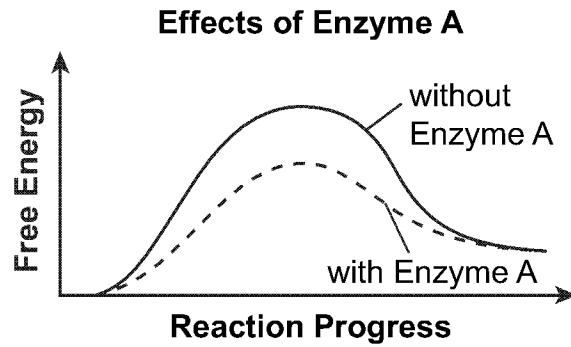


Keystone Biology

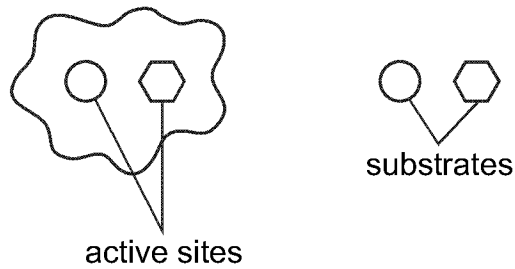
Enzyme's Active Sites

Handscoring Anchor Set

Use the graph and diagram below to answer question



Enzyme A



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

Enzyme's Active Sites Scoring Guide

3	<p>The response demonstrates a <i>thorough</i> understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by</p> <ul style="list-style-type: none"> explaining how Enzyme A acts as a catalyst in the reaction with respect to energy and explaining how Enzyme A acts as a catalyst in the reaction with respect to time and predicting how changing the shape of the enzyme's active site would affect the enzyme's ability to catalyze the reaction. <p>The response is clear, complete, and correct.</p>
2	<p>The response demonstrates a <i>partial</i> understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by fulfilling two of the three bullets listed under the 3-point response.</p> <p>The response may contain some work that is incomplete or unclear.</p>
1	<p>The response demonstrates a <i>minimal</i> understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by fulfilling one of the three bullets listed under the 3-point response.</p> <p>The response may contain some work that is incomplete or unclear.</p>
0	<p>The response provides <i>insufficient</i> evidence to demonstrate any understanding of the concept being tested.</p>
Non-scorables	<p>B – No response written or refusal to respond. F – Foreign language K – Off task U - Unreadable</p>

Note: No deductions should be taken for misspelled words or grammatical errors.

Responses that will receive credit:

Part A (2 points):

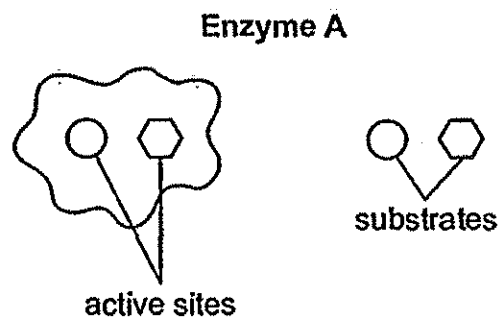
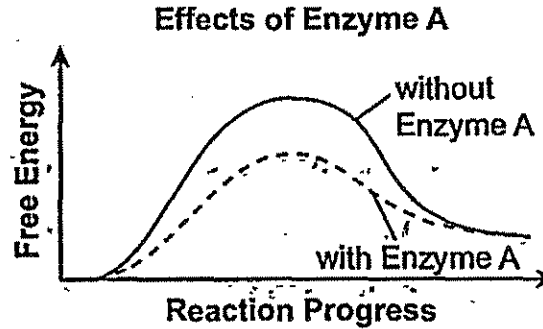
- Enzyme A acts as a catalyst by reducing the activation energy or the energy that is needed to get the reaction started. (When the substrates attach to the enzyme's active sites, they are brought close together, facilitating the reaction.) The reaction takes less time to occur (the reaction is faster is also acceptable).

Part B (1 point):

- When the shape of an enzyme's active site is changed, the substrate cannot attach to the active site; it will not "fit." The enzyme would not be able to catalyze the reaction.
- When the shape of the enzyme's active site is slightly changed (caused by a change in pH) the enzyme activity can become greatly reduced.

(Note: Information in parentheses is not necessary to receive full credit for Part A and Part B.)

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst in the reaction because it lowers the time needed for the reaction and uses less free energy than the reaction would if Enzyme A was not used.

Continued. Please refer to the previous page for task explanation.

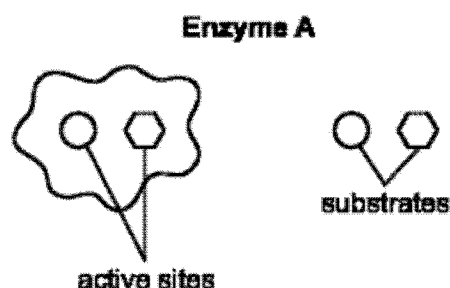
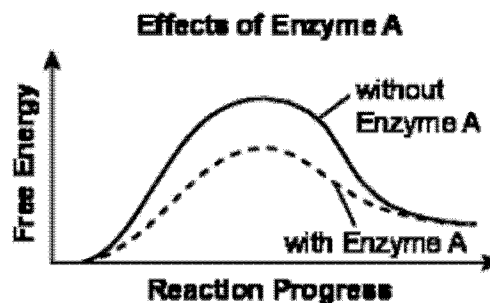
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If an enzyme's active site's shape was changed, the substrates would no longer fit into the active site. The enzyme would not be able to catalyze the reaction. If the substrates, which are catalysts, did not fit, because they would not function.

A-1 Score Point 3

This response demonstrates a thorough understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing all of the tasks presented in the item. This student states that "Enzyme A acts as a catalyst in the reaction because it lowers the time needed...and uses less free energy." Additionally, the student predicts that "if the enzyme's active site's shape was to change, the substrates would no longer fit into the active site. The enzyme would not be able to catalyze the reaction." Attempting to identify the substrate as a catalyst does not detract from the correct answer. This answer is complete for full credit.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst because it lowers the time and energy needed to finish the reaction process

103 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

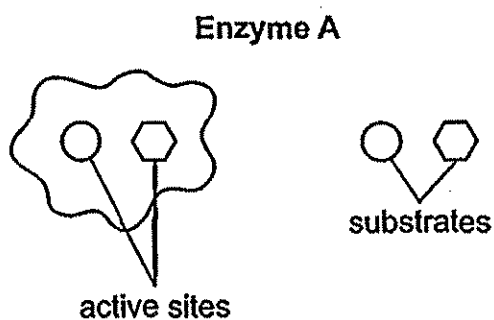
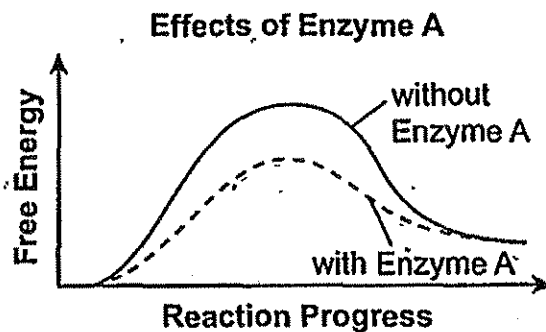
if the enzyme's active site was changed, it would no longer be able to act as a catalyst for the reaction

105 / 1000

A-2 Score Point 3

This response demonstrates a thorough understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing all of the tasks presented in the item. The explanation states that "Enzyme A acts as a catalyst because it lowers the time and energy needed to finish the reaction progress." The student also predicts that "if the enzyme's active site was changed, it would no longer be able to act as a catalyst for the reaction." This response is complete and correct.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts like a catalyst
because it has less free energy
and takes less reaction time
than without it.

Continued. Please refer to the previous page for task explanation.

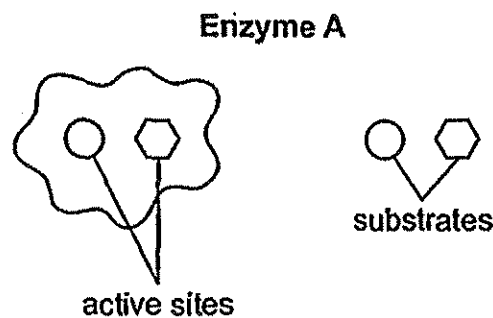
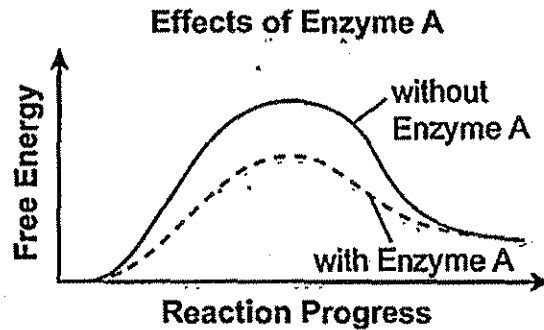
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The enzyme's change of shape would affect its ability to catalyze the reaction by its reaction progress taking more time than it did before.

A-3 Score Point 3

This response demonstrates a thorough understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing all of the tasks presented in the item. The student explains that "Enzyme A acts like a catalyst because it has less free energy (accepted as the reaction has less free energy) and takes less reaction time." The student correctly predicts that "the enzyme's change of shape would affect its ability to catalyze the reaction by its reaction progress taking more time than it did before." Though awkwardly worded, *making the reaction take more time* is enough of a prediction to imply that the enzyme is no longer acting as a catalyst. This is a weaker full credit paper, but all tasks are complete for credit.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst because it has active sites. The active sites make the reaction happen faster and uses less energy.

Continued. Please refer to the previous page for task explanation.

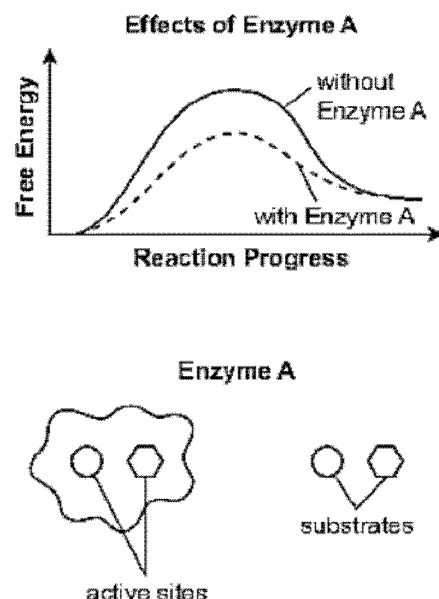
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The active sites could change their shape making the reaction happen slower. The enzyme would not have a big effect on the reaction.

A-4 Score Point 3

This response demonstrates a thorough understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing all of the tasks presented in the item. The student explains that "the active sites (on the enzyme) make the reaction happen faster and uses less energy." The student also correctly predicts that "the active sites could change their shape making the reaction happen slower." Though the second statement is worded somewhat vaguely, the information about the reaction happening slower is enough of a prediction to receive credit. This answer is complete for full credit.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst by decreasing the amount of starter energy needed for the reaction to begin. The graph shows that much less energy is used with Enzyme A there. This would reduce the time needed to produce the product of this reaction. With a shorter reaction it can be down more times with less energy needed also. This would put more of the needed products into the cell.

389 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

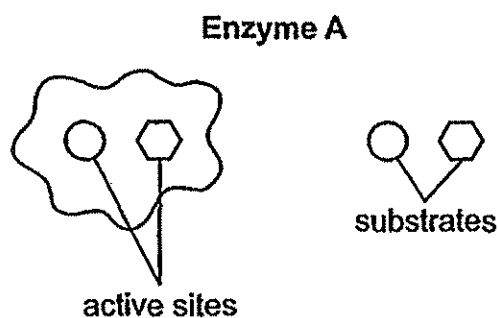
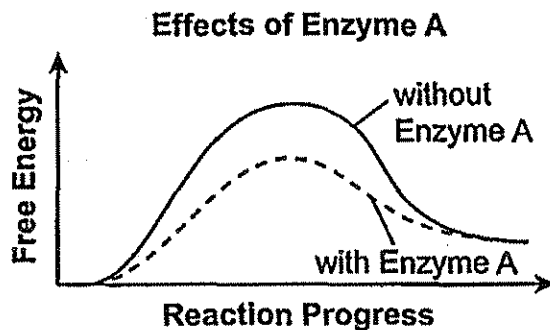
It could hurt or even help the enzyme catalyze the reaction. Some enzymes work better at different temperatures. But some differences could destroy the enzyme.

161 / 1000

A-5 Score Point 2

The response demonstrates a partial understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing two of the tasks presented in the item. The student explains that "Enzyme A acts as a catalyst by decreasing the amount of starter (activation) energy needed for the reaction." He/she continues to explain that requiring lower starter energy would reduce the amount of time needed to produce the products (reaction time). The student then provides an unacceptable prediction about how changing the shape of the enzyme would affect its ability to catalyze a reaction: *it could hurt or even help the enzyme catalyze the reaction* is not acceptable for the scenario given. This response contains incorrect work and therefore can only receive partial credit.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A works as a catalyst in the reaction because it causes the reaction to require less energy & to complete faster.

Continued. Please refer to the previous page for task explanation.

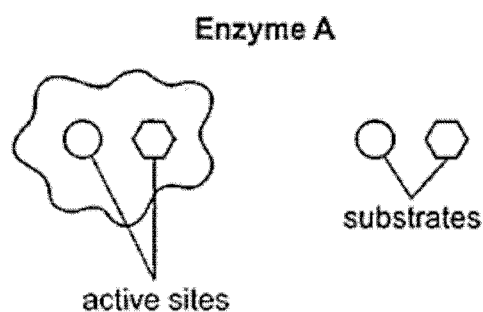
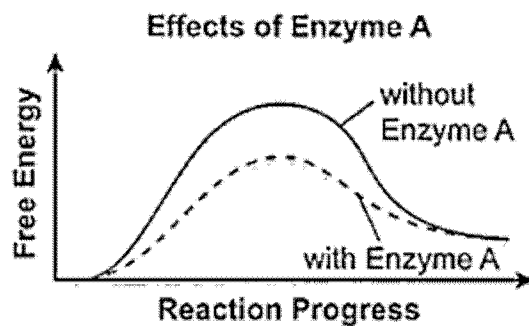
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If the enzyme changes then it's new shape
may not fit the reaction anymore.

A-6 Score Point 2

The response demonstrates a partial understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing two of the tasks presented in the item. The student explains that "enzyme A works as a catalyst...because it causes the reaction to require less energy and complete faster." However, the student provides an incomplete prediction. In order to earn full credit, the student needs to correctly predict how the enzyme not fitting would affect its ability to catalyze the reaction. This response is incomplete and therefore receives partial credit.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts like a catalyst because it
uses less energy and the reaction time
get faster.

Continued. Please refer to the previous page for task explanation.

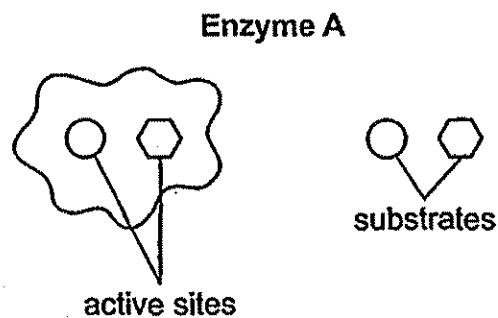
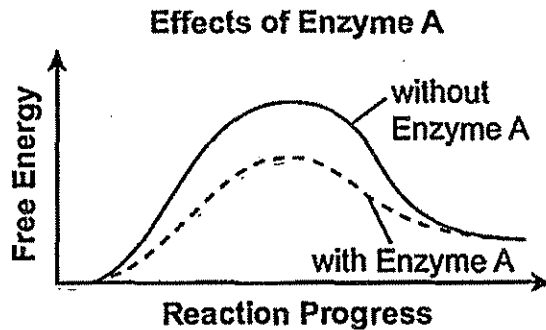
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The enzyme may cause the opposite effects
with the catalyze being used.

A-7 Score Point 2

The response demonstrates a partial understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing two of the tasks presented in the item. The student provides an acceptable response to how enzyme A acts a catalyst in the reaction by explaining that less energy is used and *the reaction time gets faster*. The prediction of how a change in shape would affect the enzyme's ability to catalyze the reaction is unclear. "The enzyme may cause the opposite effect with the catalyst being used" is not clear enough for credit. The student should more completely describe the opposite effects for additional credit. This response contains work that is incomplete or unclear, therefore the response receives partial credit.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A is a catalyst due to its ability to
greater the amount of free energy in a much shorter
amount of time. Also because it remains unchanged
after the reaction.

Continued. Please refer to the previous page for task explanation.

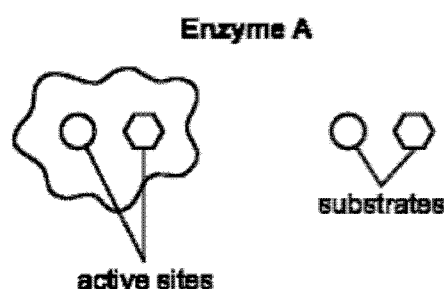
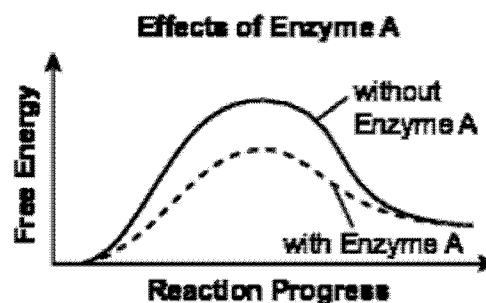
Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It would change the rate at which the free energy is present, and might be entirely unable to function as a catalyst do to its not being able to remain unchanged.

A-8 Score Point 1

The response demonstrates a minimal understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing one of the tasks presented in the item. The student provides an unclear explanation of how Enzyme A acts as a catalyst in the reaction, but correctly states the process occurs in "a much shorter amount of time." Though "greaten the amount of free energy" is incorrect, the graph does show an increase in energy in both reactions so the explanation of time can be accepted for partial credit. The prediction provided is incorrect. The student predicts that "the rate at which free energy is present" would change. Even though the student states that the enzyme might be unable to function as a catalyst, there is too much wrong information included for the response to receive additional credit. This response contains work that is unclear and incorrect and therefore receives minimal credit.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A significantly reduces the amount of free energy over time in comparison to the reaction taking place without enzyme A. It still follows the same path as the reaction without enzyme A, but just with a lower amount of free energy.

237 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

if conditions outside the cell change in a negative way, meaning the it would demand more energy to be used by the cell, then my guess is that the enzyme's ability to catalyze the reaction would slow down and decrease.

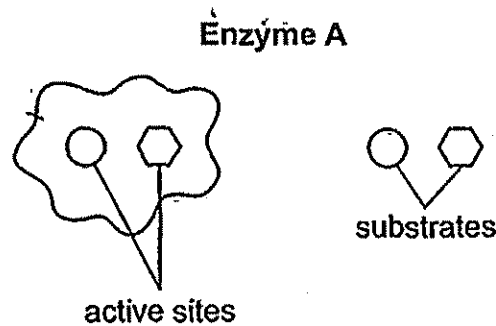
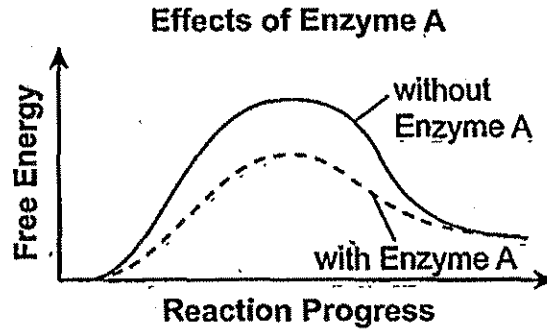
218 / 1000

A-9 Score Point 1

The response demonstrates a minimal understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing one of the tasks presented in the item. The student explains that "Enzyme A significantly reduces the amount of free energy over time."

Though a time element is present, it is difficult to discern how the enzyme changes the amount of time it takes the reaction to occur. The prediction provided by the student is unclear. This response contains work that is unclear and receives minimal credit.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A has two active sites working with it. Because these two sites are substrates they take away from the free energy throughout the reaction process, therefore making Enzyme A a catalyst in the reaction.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

Conditions around active sites can change the shape of an enzyme. If the shape changes, the enzymes active sites could change and either take away or add to the reaction and the enzyme's ability to catalyze.

A-10 Score Point 0

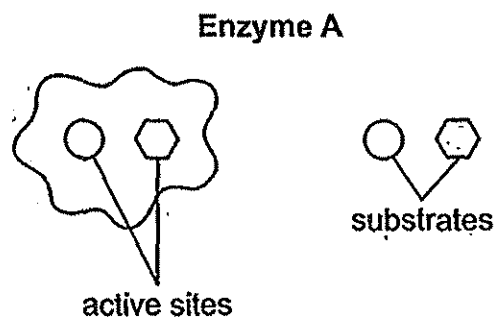
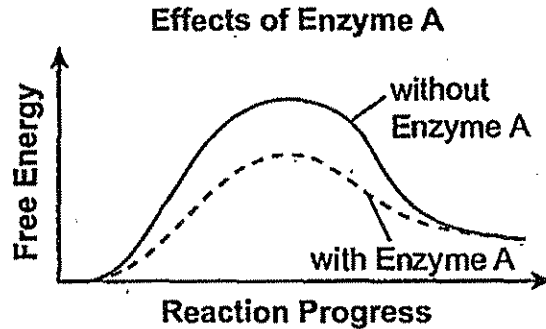
The response demonstrates an insufficient understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by not completing any of the tasks presented in the item. The explanation provided by the student consists of unclear statements and incorrect information. The response does not correctly explain how the amount of time and energy is changed when Enzyme A is acting as a catalyst. Additionally, the student predicts that a change in shape could "either take away or add to the reaction and the enzyme's ability to catalyze a reaction." Responses of this nature are unacceptable. This response contains no work that is acceptable for credit.

Keystone Biology

Enzyme's Active Sites

Handscoring Training Set 1

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

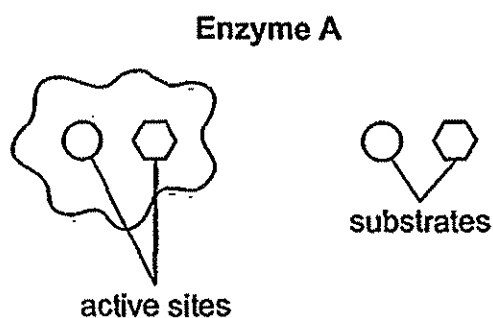
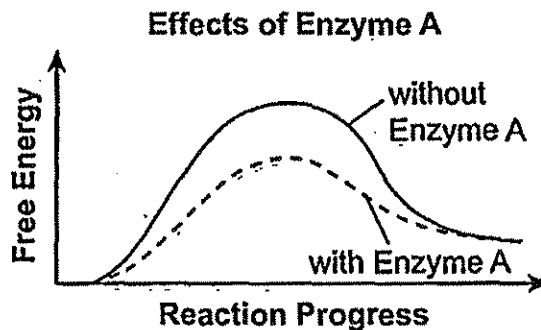
Enzyme A acts a catalyst because with enzyme A their is less free energy being used. With enzyme A, it speeds up the reaction time. That is how it acts as a catalyst.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It would affect the enzyme's ability to catalyze the reaction because they might not react right. The active sites could change, and then they wouldn't fit like a lock and key anymore, so therefore the enzyme would no longer act as a catalyst.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

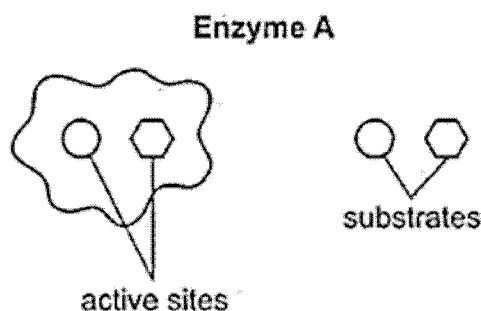
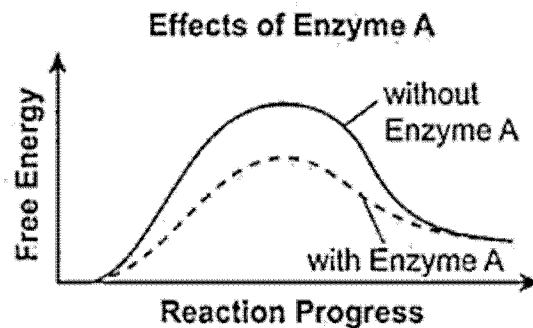
Enzyme A lessens the amount of free energy in the reaction. The time it takes for the reaction to end is also lessened by this enzyme.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If the enzyme was in conditions that prohibited its ability to catalyze the reaction, then it would not be able to lessen the amount of energy made in said reaction.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

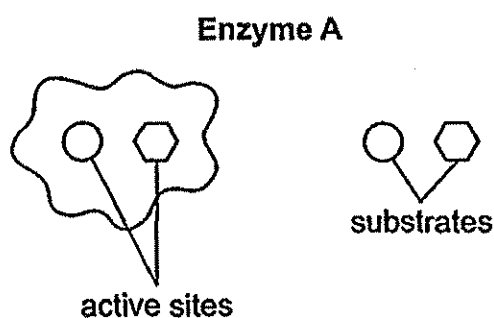
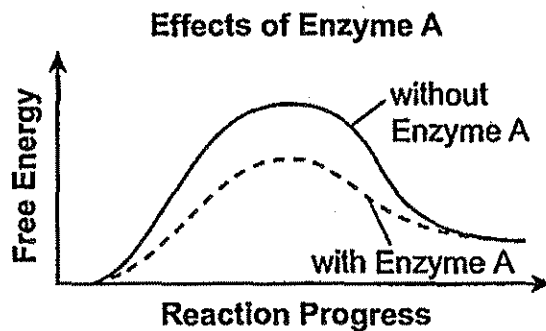
A catalyst aids in speeding up a reaction. Enzyme A helped the chemical reaction use less energy than normal, and speed up the reaction a very small amount.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If an enzyme changes its shape, it cannot bond to the substrate, rendering the enzyme useless in a chemical reaction.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

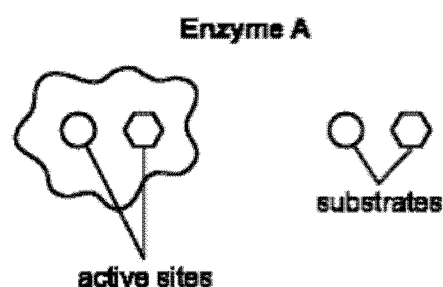
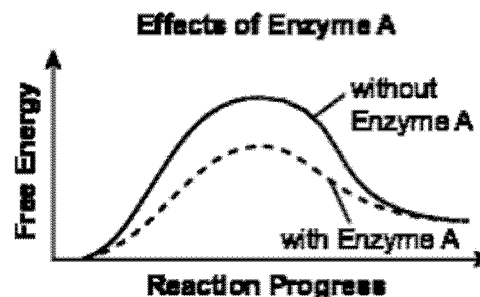
Enzyme A creates a faster reaction
and makes it easier to get to the product.
If the reaction was left alone then it would
go much slower and would also use more energy.
With the Enzyme A it is quick, fast, and uses
less energy.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It may slow the process down or speed it up with using a lot of energy. Also, the catalyze may just not do anything it was supposed to do. Another thing could be that it will react at a different time.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

enzyme A reacts much slower compaird to the other reaction process, and the amount of free energy is dramatically decreased.

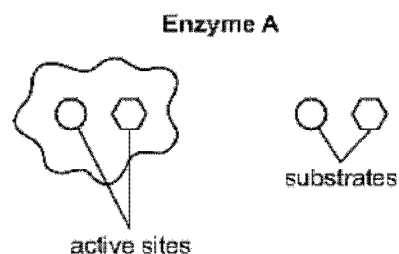
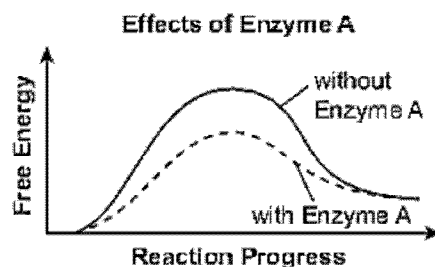
123 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would e

depending on the enviornment and what exactly are the complications are, it could dramtically effect the cell by not giving it enough nutriants, sun and/or other helpful nutrients needed for notrml function of the cell.

220 / 1000

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst because the energy and time are reduced on the graph which makes things more faster because of how much it speeds up the active sites and substrates.

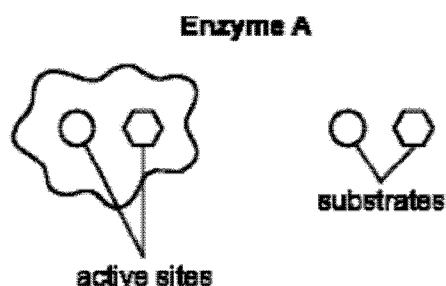
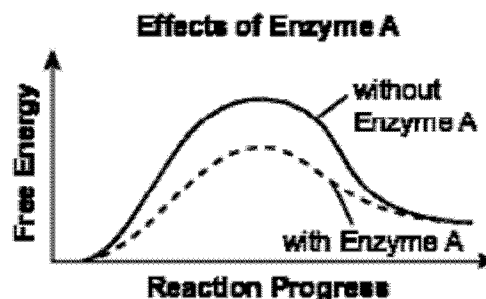
176 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

The conditons depending on what they are would reduce the effect of the active sites and would make it alot easier or harder for them to do their job.

150 / 1000

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst in the reaction by lowering the amount of free energy and shortening the amount of time it takes for the reaction to take place.

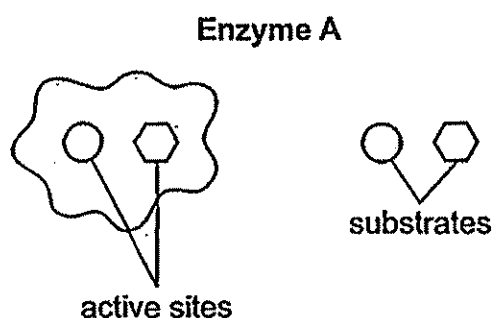
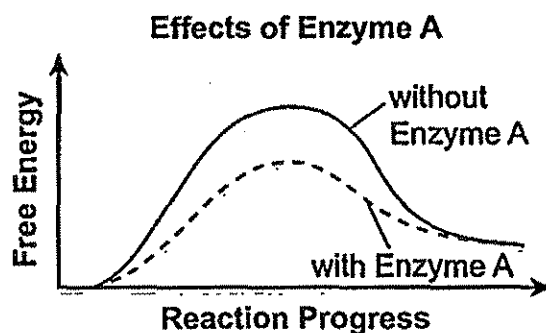
156 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

if conditions changed it would make it harder for the enzyme to catalyze the reaction and it may not be as effective

116 / 1000

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

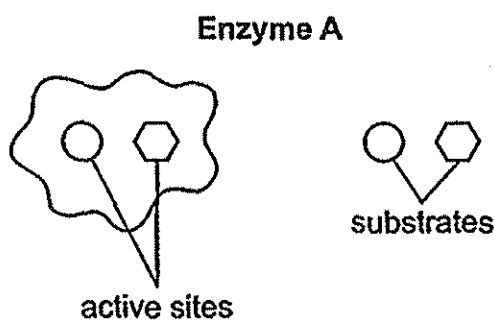
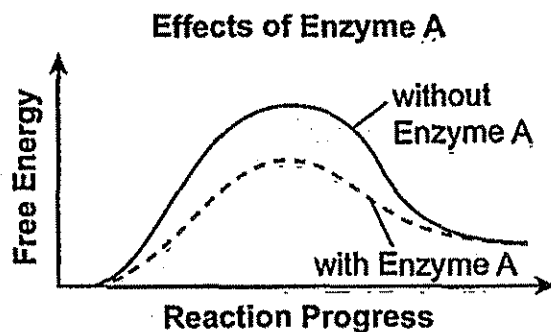
Enzyme A acts as a catalyst in the reaction because during the reaction progress the substrates within the active sites of a cell becomes greater and increases the free energy to a point and then falls slowly. That is why Enzyme A acts like a catalyst in the reaction.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

This would affect the enzyme's ability to catalyze the reaction because as the conditions around the enzyme change, the enzyme's active sites would change as the substrate of an enzyme change. The oxygen amount, and amount of pH and Mitochondria also affect the conditions of an enzyme.

Use the graph and diagram below to answer question 18.



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

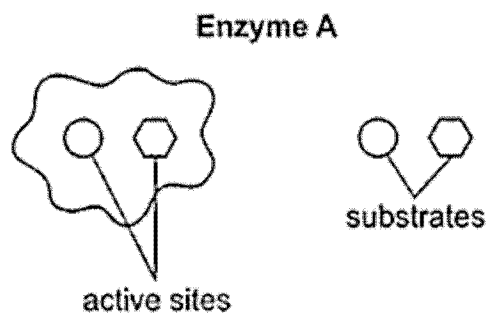
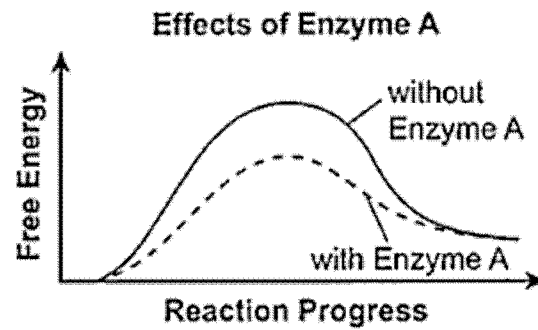
Enzyme A reduces the Free energy at first but then they leveled out with time.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It makes the active site
as if the reaction of a catalyst.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

The reaction was slowed down
by Enzyme A.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The enzyme could effect
the reaction more.

Name _____

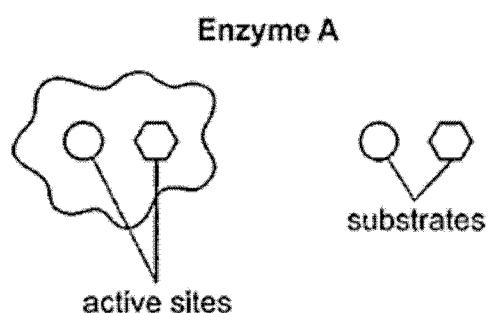
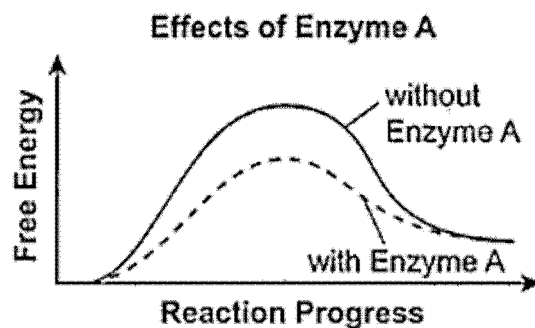
Number	Score	Notes
T1-1		
T1-2		
T1-3		
T1-4		
T1-5		
T1-6		
T1-7		
T1-8		
T1-9		
T1-10		

Keystone Biology

Enzyme's Active Sites

Handscoring Training Set 2

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

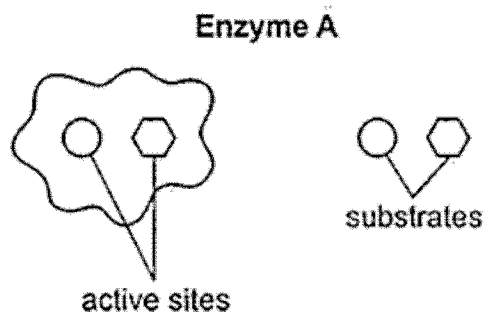
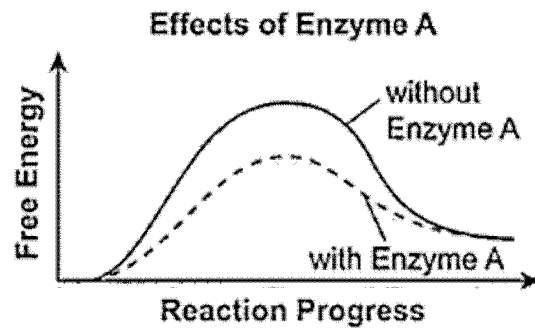
Enzyme A lowers the activation energy
amount which causes the reaction to
occur faster.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

IF the shape of the active site were to
change the substrate would no longer fit into
the correct active site. The induced fit would
not be able to occur.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

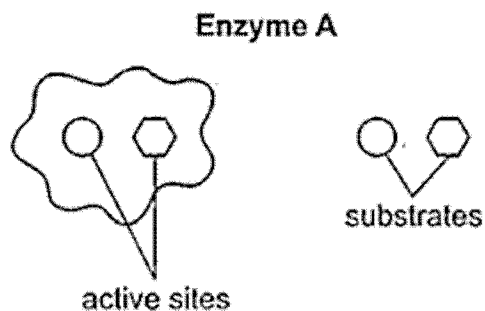
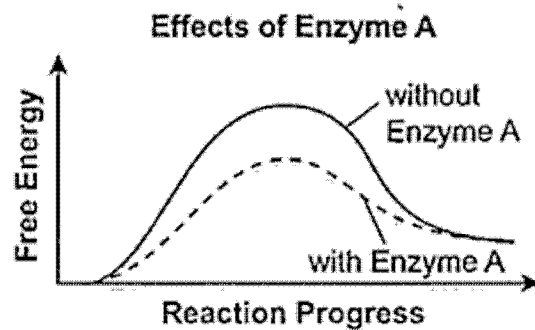
*Enzyme A lowers the energy needed and rate/time with
without the enzyme.*

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If something around an enzyme were to change and affect the shape of the enzyme's active sites, that enzyme might become denatured. Some examples of things that could denature an enzyme is the temperature or an inhibitor. When the enzyme becomes denatured, it will become useless and won't be able to catalyze reactions any more.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

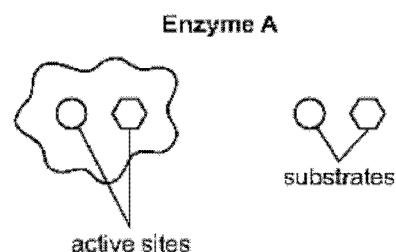
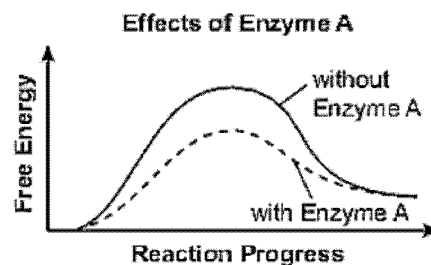
It acts as a catalyst because it lowers the energy made during the reaction. At the halfway point the energy is half of what it would originally be.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It would make it harder for the enzyme to catalyze the reaction.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A, as seen in the diagram, makes the reaction require less energy than if there was none of it. It also makes the reaction happen faster. That is basically the definition of a catalyst; something that speeds up the process.

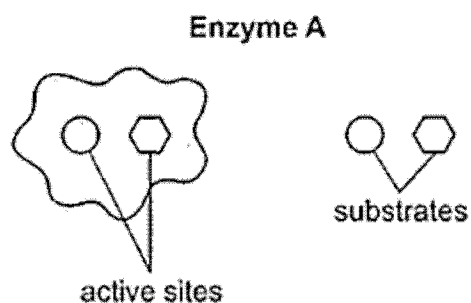
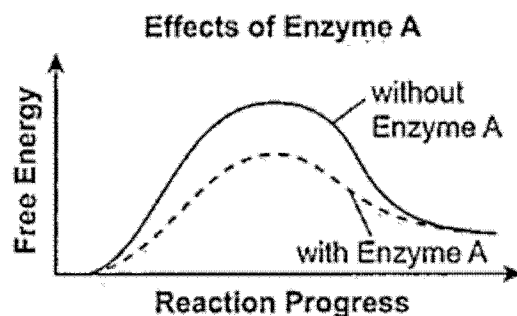
230 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

It would probably made it harder to catalyze the reaction. Or its ability to catalyze would vary because of the strange shape of its active sites.

146 / 1000

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

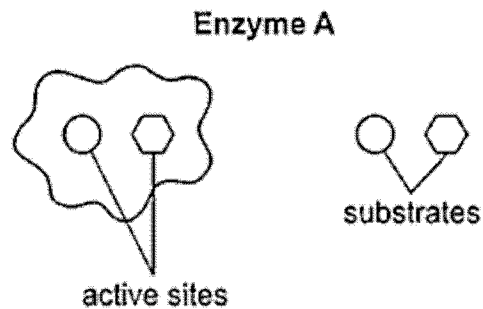
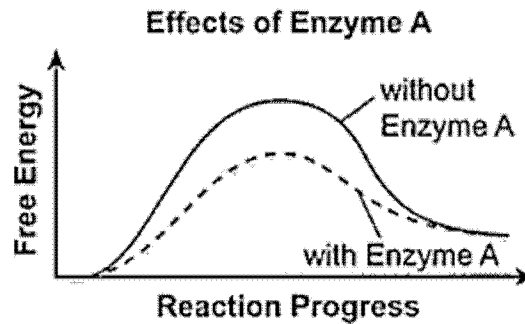
Enzyme A lessens the free energy
in the reaction progress. Without
Enzyme A there's a higher amount
of free energy in the reaction progress

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

I think that conditions would affect the enzyme's ability to catalyze the reaction because if the condition changed then the enzyme would also change. If the enzyme suddenly became smaller than it might be too small or if the enzyme got bigger then it might be too big.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

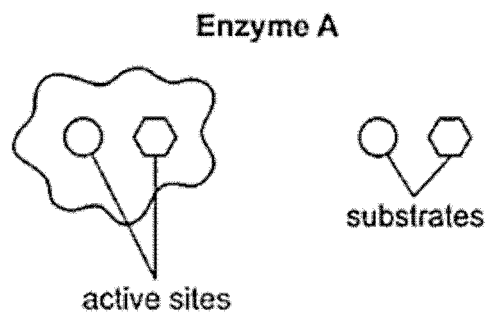
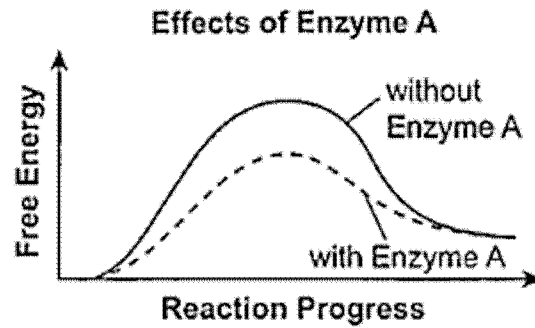
Enzyme acts as a catalyst in the reaction because it's preping for the reaction. Time is the key in a fast or slow reaction. which plays a part in the amant of energy that is released due to the catalyst Enzyme A.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The size of the active sites change would definitely play a role in the reaction. Therefore the enzyme's ability to catalyze a reaction would variate.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

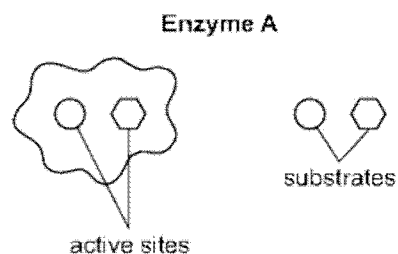
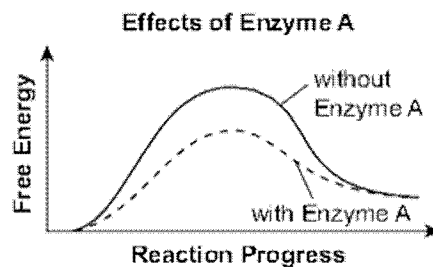
the enzyme A reduces the activation
energy

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

Its ability would be to speed up the
reaction by reducing the activation energy

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst because there is less energy that is being used and it took less time to go through the reaction progress.

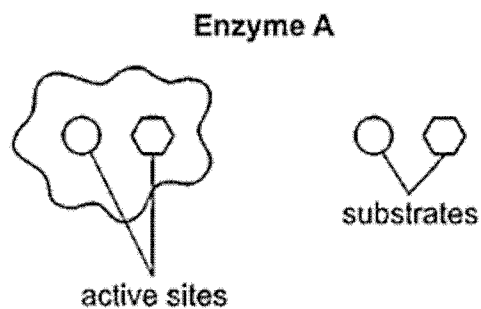
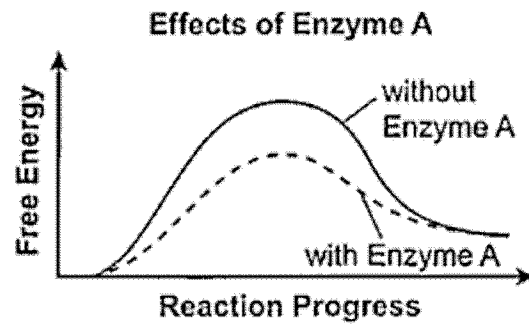
133 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

I predict that this would affect the enzyme's ability to catalyze the reaction because it used a lot of energy without the enzyme but with the enzyme it didn't use all that much.

179 / 1000

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

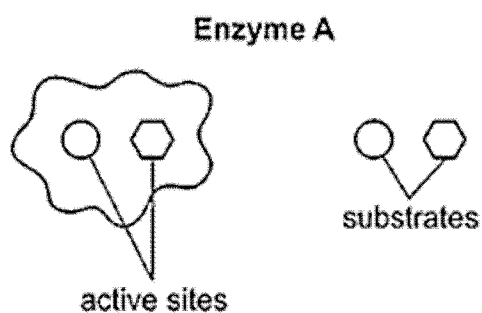
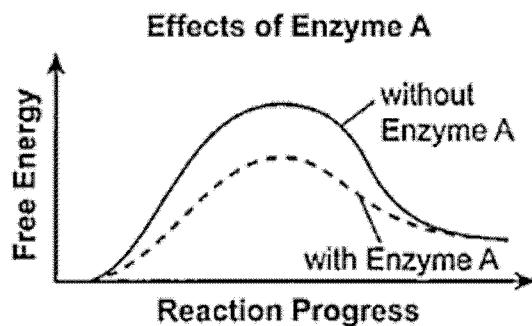
Enzyme A has smaller substrates
and is not getting enough
free energy in the amount
of time.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It would make the size
and shape of the enzyme
bigger and stronger.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst because it speeds up the reactions making the time needed less, and because it takes less energy for the reaction to take place.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

This would greatly slow down or even stop the enzyme's ability to be a catalyst. This is because it is formed to fit a certain substrate and if it changes shape, it will not be able to fit the substrates and link them together anymore.

Name _____

Number	Score	Notes
T2-1		
T2-2		
T2-3		
T2-4		
T2-5		
T2-6		
T2-7		
T2-8		
T2-9		
T2-10		

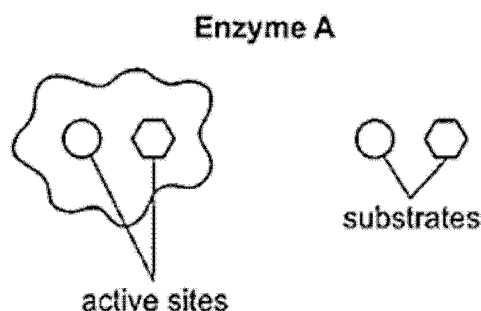
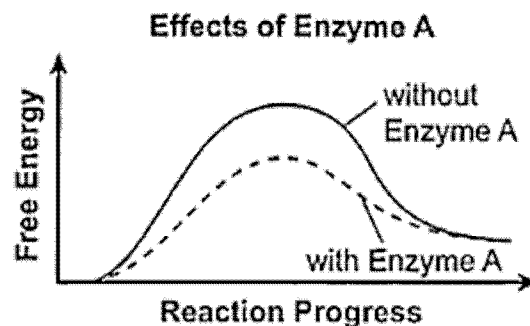
Keystone Biology

Enzyme's Active Sites

Handscoring Practice Set^{*}

*Responses in this set do not have true scores. Apply scores based on scoring criteria.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

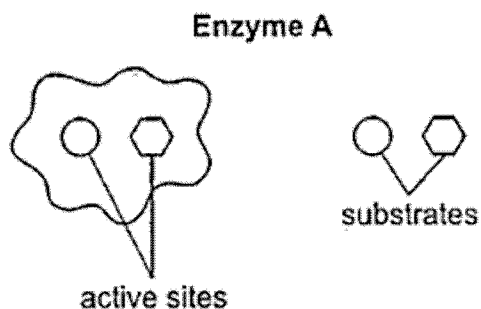
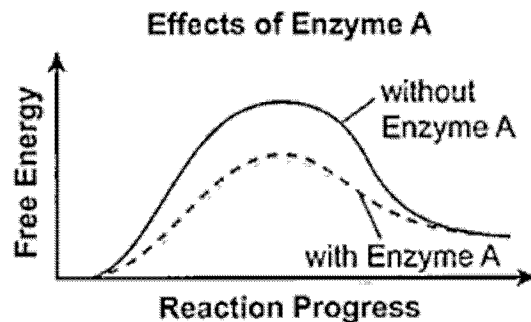
When there is no Enzyme A
there is more free energy.
When there is Enzyme A
there is less free energy.
But at the end of the
reaction process it levels
out and is almost the same

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

When the enzymes shape is large it probably gives off more free energy. And less when it is smaller.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

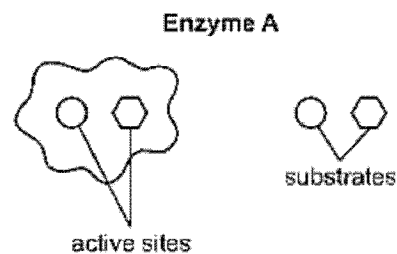
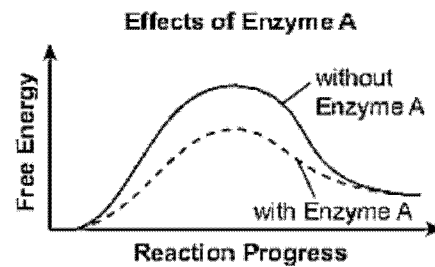
Enzyme A acts as a catalyst
because when it is used the
reaction does not need as much
energy to complete a job.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

The enzyme might only work
in certain areas and it won't work
forever

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

ITS A CATALYST BECAUSE IT TAKES SOME OF THE FREE ENERGY FOR ITSELF.

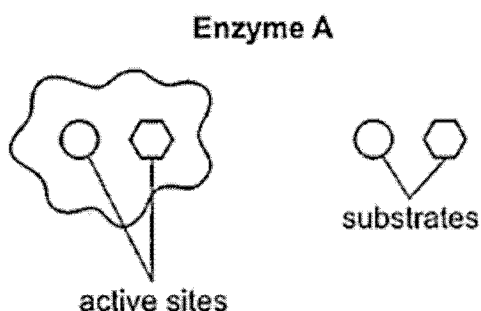
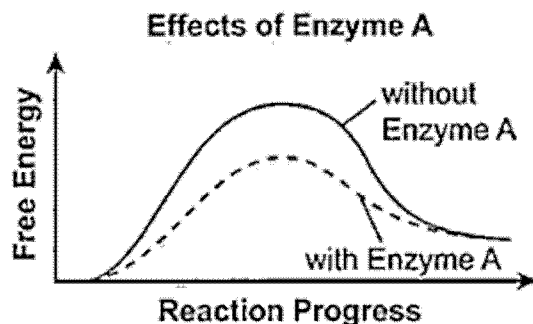
67 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the reaction.

IT WOULD MAKE IT SMALLER AND THEN NOT AS MUCH ENERGY WOULD BE TAKEN.

69 / 1000

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

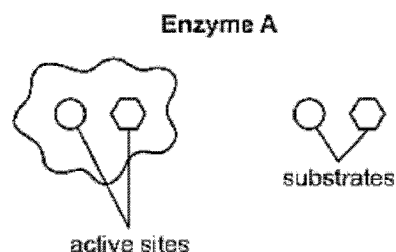
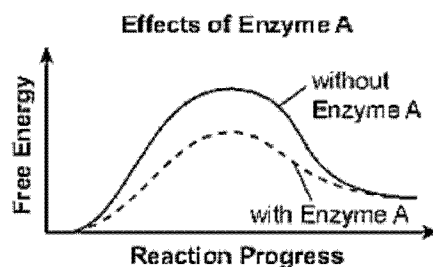
Enzyme A acts as a catalyst by making the reaction occur faster and with less energy required, as shown in the graph. The substrate in this reaction fits perfectly into the active site of the enzyme, so everything works.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

If the active site is morphed to a new shape, the substrate will no longer fit into the enzyme and it can't do its job as a catalyst.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

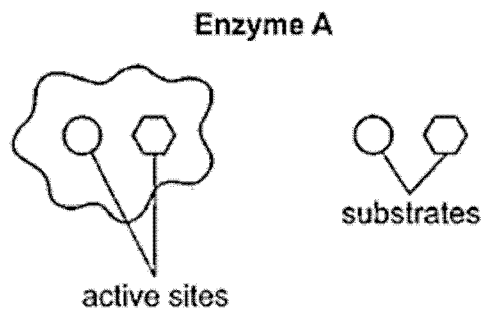
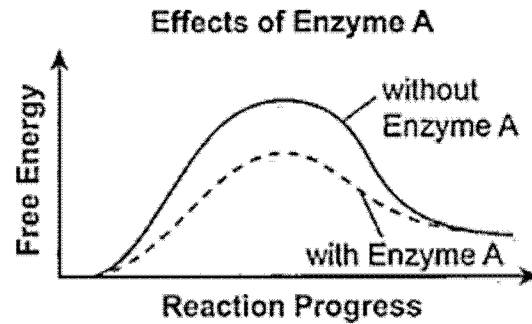
It acts like a catalyst because it lowers the amount of time for energy to free.

80 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would change the reaction because the shape is changed. if the shape and conditions are changed then everything else changes with it.

139 / 1000

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

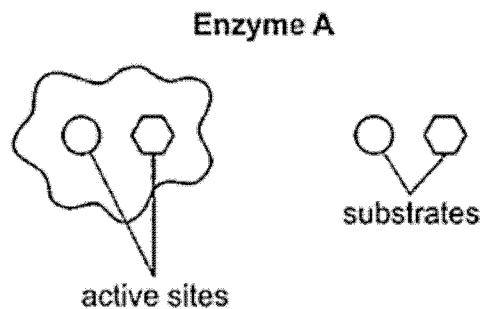
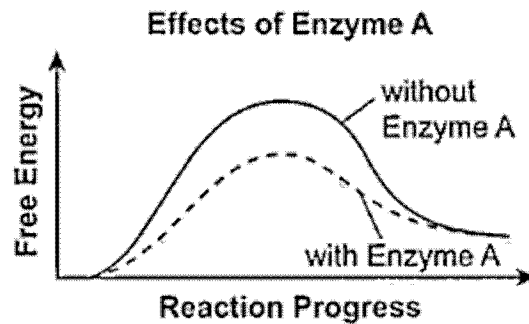
It acts as a catalyst because
it shows you the more energy
the quicker it is.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It would accept because of how
much energy it has.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

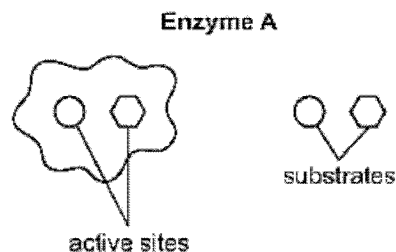
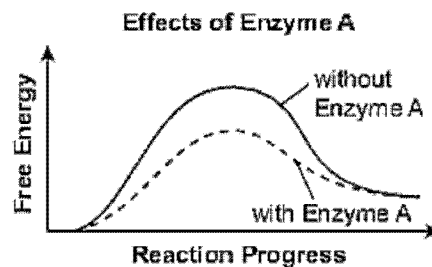
Enzyme A acts as a catalyst
by giving the reaction more
energy and speeding up the
process.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

It could possibly make the catalyst work slower and produce less energy.

Use the graph and diagram below to answer the question.



Part A: Explain how Enzyme A acts as a catalyst in the reaction. Be sure to include energy and time in your answer.

