

Test 4 Study Guide (Part 2) – Enzymes (BIO.2c) (28pts)

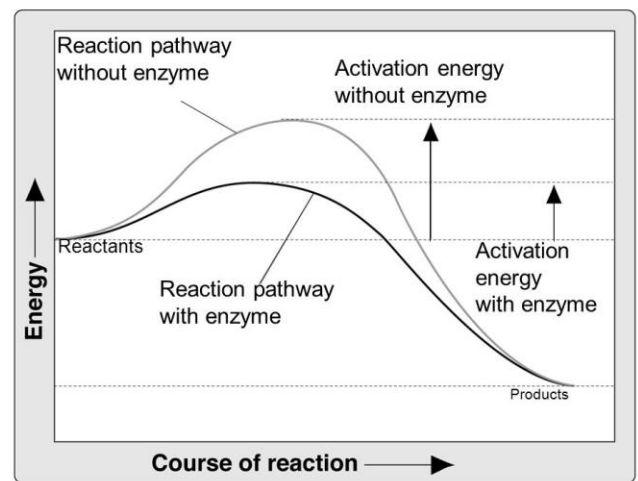
Describe the function of enzymes. (1pt)

Describe the relationship between a substrate and the active site of the enzyme. (1pt)

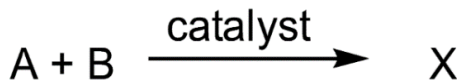
Draw a diagram of the action of an enzyme, from just before it binds to the substrate to when it releases the product. Label the **active site, enzyme, enzyme-substrate complex, product, and substrate.** (5pts)

Based on the graph at right:

- What does adding an enzyme do to the activation energy required to make a chemical reaction occur? (1pt)
- How does this affect the rate of the reaction? (1pt)



Refer to the chemical equation below:



Using the symbols and words in the equation, identify the:

- Reactants (Substrates) (1pt) _____
- Product (1pt) _____

When the catalyst is added, over time what will happen to the following substances (4pts; 1pt each):

Substance	Will increase, decrease, or stay the same
A	
B	
catalyst	
X	

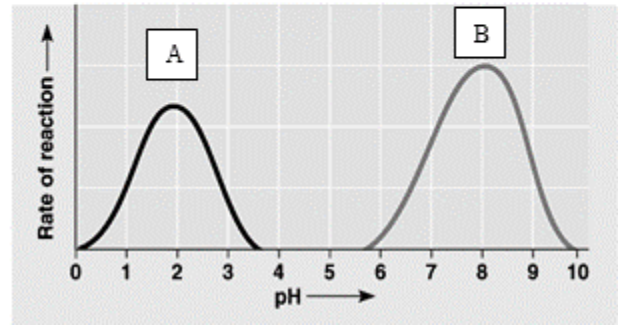
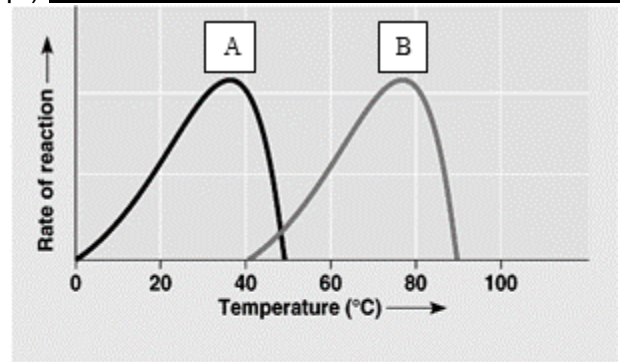
If the catalyst is removed, the rate at which X is produced will (1pt)
 Refer to the graph at right (4pts; 1pt each):

- Identify the optimum temperature of Enzyme A

- Identify the optimum pH of Enzyme A

- Identify the optimum temperature of Enzyme B

- Identify the optimum pH of Enzyme B



For questions 1 – 6, refer to the following data table, which summarizes the results of an experiment on the enzyme catalase. Catalase is an enzyme which works in the cells to break down hydrogen peroxide into oxygen and water. (6pts; 1pt each)

Substrate Concentration (mM)	Temperature (°C)	pH	Rate of oxygen production (mL/min)				
			Test 1	Test 2	Test 3	Test 4	Mean
1	10	6	5	7	4	8	6
1	20	6	10	12	13	9	11
1	30	6	20	24	23	21	22
1	40	6	60	66	68	65	64
1	50	6	18	22	21	19	

- Identify the independent variable. _____
- Identify the dependent variable. _____
- Identify one constant for this experiment. _____
- Identify the optimum temperature, based on the data, of the enzyme catalase. _____
- Based on the data, the enzyme denatures at or above which temperature? _____
- What is the mean rate of oxygen production (in mL/min) of catalase at 50°C? _____

When temperature or pH changes and moves away from the enzyme's optimal conditions,

- describe what happens to the enzyme's shape (1pt), and
- explain how this affects the rate of the chemical reaction (1pt).

