

Name: _____

**Ex 39B: Chemical and Physical Processes of Digestion:
Computer Simulation Data Sheet
Ziser, 2001**

Activity 1: Assessing Animal Starch Digestion by Salivary Amylase

Salivary Amylase Digestion of Animal Starch							
Tube #	1	2	3	4	5	6	7
Additives	amylase starch pH 7.0 buffer	amylase starch pH 7.0 buffer	amylase DI water pH 7.0 buffer	DI water starch pH 7.0 buffer	DI water maltose pH	amylase starch pH 2.0 buffer	amylase starch pH 9.0 buffer
Incubation Condition	Boil First 37°	37°	37°	37°	37°	37°	37°
Benedict's Test							
IKI Test							

What do tubes 2,6, and 7 reveal about pH and amylase activity?

Which pH buffer allowed the highest amylase activity?

Which tube indicates that the amylase did not contain maltose?

Which tubes indicate that the deionized water did not contain starch or maltose?

If we left out control tubes 3,4, or 5, what objections could be raised to the statement: “amylase digests starch to maltose”?

Would the amylase present in saliva be active in the stomach?

What effect does boiling have on enzyme activity?

Activity 2: Assessing Plant Starch Digestion

Enzyme Digestion of Animal Starch and Plant Starch							
Tube #	1	2	3	4	5	6	7
Additives	amylase animal starch pH 7.0 buffer	amylase starch pH 7.0 buffer	amylase glucose pH 7.0 buffer	amylase cellulose pH 7.0 buffer	amylase cellulose DI water	peptidase starch pH 7.0 buffer	bacteria cellulose pH 7.0 buffer
Incubation Condition	37°	37°	37°	37°	37°	37°	37°
Benedict's Test							
IKI Test							

Which tubes showed a positive test for IKI reagent?

Which tubes showed a positive test for the Benedict's reagent?

What was the effect of freezing tube 1?

How does the effect of freezing differ from the effect of boiling?

What was the effect of amylase on glucose in tube 3? Can you offer an explanation for this effect?

What was the effect of amylase on cellulose in tube 4?

What can you conclude about the digestion of cellulose, judging from the results of test tubes 4,5, and 7?

What was the effect of the different enzyme, peptidase used in tube 6? Explain your answer based on what you know about peptidase.

Activity 3: Assessing Protein Digestion by Pepsin

Pepsin Digestion of Protein						
Tube #	1	2	3	4	5	6
Additives	Pepsin BAPNA pH 2.0	Pepsin BAPNA pH 2.0	Pepsin DI water pH 2.0	DI water BAPNA pH 2.0	Pepsin BAPNA pH 7.0	Pepsin BAPNA pH 9.0
Incubation Conditions	boil first 37° C	37° C	37° C	37° C	37° C	37° C
Optical Density						

Which pH provided the highest pepsin activity?

Would pepsin be active in the mouth? Explain your answer.

Tubes 1 and 2 contained the same substances. Explain why their optical densities were different.

If you had not run the tube 2 and 3 samples, what argument could be made against the statement "pepsin digests BAPNA?"

What do you think would happen if you reduced the incubation time to 30 minutes?

What do you think would happen if you decreased the temperature of incubation to 10° C?

Activity 4: Assessing Fat Digestion by Pancreatic Lipase and the Action of Bile

Pancreatic Lipase Digestion of Fats and the Action of Bile						
Tube #	1	2	3	4	5	6
Additives	Lipase veg oil bile salts pH 7.0	Lipase veg oil DI water pH 7.0	Lipase DI water bile salts pH 9.0	DI water veg oil bile salts pH 7.0	Lipase veg oil bile salts pH 2.0	Lipase veg oil bile salts pH 9.0
Incubation Conditions	37° C	37° C	37° C	37° C	37° C	37° C
pH						

Explain the difference in activity between tubes 1 and 2.

Can we determine if fat hydrolysis has occurred in tube 6? Explain your answer.

Which pH resulted in maximum lipase activity?

Is this method of assay sufficient to determine if the optimum activity of lipase is at pH 2.0?

In theory, would lipase be active in the mouth?

Would it be active in the stomach?

Explain your answers.

Based on the enzyme pH optima you determined, where in the body would we expect to find the enzymes in these experiments?

Amylase:

Pepsin:

Lipase: