

PM SHRI KENDRIYA VIDYALAYA, DINJAN

2024-25

INVESTIGATORY PROJECT REPORT

AFFILIATION TO CBSE

CHEMISTRY



Topic: Study of Digestion of Starch by Salivary Amylase and the Effect of pH and

Name of Student: Gayatri Nikam

Class: XII

Section: A

Subject: Chemistry

Code: 043

Sub. Teacher: Mrs. Manisha Bisht

Roll No.:



Acknowledgement

I would like to extend my sincere and heartfelt obligation towards all those who have helped me in making this project. Without their active guidance help, cooperation and encouragement, I would not have been able to present the project on time.

I am extremely thankful and pay my sincere gratitude towards my teacher **Mrs. Manisha Bisht** for her valuable guidance and support for completion of this project.

I also acknowledge with a deep sense of reverence, my gratitude towards my parents, other faculty members of the school and friends for their valuable suggestion given to me in completing the project.

Date:

Place:





Certificate

This is to certify that the project work on "**Study of Digestion of Starch by Salivary Amylase and the Effect of pH and Temperature.**" Based on the CBSE curriculum has been completed by **Miss. Gayatri Nikam** of Class XII Section A of **PM SHRI Kendriya Vidyalaya, Dinjan.**

The above mentioned project work has been completed under my guidance during the academic year of 2024-25.

Signature of Teacher

Teacher's Name:

Designation:





Introduction

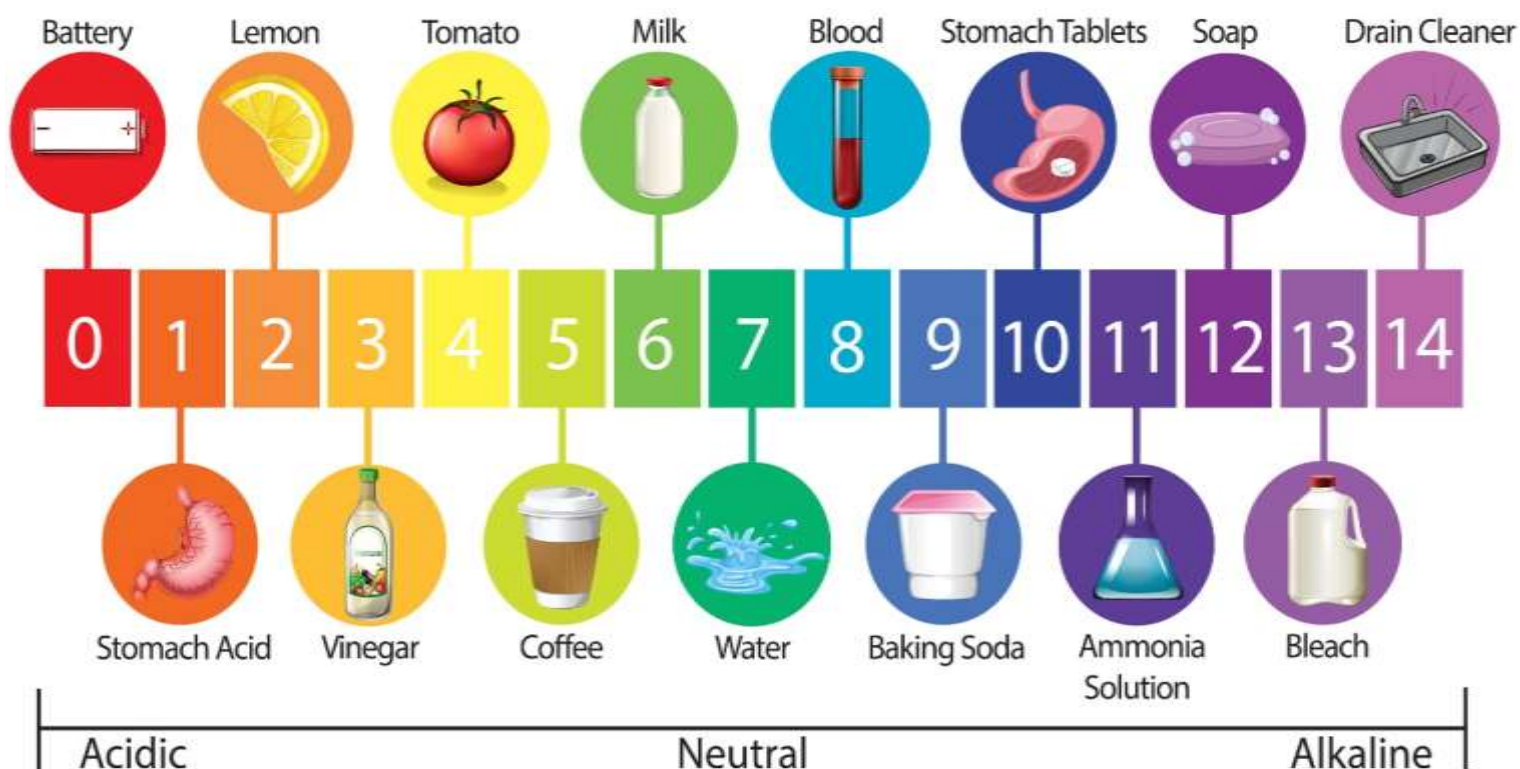
What is Digestion of Starch?

Digestion of starch begins in the mouth through the action of salivary amylase, an enzyme that hydrolyzes starch into maltose. Starch is a polysaccharide, and its breakdown is critical for providing energy to the body in the form of glucose.

Importance of pH and Temperature:

The activity of enzymes like salivary amylase depends significantly on environmental factors such as pH and temperature. Optimal activity occurs within a narrow range of these conditions. Exploring these variables helps us understand enzymatic behavior in biological systems.