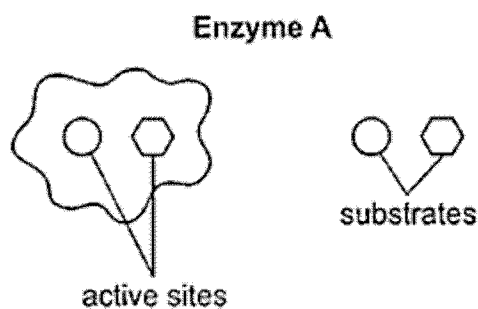
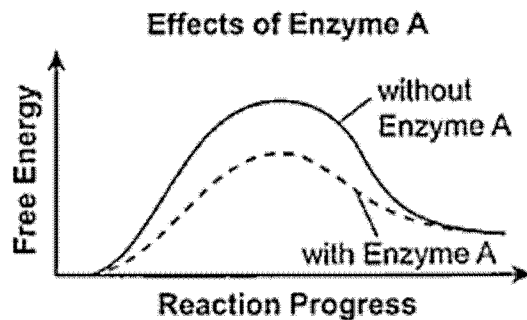
Enzyme A acts as a catalyst because it requires the most energy to be in use. It needs alot of energe in a short ammount of time.

132 / 1000

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would

This would effect the enzymes ability to get substrates in the active sites. If it too hot, the substrates will not go in, if it is too cold, it will take a long time. In my biology class i have learned that at about 23 degrees celcius, it will be 100% effective.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst in
the reaction by lowering the amount of
activation energy over time to start the
chemical reaction.

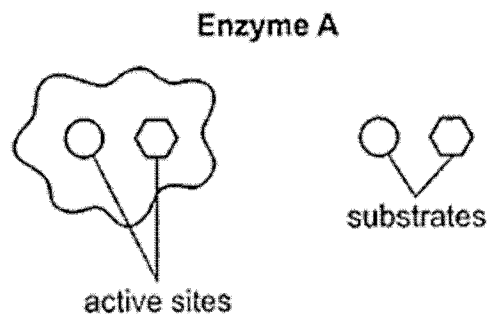
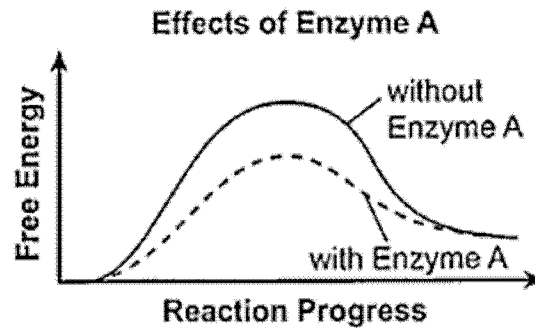
Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze

~~I predict that~~
the reaction.

conditions that change and affect the shape of an enzyme's active sites would affect an enzyme's ability to catalyze the reaction by making the enzyme unable to catalyze the substances to start the chemical reaction.

Use the graph and diagram below to answer question



Part A: Explain how Enzyme A acts as a catalyst in the reaction.
Be sure to include energy and time in your answer.

Enzyme A acts as a catalyst in the reaction above since it lowers the activation energy. Also, it carries out the reaction in a shorter amount of time, compared to the solid black line. Overall, all these facts support the idea that Enzyme A is a catalyst.

Continued. Please refer to the previous page for task explanation.

Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

With the conditions changing around the enzyme while affecting the shape of the active sites, the enzyme wouldn't function properly. Instead, it will be useless and therefore can't catalyze the reaction.

Practice Set*

Subject: **Biology**

Item: **Enzyme's Active Sites**

Grade **HS**

Name _____

Number	Score	Consensus	Annotation
P-1			
P-2			
P-3			
P-4			
P-5			
P-6			
P-7			
P-8			
P-9			
P-10			

***Responses in this set do not have true scores. Apply scores based on scoring criteria.**

Keystone Biology

Enzyme's Active Sites

Handscoring
Training Sets 1 and 2
True Scores/Annotations

Training Set 1

Paper	Score	Comments
T1-1	3	The response demonstrates a <i>thorough</i> understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing all three task presented in the item. The student explains that enzyme A acts a catalyst because...there is less free energy being used...and it speeds up the reaction time. The explanation provided includes both energy and time. In Part B, the student predicts that the enzyme would no longer act as a catalyst because the active sites could change and then they wouldn't fit like a lock and key. The response is clear, complete and correct.
T1-2	2	Part A: energy: lessens the amount of free energy <u>in</u> the reaction time: the time it takes for the reaction to also end is also lessened by this enzyme Part B: no credit, not be able to lessen the amount of energy made is incorrect
T1-3	3	Part A: energy: chemical reaction uses less energy time: a catalyst aids in speeding up a reaction or enzyme A speed[s] up the reaction a very small amount Part B: changes it's shape, it cannot bond to the substrate, <u>rendering the enzyme useless</u>
T1-4	2	Part A: energy: with enzyme A [the reaction] uses less energy time: enzyme A creates a faster reaction Part B: no credit – if student lists multiple possibilities they must all be correct – changing the shape of the enzyme will not cause the reaction to speed up
T1-5	1	Part A: energy: the amount of energy is dramatically decreased time: no credit – enzyme A would not react much slower is not correct Part B: no credit – not describing the effect on the enzymes ability to catalyze the reaction
T1-6	2	Part A: energy: energy is reduced time: time is reduced Part B: no credit – easier or harder is not an acceptable prediction about the enzyme's ability to catalyze the reaction
T1-7	2	Part A: energy: lowering the amount of free energy and time: shortening amount of time it takes the for the reaction to take place Part B: no credit – make it harder and not as effective are too vague of a prediction
T1-8	0	The response demonstrates an insufficient understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by not completing any of the tasks presented in the item. The explanation in Part A does not correctly explain how enzyme A acts as a catalyst in the reaction. The student describes the shape of the graph shown, but does not explain the effect enzyme A would have on the energy or time. The student does not provide a prediction how the change in shape would affect the enzyme's ability to catalyze the reaction. The response attempts to explain how the conditions would change and not the affect these changes would have. The response contains work that is incomplete or unclear.
T1-9	1	Part A: energy: enzyme reduces the free energy but leveled out with time (acceptable interpretation of the graph time: no credit – time is not addressed in student response Part B: no credit – nothing acceptable for credit
T1-10	0	Part A: energy: no credit – energy not addressed time: no credit – reaction would speed up, not slow down Part B: no credit – could effect the reaction more is unacceptable

Training Set 2

Paper	Score	Comments
T2-1	2	Part A: energy: lowers activation energy time: causes reaction to occur faster Part B: no credit – how would not being able to fit affect the reaction
T2-2	3	Part A: energy: lowers the energy needed time: lowers the rate /time used (rate is not used correctly, but does not negate credit) Part B: it (the enzyme) will become useless and won't be able to catalyze reactions (information about becoming denatured is correct)
T2-3	0	Part A: energy: no credit – lowers the free energy <u>made</u> is not acceptable time: no credit – time is not addressed Part B: no credit – making it harder for the enzyme to catalyze the reaction is too vague
T2-4	2	Part A: energy: requires less energy time: makes the reaction happen faster Part B: no credit – does not state enzyme would not be able to catalyze the reaction
T2-5	1	Part A: energy: lessens the free energy is acceptable (general answer about energy, but doesn't say lessens free energy made) time: no credit – time is not addressed Part B: no credit – does not say how the change in size would affect the ability to catalyze the reaction
T2-6	0	Part A: energy: no credit – does not talk about the change in energy requirement time: no credit – does not address change in time with/without the enzyme Part B: no credit – response does not state how its ability will change, just that it does (does it catalyze the reaction better or worse?)
T2-7	1	The response demonstrates a partial understanding of the role of an enzyme as a catalyst in regulating a specific biochemical reaction by completing one of the tasks presented in the item. The student correctly states that enzyme A reduces the activation energy, but fails to provide any information about the effect on time in their response. The response in Part B does not correctly answer the question presented by predicting that the enzyme would catalyze the reaction (which is a repeat of the information given in Part A). The response contains work that is incomplete or unclear.
T2-8	2	Part A: energy: there is less energy time: it took less time Part B: no credit – student explains why its ability will change, but not how (slows down the reaction)
T2-9	0	Part A: energy: no credit – does not explain how enzyme catalyzes reaction in terms of energy time: no credit – does not explain how enzyme catalyzes reaction in terms of time Part B: no credit – how would these changes affect the enzymes ability to catalyze the reaction?
T2-10	3	Part A: energy: takes less energy for the reaction to take place time: speed up the reaction (making the time needed less) Part B: this would...stop the enzyme's ability to be a catalyst (enzyme would not fit)