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| **3.2.4. Design Your Own Enzyme Lab** |

Introduction—

Each team will design an experiment over one of these 4 factors and its effects on enzyme action. Figure out which factor you are doing BEFORE typing up your report.

1. pH
2. temperature
3. enzyme concentration
4. substrate concentration

**1. Identify the Problem or Question**

* State the research problem or question in one sentence.
* The problem should be very specific and measurable.

*Write one sentence in the form of a question or problem statement.*

Problem Statement:

**2. Predict a solution to the problem or an answer to the question.**

* This will be in the form of a hypothesis.
* This solution design or hypothesis should be based on previously obtained knowledge or research and should be supported by scientific evidence.
* Write a one or two sentence statement predicting the outcome of the experiment.

Hypothesis:

* Identify the independent and dependent variables.
* The independent variable is the variable that is varied or manipulated by the researcher. The dependent variable is the measurable effect, outcome, or response in which the researcher is interested. In other words, the independent variable is the presumed cause, whereas the dependent variable is the presumed effect. In an experiment, the independent variable is the variable that is controlled and manipulated by the experimenter; the dependent variable is not manipulated but instead is observed or measured for variations.

The independent variable is:

The dependent variable is:

**3. Design the experiment to be used to test your hypothesis.**

* Include a list of all materials used.
* Be specific.
* Take all safety concerns into account.
* Identify a control to be used for comparison if applicable.
* Control all outside variables that could affect the outcome of the experiment.
* Clearly define how the data will be collected and recorded, including measurement units.
* Design a data table to use to record information.
* Plan the strategy that will be used to summarize the data. For example, a graph might be used to summarize the data.

Write a series of numbered steps and include a list of required materials. The data table should include units that will be used to collect data.

Materials:

Procedure:

1. **Carry out the experiment.**

* Collect data from your experiment and organize the data into data tables.
* Complete multiple trials. (Perform the procedure multiple times, collecting data each time.)

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1. **Analyze the data and observations.**

* Make graphs or charts of the data.
* Check that the independent and dependent variables are properly placed on any graphs.
* Be logical and clear.
* Look beyond the obvious.

Graph:

1. **State the conclusion.**

* Use a one sentence statement.
* Be clear and concise.

Write a one sentence statement directly related to the original hypothesis. It might start with “The hypothesis was correct…”

Conclusion:

1. **Summary Paragraph**

* Write a brief paragraph.
* Explain the rationale for your conclusion.
* Clarify details.

Write one paragraph of text explaining the rationale for the conclusion.

Summary Paragraph: