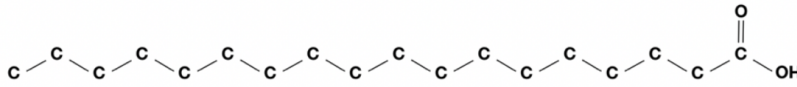
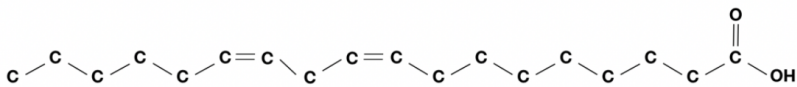
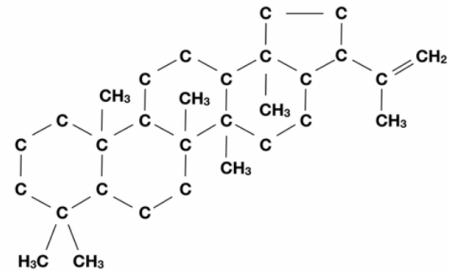
Athletes eat large meals containing carbohydrate and fat when they are in training but their body weight (mass) remains nearly constant. Which of the following statements correctly describes what happens to most of the mass consumed?

Select one:

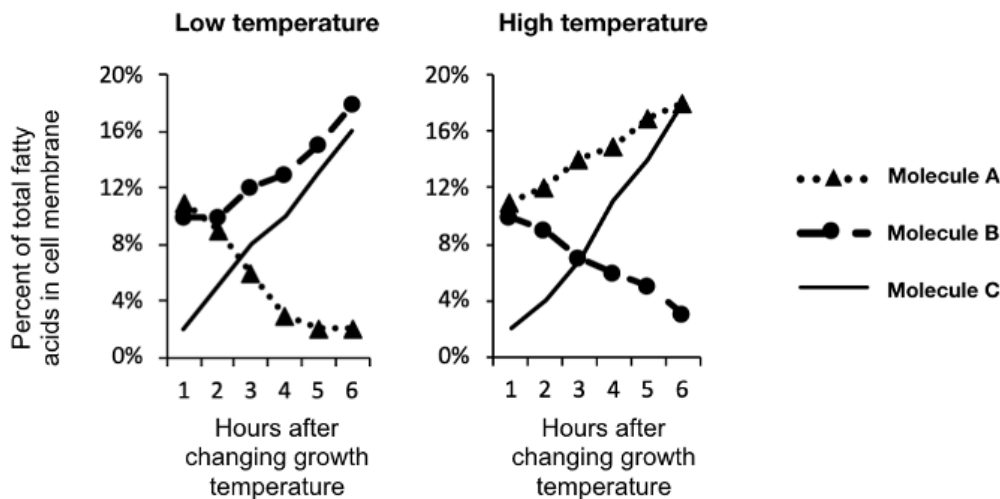
- a. It is converted to energy.
- b. It is released as carbon dioxide and water.
- c. It is converted into adenosine triphosphate (ATP).

most mass consumed is released as CO₂ and H₂O

[Questions 42-45] Two different fatty acids are shown below. These fatty acids are present in phospholipids that make up cell membranes of bacteria. Additionally, a molecule called hopene is shown. This molecule is very bulky, and wedges into bacterial membranes to have an effect on membrane fluidity similar to the effect that cholesterol has on animal membranes. (Note: each of these molecules has additional hydrogen atoms not shown in this figure, so that every carbon has 4 bonds).

Stearic Acid**Linoleic Acid****Hopene**

To determine the impact of temperature on bacterial membrane composition, you decide to perform an experiment. First, you grow bacteria at 37°C (this is their standard growth temperature) in the presence of all of these compounds. After one hour, you move the bacteria to different temperatures. At various time points after changing the temperature, you collect the bacteria and determine the composition of each compound in their membranes. Your results are shown below. Use these data to answer the following questions.

**Question 43**

Complete

Not graded

Which molecule on the graphs may be hopene?

Select one:

- a. Molecule A
- b. Molecule B
- c. Molecule C

similar to cholesterol structure, pretty stable



Complete

Not graded

Which molecule on the graphs may be stearic acid?

Select one:

- a. Molecule A
- b. Molecule B
- c. Molecule C

stearic acid is a saturated fatty acid with no double bonds (less fluid) at low temperature the cell doesn't want stearic acid because it will increase the rigidity

Question **45**

Complete

Not graded

Which molecule on the graphs may be linoleic acid?

