

Unit 2 TEST Study Guide: Energy and Enzymes

- 1 Review possible results for the starch “packing peanut” demo below ... Indicate what color each color indicator would be if it was added to the peanut & saliva solution after soaking in human saliva enzymes for 10 minutes:

Color indicator	No hydrolysis reaction yet ... <u>ALL</u> STARCH	Some hydrolysis = <u>some</u> STARCH and <u>some</u> GLUCOSE	Hydrolysis complete = <u>ALL</u> GLUCOSE
Iodine color	Black	Black	Yellow-Brown
Benedict’s Solution color	Blue	Yellow	Yellow

2. Complete the table below to review some of the enzymes we studied this unit:

Material studied / Demo Name	Substrate	Enzyme	Type of living cell that produces the enzyme
Potato n Basil “smoothie”	H₂O₂	catalase	plant (basil & potato)
liver n heart tissue	H₂O₂	catalase	animal (chicken)
Paper DOT Lab (Yeast solution)	H₂O₂	catalase	yeast fungus
Jello “soup”	gelatin protein	gelatinase	pineapple
Stomach This egg whites	egg white protein	Pepsin (proteinase)	human stomach

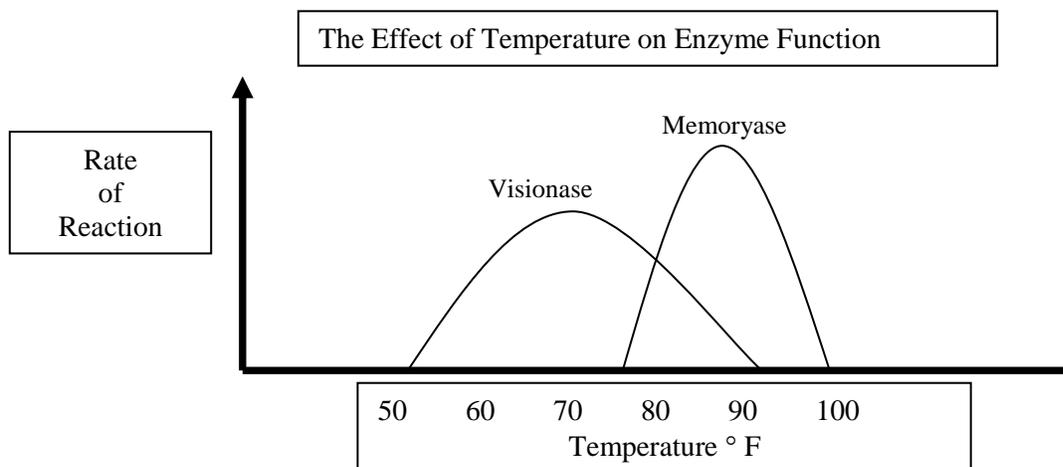
3. Explain why Jello made from fresh Kiwi is “soupy” while Jello made from fresh strawberries is firm?

Kiwi contains a natural gelatinase enzyme that breaks down the gelatin proteins while the strawberries do NOT have this enzyme

4. Assume a person falls into a pond of water and drowns. If the paramedics arrive within 10 minutes and attempt to revive the person, which scenario will give the person the best chance of being revived and living again: Falling into 75 degree (F) water or falling into 40 degree (F) water? EXPLAIN.

Falling into cold water would slow down the body’s enzymes and cause the brain cells to use/breakdown ATP at a slower rate Keeping the brain cells alive longer

Study the graph below that depicts the effect of temperature on two enzymes (memoryase and visionase) in the brain of a mosquito and then answer the following questions.