The pH Scale





Objectives

- To study the digestion of starch by salivary amylase.
- To analyze the effect of pH and temperature on the enzymatic activity of salivary amylase.

Theory

Salivary Amylase:

Salivary amylase (also known as ptyalin) is an enzyme secreted by the salivary glands. It catalyzes the breakdown of starch (a polysaccharide) into maltose (a disaccharide).

Reaction:

Starch \rightarrow Maltose

Conditions:

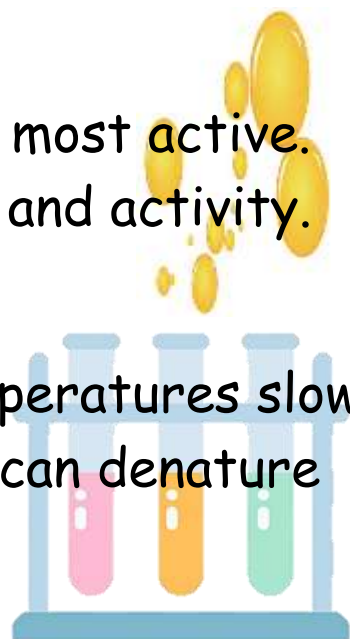
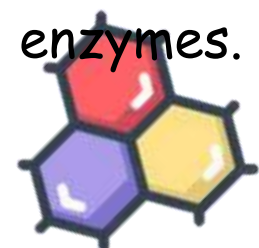
- . **Optimal pH:** Around 6.7-7.0
- . **Optimal Temperature:** 37°C (body temperature)

Effect of pH:

Enzymes have an optimum pH at which they are most active. Deviation from this pH affects their structure and activity.

Effect of Temperature:

Temperature affects enzyme kinetics. Low temperatures slow down enzyme activity, while high temperatures can denature enzymes.





Materials Required

- Fresh saliva sample
- 1% starch solution
- Test tubes
- Buffer solutions (pH 4, 7, 9)
- Water bath
- Thermometer
- Iodine solution
- Stopwatch
- Droppers
- Beakers





Procedure

A. Digestion of Starch by Salivary Amylase

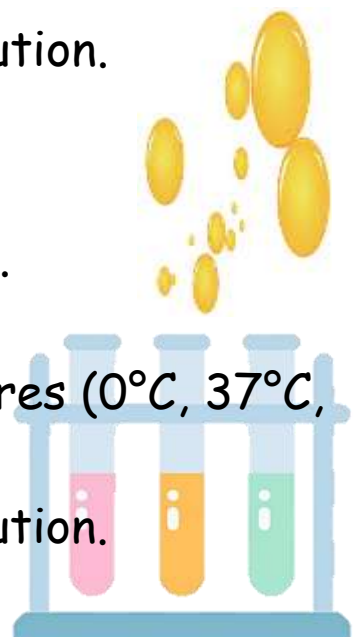
1. Collect a fresh saliva sample and dilute it with distilled water (1:10 ratio).
2. Prepare a 1% starch solution by dissolving 1 g of starch in 100 mL of distilled water and heating until fully dissolved.
3. Take 5 mL of starch solution in a test tube and add 1 mL of saliva.
4. Incubate the mixture at room temperature (around 25°C) for 5 minutes.
5. Add 2-3 drops of iodine solution.
 - A blue-black color indicates the presence of starch.
 - No color change indicates complete digestion of starch.

B. Effect of pH on Digestion

1. Take 5 mL of starch solution in three separate test tubes.
2. Adjust the pH of each solution using buffer solutions (pH 4, 7, and 9).
3. Add 1 mL of diluted saliva to each test tube.
4. Incubate the test tubes at 37°C for 5 minutes.
5. Test for the presence of starch using iodine solution.

C. Effect of Temperature on Digestion

1. Take 5 mL of starch solution in three test tubes.
2. Add 1 mL of diluted saliva to each test tube.
3. Incubate the test tubes at different temperatures (0°C, 37°C, and 60°C) for 5 minutes.
4. Test for the presence of starch using iodine solution.





Observations

1. Table 1: Effect of pH on Starch Digestion

| pH of solution | Observation with Iodine | Inference |
|----------------|-------------------------|--------------------|
| 4 | Blue-Black | No digestion |
| 7 | No colour change | Complete digestion |
| 9 | Light Blue | Partial Digestion |

2. Table 2: Effect of Temperature on Starch Digestion

| Temperature of Solution | Observation with Iodine | Inference |
|-------------------------|-------------------------|--------------------|
| 0 | Blue-Black | No digestion |
| 37 | No colour change | Complete digestion |
| 60 | Light Blue | Partial Digestion |

Results

□ **Optimal pH:** The digestion of starch by salivary amylase is most effective at pH 7. Extreme pH levels reduce enzyme activity due to denaturation.

□ **Optimal Temperature:** Enzyme activity is highest at 37°C. Low temperatures slow down enzyme activity, while high temperatures cause partial denaturation.





Conclusion

The digestion of starch by salivary amylase occurs best at a neutral pH (7) and body temperature (37°C). Deviations in pH and temperature significantly affect enzymatic activity, highlighting the importance of maintaining optimal conditions for biological processes.

Precautions

- Use fresh saliva and dilute it properly.
- Maintain uniform concentrations of starch and buffer solutions.
- Handle iodine solution with care to avoid staining.
- Ensure accurate temperature control during incubation.





Bibliography

- NCERT Chemistry Textbook, Class XII
- Online resources on enzymatic activity and salivary amylase
- Practical Chemistry Laboratory Manual

