Topic Review Guide: Enzymes (Videos 31 and 32)

To Think About: How do molecules and atoms from the environment build new molecules? In what ways do the subcomponents of biological molecules and their sequences determine the properties of those molecules? What interactions between molecules affect their structure and function?

Watch: Mr. Andersen's Enzymes Video
Then: Mr. Andersen's Biological and Polymer Systems Video

Read: Hillis, Principles of Life, 1st ed. (2012): Chapter 2, pages 29-31
Hillis, Principles of Life, 1st ed. (2012): Chapter 3, pages 46-54

Supplementary Resources: Click the links below for more information to help you learn more about this lesson.

- McGraw-Hill: How Enzymes Work (animation)
- Sumanas: Activation Energy and Enzymes
- Maricopa College Online Biology Book: Enzymes
- Lew-Port's Biology Place: Enzyme Activity
- College of DuPage: Enzymes Review
- Kimball's Biology Pages: Enzymes
- Northland College: Enzymes
- KScience: Enzymes
- The Open Door Web Site: Enzymes

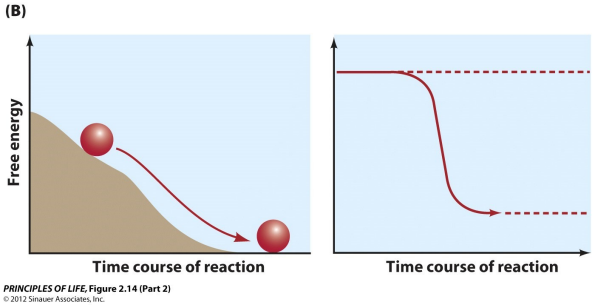
Listen and Look: Here is a list of key terms and concepts you will hear about and see during these podcasts and chapter readings. Get to know them! Be able to connect them to one another using a concept map. **Don't just simply define the terms—you must understand the relationships among and between them!**

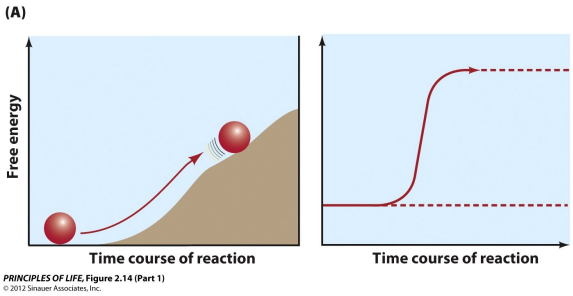
KEY TERMS

Metabolism	Anabolic reactions	Catabolic reactions	Laws of Thermodynamics
Endergonic reaction	Exergonic reaction	Enzyme	Catalase
Activation energy	Active site	Substrate	Activation
Cofactor	Induced fit	Inhibition	Enzyme-substrate complex (ES)
Free energy	Coenzyme	Irreversible inhibition	Reversible inhibition
Allosteric site	Competitive inhibitor	Noncompetitive inhibitor	Allosteric regulation
Feedback inhibition			

Recall and Review: Use the lecture in the videos and your textbook reading to help you answer these questions in your BILL.

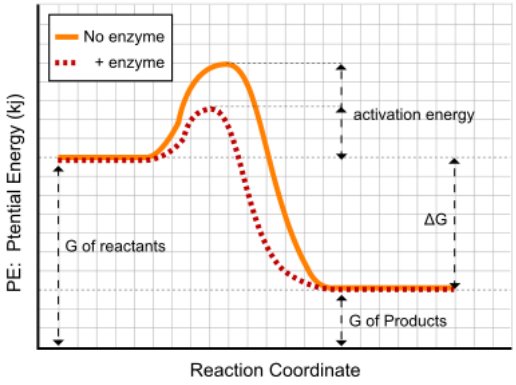
1. Compare and contrast anabolic reactions with catabolic reactions. State an example of each type of reaction that can occur in a living organism.



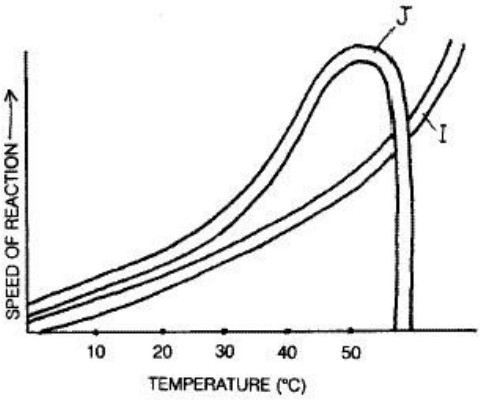


the biology space

2. **Describe** which chemical reaction types are represented in the diagrams below: endergonic or exergonic reactions. How do you know?
3. **Explain** what the purpose of the enzyme catalase is.
4. **Draw** a diagram that illustrates the relationship between the substrate and an enzyme.
5. **Compare and contrast** the "lock and key" model with the induced fit model of enzyme activity. **Explain** which model more accurately describes how enzymes interact with their substrates, and why.
6. **Explain** how the structure of an enzyme determines that enzyme's specificity.
7. The graph at right illustrates the changes in energy that occur in a chemical reaction with and without an enzyme present. **Explain** what is occurring in the graph.



8. **Create** a Venn diagram that illustrates similarities and differences between allosteric and competitive inhibitors.
9. In his "Enzymes" video, Mr. Andersen describes two types of allosteric inhibition. **Describe** the difference between the two and **draw** a diagram that shows this difference.
10. **Create** a graphic organizer that illustrates the similarities and differences between irreversible and reversible enzyme inhibitors, giving examples of each type.
11. **Explain** why enzyme catalyzed reactions reach a maximun demonstrates what data gathered from an enzyme-catalyze
12. **Construct** graphs that illustrate the following conditions tha reaction and **explain** why this condition affects the reaction
    a. High temperature
    b. High enzyme concentration
    c. High substrate concentration
    d. Low or high pH
    e. Presence of inhibitors



13. Using the graph at right, **predict** what the optimum temperature for enzyme I might be. **Explain** what is happening to enzyme J after 45 degrees C.
14. Feedback inhibition is a mechanism by which metabolic pathways can be regulated (p. 51, text). Using a non-biological example, **explain** the process of feedback inhibition.

Learn More: For more examples of enzymes, use the links below:

- Elmhurst College: Enzyme Inhibitors
- Elmhurst College: Enzyme Inhibition in Medicine
- Biotechnology Industry Organization: Enzymes in Food Production
- PHSchool.com: Enzyme Catalysis Lab