

Lab Report Sample 1

Biology — Effect of Temperature on Catalase Activity

Sample status: Original illustrative sample created for portfolio demonstration. It is not a customer submission.

Abstract

This experiment examined how temperature affects catalase activity, using oxygen production as an indicator of reaction activity. The illustrative results show a stronger response at moderate temperature than under chilled or warmer conditions. The pattern demonstrates how enzyme activity can vary with environmental conditions.

Introduction

Enzymes are biological catalysts that increase reaction rates without being consumed. Catalase protects cells from hydrogen peroxide by converting it into water and oxygen. Because enzyme activity is sensitive to environmental conditions, temperature provides a useful variable for investigation.

The purpose of this investigation was to determine whether changing temperature produces measurable differences in catalase activity. Temperature was the independent variable and observed oxygen production was the dependent variable.

Research Question

How does temperature affect catalase activity when reactant concentration, volume, and reaction time are controlled?

Hypothesis

If catalase is exposed to a moderate temperature, its activity will be greater than at very low or very high temperatures because molecular movement increases with temperature until excessive heat begins to affect enzyme structure.

Materials and Method

Three temperature conditions were prepared: chilled, room temperature, and warm. Equal volumes of hydrogen peroxide and a catalase-containing solution were used for each trial. Reactants reached their assigned temperature before mixing, and oxygen production was observed over the same time interval. Each condition was repeated three times.

Representative Results

Temperature	Trial 1	Trial 2	Trial 3	Mean
Chilled	8	9	8	8.3
Room	18	19	17	18.0
Warm	14	15	13	14.0

Illustrative data only — included to demonstrate laboratory-report structure.

Discussion

The room-temperature condition produced the highest mean value in this illustrative dataset. The warm condition remained active but produced a lower response, while the chilled condition produced the lowest response. A possible explanation is that moderate temperature supported effective enzyme-substrate interactions, while low temperature slowed molecular movement and higher temperature may have reduced enzyme stability.

Limitations include the small number of trials, simple measurement method, and possible variation in temperature control. Additional trials and more precise gas-volume measurement would strengthen the investigation.

Conclusion

Within the conditions represented here, temperature affected catalase activity, with the strongest response occurring at moderate temperature. The experiment demonstrates the use of controlled variables, repeated trials, and quantitative observations.

Sample Note

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