

Name: _____ Period: _____ Seat #: _____ Date: _____

LAB: Enzymes

Objective: The purpose of this lab is to better understand how enzymes work in living organisms and to gather information about the factors that affect them.. (Indiana State Academic Standards: Biology, 1.3, 1.4, 1.5, 1.9 & 1.10)

Instructions: Follow each step of the procedure below.

Background:

Enzymes are proteins that are very important to living organisms. Enzymes speed up chemical reactions that would take much longer to happen if the enzyme were not present. They are also **specific**. This means that every chemical reaction that occurs in the body needs its own enzyme to make the reaction happen faster. One enzyme will only work on one **type** of reaction.

Although many inorganic substances in living things are essential to life, the vast majority of substances in living things are organic compounds. Carbon forms the structural basis of all organic molecules. Enzymes are organic molecules. The basic structure of an enzyme is made of protein. A vitamin or an inorganic mineral may also be bonded to the protein that makes up the enzyme. The combination of the protein and the coenzyme gives each enzyme its own specific shape.

Most organic molecules are made of basic units called **monomers** many of which bond together to form a complex molecule called a **polymer**.

Carbohydrates are large organic polymers made of simpler compounds called simple sugars. Simple sugars are needed by the cells to make cell energy called ATP. In our diets, we eat large, complex carbohydrates. Our digestive system uses enzymes (like diastase) to break these large carbohydrates down into their small building blocks (monomers = monosaccharides) which the circulatory system then carries to each cell for cellular respiration. During cellular respiration, these monosaccharides are broken down, energy is released from the chemical bonds, and the energy is transferred to the chemical bonds of ATP.

Carbohydrates are not broken down easily or quickly into smaller molecules unless the proper enzyme is present to speed up the reaction.

Materials:

Test tube rack	0.2% Diastase solution	hot plate
4 test tubes	2.0% Diastase solution	beaker
iodine solution	.01% Glycet Solution	water
10% starch solution	Benedict's solution	tape
Pipetts	test tube holder	

Procedure

- _____ 1. Obtain four test tubes. They should be labeled in the following manner:

Test tube #1	=	water
Test tube #2	=	0.2% diastase
Test tube #3	=	2.0% diastase
Test tube #4	=	2.0% diastase & 0.1% Glycet
- _____ 2. Using a graduated cylinder, pour 3 ml of starch into **each** test tube. Rinse out graduated cylinder now and between each of the next uses.
- _____ 3. Add 3 mL water to test tube #1 marked water.
- _____ 4. Add 3 mL 0.2% diastase to test tube number 2 marked "0.2% diastase."
- _____ 5. Add 3 mL 2% diastase to test tube number 3 marked "2% diastase."
- _____ 6. Add 3 mL 2% diastase/Glycet to test tube number 4 marked "Glycet."
- _____ 7. Add 1 drop of iodine to each of the test tubes.
- _____ 8. Put your thumb over the end of the test tube and shake gently to mix.
- _____ 9. What does iodine test for in each test tube? _____
- _____ 10. What color should you see if starch is present?
- _____ 11. Add 3 ml Benedict's Solution to each test tube.
- _____ 12. Put the test tube into a hot water bath for about 2 minutes. (If there is glucose present, the contents in the test tube will turn orange or red.)

Data:

Data Table 1.

Test Tube	Color with Iodine	+/-	Color with Benedict's Solution	+/-
Starch and water				
Starch and 0.2% diastase				
Starch and 2% diastase				
Starch, 2% diastase, & Glycet				

Analysis: (Complete sentences are required.)

1. What are the elements that make up carbohydrates, and what kinds of foods have complex carbohydrates?
2. What is the ratio of each element to the others?
_____ : _____ : _____
4. What are the monomers and polymers of carbohydrates?
5. In which test tube did it appear that no starch was broken down? Why? In which test tube(s) did starch get broken down? In which test tube(s) was the most starch broken down into glucose?
6. To which of the four large groups of organic molecules diastase belong? How do you know this?
7. What are the monomers for proteins?
8. What is the function of an enzyme? Explain how they function?
9. Based on the data, what role did the "glycet" play in the experiment?