

# Practical Worksheet: How Temperature Affects Amylase Digestion of Starch

## Big Idea

Enzymes digest large, insoluble food molecules into small, soluble molecules that can be absorbed by the body. Amylase breaks down starch into reducing sugars. Starch can be detected using iodine solution: Blue-black = starch present; Brown/orange = no starch present (digested).

## Aim

To investigate how temperature affects the rate at which amylase breaks down starch into reducing sugars.

## Hypothesis

As temperature increases, amylase will work faster up to an optimum temperature, after which the rate will decrease as the enzyme begins to denature.

## Results Table 1: Time for Starch to Disappear

| Temperature (°C) | Time 1 (s) | Time 2 (s) | Average Time (s) |
|------------------|------------|------------|------------------|
| 10               | 300        | 320        |                  |
| 25               | 160        | 150        |                  |
| 37               | 80         | 70         |                  |
| 50               | 210        | 230        |                  |

Calculate the Average Time

## Results Table 2: Rate of Reaction

| Temperature (°C) | Average Time (s) | Rate (1/s) |
|------------------|------------------|------------|
| 10               |                  |            |
| 25               |                  |            |
| 37               |                  |            |
| 50               |                  |            |

## Graphing Task

Plot Temperature (°C) on the x-axis and Rate (1/s) on the y-axis. Describe the trend shown in your graph and identify the optimum temperature for amylase activity.

## Analysis Questions

1. What colour change shows that starch is present?
2. What result shows that starch has been digested?

3. Which temperature produced the fastest digestion? Explain your answer using enzyme theory.
4. Why does digestion slow down at higher temperatures such as 50°C?
5. Explain how this practical demonstrates that chemical digestion produces small, soluble molecules that can be absorbed.
6. State two controlled variables in this experiment and explain why they must be kept constant.

### **Conclusion (4–6 sentences)**

Summarize how temperature affected amylase activity. Identify the optimum temperature and link your findings to the role of enzymes in digestion in the human body.