

Manipulation of Enzymes and Enzymatic Processes

Results

## Results

The following tables and figures show the results for tests performed on the two enzymes, salivary amylase and phosphorylase. In Part A, the results of the iodine test and Benedict's test on salivary amylase show the increased rate of reaction as the concentration of salivary amylase is increased. Part B presents the results of the iodine test performed on phosphorylase. These results indicate that synthesis using fresh phosphorylase requires a starch primer and glucose-1-phosphate. Boiled phosphorylase produced a synthesis only when an excess of starch and potassium phosphate were added.

Part A: Salivary Amylase Results. Table 1 shows the results of the initial iodine and Benedict's tests performed on control samples, varying percentages of salivary amylase concentrations. A positive result for the iodine test (starch is present) was a colour change ranging from violet to black; a negative result (no starch) was the yellow colour of the iodine solution.

### Iodine and Benedict's Test Results for Control Salivary Amylase Solutions

Test Tube # / Solution	Appearance for Iodine Test	Iodine Test (+/-)	Appearance for Benedict's Test	Benedict's Test (+/-)
10% Salivary Amylase	Solution remained yellow colour of iodine solution.	-	Orange brown precipitate formed.	+
5% Salivary Amylase	Solution remained yellow colour of iodine solution.	-	Green brown precipitate formed.	+
2% Salivary Amylase	Solution remained yellow colour of iodine solution.	-	Solution remained blue colour of Benedict's solution.	-
1% Salivary Amylase	Solution remained yellow colour of iodine solution.	-	Solution remained blue colour of Benedict's solution.	-
1% Starch Suspension	Blue-black colour change occurred.	+	Solution remained blue colour of Benedict's solution.	-

Table 2 illustrates the results of the iodine test at different time intervals after mixing an amylase solution of varying concentrations with a 1% starch suspension. It is important to note that, within the contents of each, 2ml of McIlvaine's buffer was added to maintain an optimal pH for the enzymatic reaction. A blue-black colour change (a positive result) suggests the presence of starch. A yellow colour, or negative result, indicates a lack of starch in the solution and, thus, the completion of the reaction. Table 2 shows that the reaction time – the time needed for starch to be degraded – decreased as the concentration of salivary amylase increased.

1

Summary of the overall findings.

2

Tables and figures are numbered and have clear, descriptive titles.

3

Introductions to tables and graphs highlight important observations.

4

Tables include clear headings.

# Lab Report

## Annotated Lab Report

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Results of the Iodine Test at Differing Time Intervals After Mixing (T<sub>n</sub>)

Test Tube Combination	Solution Mixed with 1% Starch Solution and Mcllvane Buffer	Reaction Time When Iodine Test Turned Negative (s)
#9 - #14	1% Salivary Amylase	660 seconds
#8 - #13	2% Salivary Amylase	300 seconds
#7 - #12	5% Salivary Amylase	135 seconds
#6 - #11	10% Salivary Amylase	55 seconds
#10 - #15	Water	N/A

Figure 1 shows the downward slope of change for increasing concentrations of salivary amylase. Time is plotted on the ordinate; the concentration of salivary amylase in the solution is on the abscissa. Note that as the concentration increased, the time needed to complete the reaction decreased.



Figure 1 Reaction time for solutions with increasing concentration of salivary Amylase (%)

The final step was to apply Benedict's test to the different concentrations of salivary amylase mixed with the 1% starch solution. When Benedict's test is applied, a green, yellow, orange, red or brown solution indicates a positive test and the presence of reducing sugars. If the solution remains blue, the test is negative, indicating the absence of these sugars. It is important to note that the same percentages of salivary amylase were used in the Benedict's test as were used for the iodine test (shown in Table 2). Table 3 presents the results of the Benedict's test on these solutions. Table 3 reveals that only one solution – the tube without any salivary amylase – tested negative for reducing sugars.

5

On figures, axes are clearly labelled.

6

Tables and figures are numbered and have clear, descriptive titles.