Select one:

- a. Molecule A
- b. Molecule B
- c. Molecule C

linoleic acid is an unsaturated fatty acid with double bonds (more fluid) it will increase at low temperature to maintain membrane fluidity it will decrease at high temps to prevent membrane from being too fluid

Question **46**

Complete

Not graded

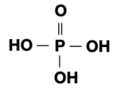
You anticipate that as global climate change increases the temperature of the Earth over time, these bacteria will adapt to the increasing temperature by changing their membrane composition. Which molecule(s) do you expect to increase in abundance over time as bacteria adapt?

Select one:

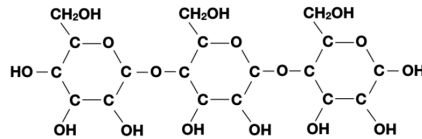
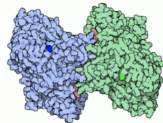
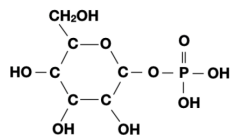
- a. Stearic acid
- b. Linoleic acid
- c. Hopene
- d. More than one of the above

both stearic and Hopene can help maintain the cell structure in rising global temperatures

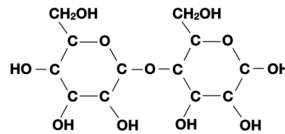
[Questions 46–49] One major way that extra glucose is stored in mammals is by conversion to large glycogen molecules. Glycogen can then be broken back down into individual glucose-1-phosphate molecules that are eventually used in glycolysis. The conversion of glycogen to individual glucose-1-phosphate molecules is facilitated by an enzyme called glycogen phosphorylase. This reaction is shown below (the blue and green image is a picture of the enzyme structure!). The standard free energy change (ΔG^0) for the forward reaction that produces Glucose-1-Phosphate is +3.1 kJ/mol. Determine whether each statement below is true or false.

Inorganic Phosphate

+

Glycogen**endergonic reaction****Glycogen Phosphorylase****Glucose-1-Phosphate**

+

**Remaining Glycogen****Question 47**

Complete

Not graded

T/F: The forward reaction can only proceed in a cell if it is coupled to an exergonic reaction.

Select one:

- a. True
- b. False

false, it's facilitated by an enzyme**Question 48**

Complete

Not graded

T/F: When you are fasting and your body is breaking down glycogen and using glucose-1-phosphate in glycolysis to make ATP, this reaction will be at equilibrium.

Select one:

- a. True
- b. False



Complete

Not graded

T/F: Glycogen phosphorylase will continue catalyzing this reaction after it has reached equilibrium.

Select one:

- a. True **an enzyme doesn't know to stop catalyzing until something specifically inhibits it**
- b. False

Question **50**

Complete

Not graded

Under normal physiological conditions, your cells have about 100 times more inorganic phosphate than glucose-1-phosphate. Therefore, under normal physiological conditions this reaction is exergonic.

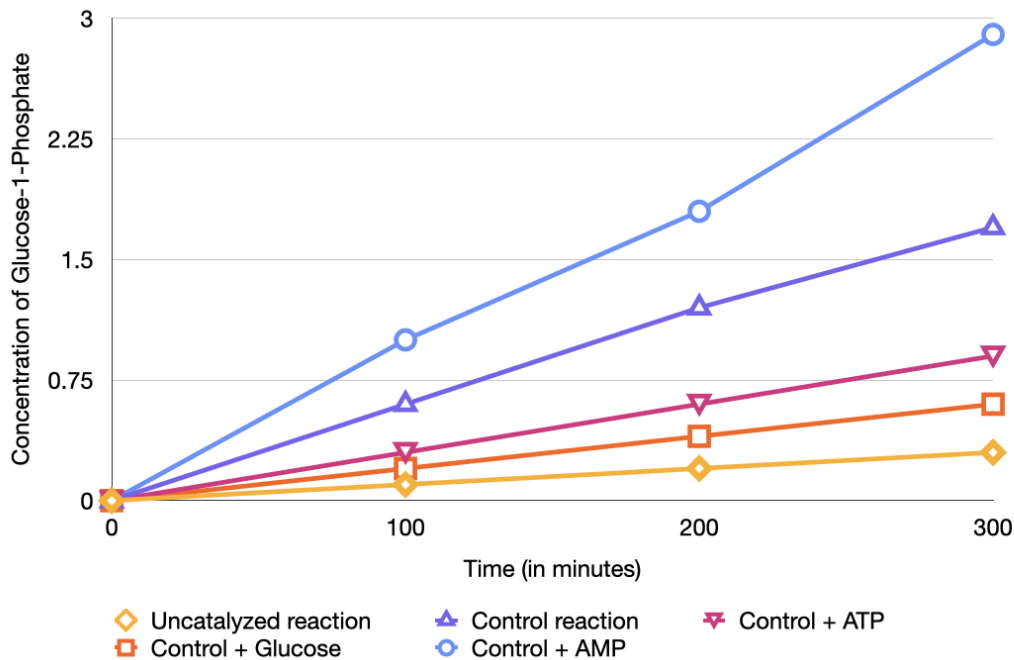
Select one:

- a. True **yes, will occur spontaneously and reactants are higher than products**
- b. False

[Questions 49–52] You are interested in determining whether any molecules activate or inhibit glycogen phosphatase activity. To measure enzyme activity under different conditions, you set up a control and three experiments where you add different potential activators or inhibitors of glycogen phosphorylase to the reaction, and you measure the amount of glucose-1-phosphate produced over time in each experiment. Use this information to answer the following questions.

Uncatalyzed Reaction: Glycogen + Inorganic phosphate

Control Reaction: Glycogen + Inorganic phosphate + Glycogen phosphatase



Question 51

Complete

Not graded

T/F: Glucose is an activator of glycogen phosphorylase activity.

Select one:

- a. True
 b. False

control+glucose is lower than control rxn

Question 52

Complete

Not graded

T/F: T/F: The addition of ATP increases glycogen phosphorylase activity.

Select one:

- a. True
 b. False

atp addition is lower than control rxn

Complete

Not graded

T/F: The addition of AMP to the control reaction does not change the overall ΔG of this chemical reaction.

Select one:

- a. True
 b. False

**deltaG of a rxn does NOT change based on what's added to the rxn (i.e. enzymes)
 enzymes only change the amount of activation nrg required for the rxn to occur
 instead of the total delta G**

Question 54

Complete

Not graded

When AMP is added to the reaction, more inorganic phosphate will be used.

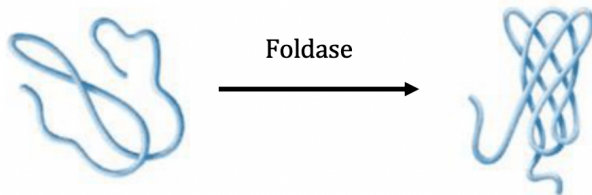
Select one:

- a. True
 b. False

adding AMP increases amount of products produced in the rxn, therefore it would require an increase in the amount of reactants (inorganic phosphate) used to produce this

Information

[Questions 54-60] The following diagram shows the folding of a protein. After proteins are synthesized in a cell, they need to be folded into specific highly organized structures in order to perform their functions. This folding process involves the making and breaking of different types of bonds and intramolecular interactions. To assist in protein folding, the cell uses enzymes called "foldases". Based on this information and the diagram, answer the following questions.



Question 55

Complete

Not graded

Entropy of the protein decreases over the course of this reaction.

Select one:

- a. True
 b. False

simple \rightarrow complex anabolic rxn, decrease local entropy, increase universe entropy



Complete

Not graded

As this reaction proceeds, a small amount of energy will be released as heat.

Select one:

- a. True **energy is always released as heat no matter what**
- b. False

Question 57

Complete

Not graded

Foldase provides the energy required to make this reaction proceed in the direction shown by the arrow.

Select one:

- a. True **just lowers the activation nrg as an enzyme**
- b. False

Question 58

Complete

Not graded

Foldase is used up in this reaction.

Select one:

- a. True **enzymes aren't used up in rxns**
- b. False

Question 59

Complete

Not graded

Because this process uses an enzyme, we know that this process is endergonic.

Select one:

- a. True **enzyme use doesn't determine if exergonic or endergonic**
- b. False



Complete

Not graded

Because the protein folding reaction proceeds in the presence of a specific enzyme and no other components, we can conclude that:

**if rxn happens with enzyme, can infer it won't happen
without the enzyme**

Select one:

- a. The reaction would not proceed in the absence of the enzyme
- b. The reaction would proceed in the absence of the enzyme but at a slower rate
- c. The reverse reaction (protein unfolding) would not proceed in the presence of the enzyme
- d. The reaction in the presence of the enzyme will not proceed any faster if the temperature is raised a few degrees

[◀ MT1 Group Phase Team ...](#)

Jump to...

[Answer change reasoning ... ▶](#)

