NAME:_____ DATE_____

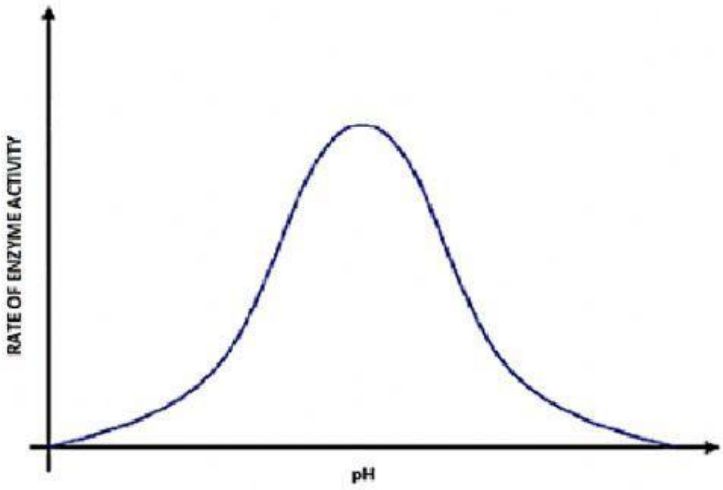
ENZYMES, TEMPERATURE AND pH

1. Enzymes that work on carbohydrates are called _____

2. Enzymes that work on fats are called _____

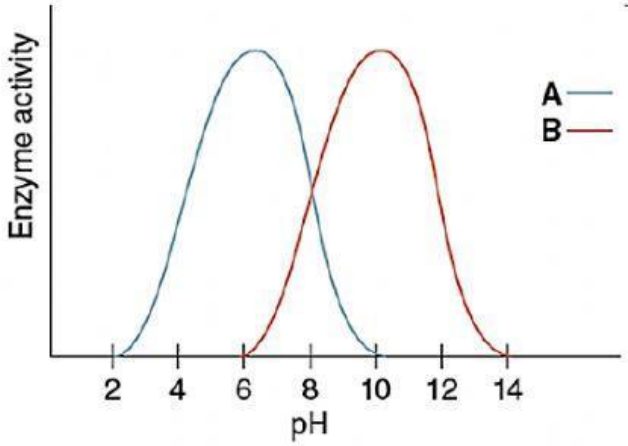
3. Enzymes that work on proteins are called _____

4a. Below is a graph of how pH affects the reactivity of an enzyme. Drag the following labels into place on the graph.




| | | |
|---|---|---|
| A | enzyme starts to slow down as the solution it is in gets more basic | A |
| B | (acidic) denaturation point | B |
| C | enzyme starts to slow down as the solution it is in gets more acidic | C |
| D | (basic) denaturation point | D |
| E | Optimum pH | E |

4b. Look at the graph of how two enzymes react to changes in pH.




i. Do both enzymes have the same optimum pH? _____

ii. What is the optimum pH of enzyme A? _____

iii. What is the optimum pH of enzyme B? _____

iv. Which enzyme was most likely taken from the human small intestines? _____

5. Lipase is an enzyme that breaks down fats. We can use an indicator to follow this reaction. The indicator is red to start with but turns **yellow** when all the fat has been broken down. Use the information to answer the questions below.

| TEST-TUBE | TEMP / °C | INITIAL COLOUR | FINAL COLOUR |
|---|---|---|---|
| 1 | 0 | RED | RED |
| 2 | 10 | RED | ORANGE |
| 3 | 40 | RED | YELLOW |
| 4 | 60 | RED | ORANGE |
| 5 | 100 | RED | RED |

a. At what temperature does lipase work best? _____ °C

b. The colour did not change in test-tube 1 because the _____ in the test-tube was too _____.

c. The colour did not change in test-tube 5 because the _____ in the test-tube was too _____.

d. Predict an end colour if we heated test-tube 1 to 40°C. _____

e. Predict an end colour if we cooled test-tube 5 to 40°C. _____

6. A number of factors can affect the rate of an enzyme-controlled reaction. State if each of the following would **INCREASE**, **DECREASE**, **HAVE NO EFFECT** on the reactivity of the enzyme.

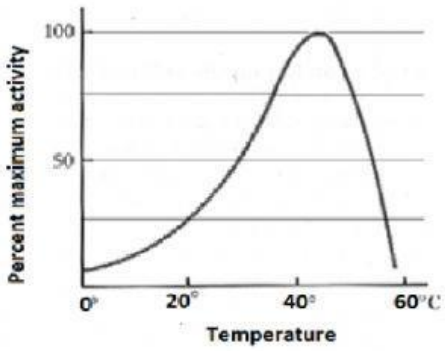
a. Increasing the amount of enzyme. _____

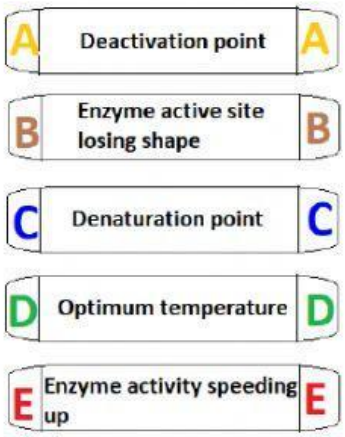
b. Decreasing temperature. _____

c. Forgetting to add the substrate at the start of the enzyme reaction. _____

d. A more acidic pH from the optimum. _____

7. Below is a graph of how temperature affects the reactivity of an enzyme. Drag the following labels into place.




a. What temperature gives 25% enzyme activity? _____ °C

b. At 30°C we would achieve _____ % enzyme activity.