- Which enzyme functions over the largest range of temperatures? Visionase
- Which enzyme achieves the highest rate of chemical reaction? Memoryase
- Circle the temperature at which Memoryase enzyme would be the most active: 60 70 80 **90** 100
- Circle the temperature at which both enzymes function the best: 65 75 **85** 95
- Circle the temperature at which neither enzyme would function: 60 70 80 90 **100**

During the catalase dot lab, filter paper dots were soaked in a yeast solution that contained catalase. Catalase breaks down hydrogen peroxide (produced naturally in our bodies during cellular respiration) into water and oxygen gas. Please think about this lab and answer questions 10-20

10. The substance contained in the “bubbles” lab

Oxygen (O₂)

11. Enzyme that catalyzes the reaction

Catalase

12. Reactant in the Catalase “dot” lab

H₂O₂

13. The substance with the active site

Catalase

14. The substance that is reusable after the reaction

Catalase

15. The liquid product left after the reaction

H₂O

16. The substance that can be denatured

Catalase

17. The substance made from connected amino acids

Catalase

18. The substrate of the reaction

H₂O₂

19. What types of living organisms make catalase enzymes and WHY?

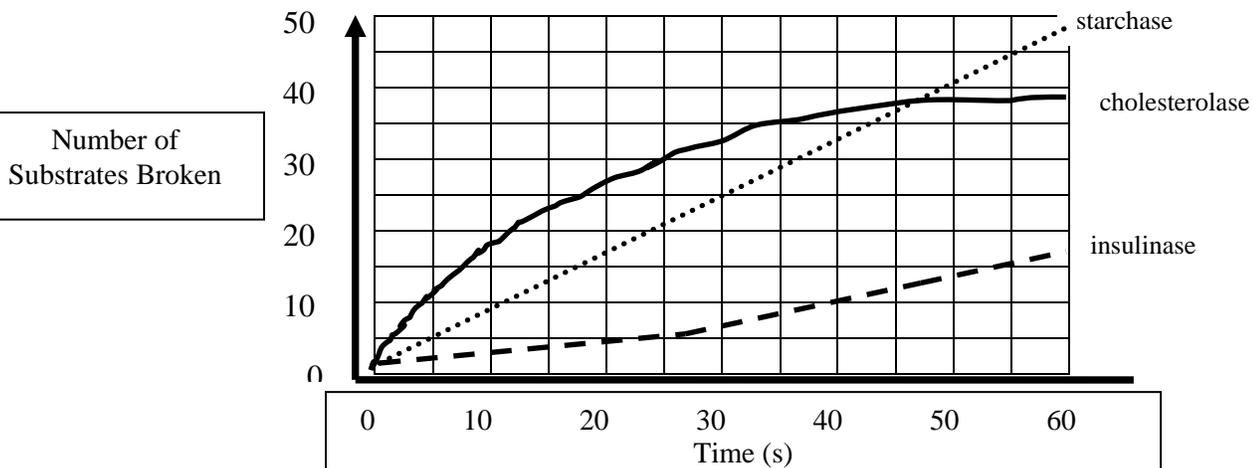
Any living thing that uses oxygen for cellular respiration and builds up H₂O₂ as a byproduct (e.g., humans, chickens, yeast, basil, potato, etc.)

20. Assume a student places a small piece of liver in a test tube filled with 3 mL of H₂O₂ and watches it bubble for 30 seconds and then drains the remaining H₂O₂ liquid into a new test tube. What is the correct conclusion if the student places a NEW piece of liver into the second tube and notices bubbles for 2 minutes?

- The H₂O₂ must be contaminated
- The liver catalase enzymes are being used again and again
- The liver catalase enzymes must have been denatured
- Some of the H₂O₂ had NOT all reacted and continued to react in the second test tube**

Study the graph below that depicts the effect of time (seconds) on how fast three enzymes (starchase, cholesterolase, insulinase) can breakdown (hydrolysize) their own substrate inside a cell.

The Effect of Time on Number of Substrates Broken



21. Which digestive enzyme can break substrates at the fastest rate?

Cholesterolase

22. Which digestive enzyme breaks down the most substrates in 60 seconds?

starchase

23. How many substrates does starchase have broken after 30 seconds?

25

24. Predict how many substrates insulinase would break in 70 seconds?

20 - 25

25. Which is the most likely reason why cholesterolase did not break any more substrates from 40s to 60 s?

Most of the substrates had already been broken and more time was spent traveling to the few distant ones