**AP Biology**

**LAB REPORT RUBRIC**

1. **Title** (5 pts): “The Effect of (A) on (B)”

 *Example: The Effect of a Catalase on the rate of decomposition of hydrogen peroxide.*

**2. Introduction** (15 pts)

 a. Background

 Present a review of the topic. Place the research/experiment in the proper context of biology. Relate your experiment to the concepts learned in class. Review prior research directly related to the experiment.

 *Example: Enzymes are proteins that act as catalyst affecting the* ***rate*** *of reactions. In enzyme- catalyzed reactions, the substance to be acted upon, the substrate, binds to the active site of the enzyme which results in a reduction in the energy required to activate the reaction of the substrate molecule. The enzyme is not changed in the reaction and can be recycled to catalyze reactions with other substrate molecules Environmental factors such as temperature, pH, and salt concentration can break bonds within the enzyme which results in a change of the structural shape of the enzyme. Therefore, if the environmental conditions are not optimal the enzyme may denature (change shape) which will render it useless because the active site will not be able to bind to the substrate. The enzyme used in this lab is catalase. One function of catalase within cells is to prevent the accumulation of toxic levels of hydrogen peroxide which forms as a byproduct of metabolic processes. This reaction occurs spontaneously but very slowly. Catalase speed up the reaction considerably. In this experiment, a rate for this reaction will be determined.*

 b. Hypothesis

 “If this relationship exists, then when I change (increasing, decreasing, etc.) (A) it will cause (B) to change in a specific way (increase, decrease, etc.)

 *Example: If catalase increases the rate to hydrogen peroxide decomposition, then added catalase to a solution of hydrogen peroxide will increase its decomposition rate..*

c. Safety

 List or explain any specific procedures or equipment needed for safety.

**3. Materials and Methods** (15 pts)

 a. Materials

 List the materials used in the experiment.

 b. Methods

 Describe the procedures in sufficient detail so that others can repeat your research.

**4. Results** (35 pts) (a, b, c, d, e = 2 pts. each) (f =15 pts.) (g = 10 pts.)

 a. Dependent Variable: State the dependent (or measured) variable, the (B) in your hypothesis. It must have units and must be measurable.

 *Example: The dependent variable is …….*

 b. Independent Variable: State the independent (or manipulated) variable, the (A) in your hypothesis. State how the independent variable was modified. If it was measured, it must have units.

 *Example: The independent variable is …….*

 c. Conforming variables (Constants)

 List all of the confounding variables that were kept constant during the experiment. Be thorough.

 *Example: All hydrogen peroxide samples are 1.5% and the same amounts are used, all catalase is freshly made and kept on ice at all times, etc….*

 d. Replication / Sample Size

 State the number of trials for each modification of the independent variable. You must have a minimum of three trials for each modification of the independent variable. Be sure to also present the average of your data from the trials

 *Example: Each trial was repeated (# of groups in class).*

 e. Controls (positive, negative, a base line, or all three)

 List the controls used in the experiment and explain what they were controlling for.

 *Example: A base line assay was determined by recording the rate of hydrogen peroxide decomposition by performing all the steps of the procedure without adding the catalase.*

 f. Organize Data

 Organize the collected data in a data table. Provide a title for your data table. The title of the data should describe the research and include both variables (A) and (B). Describe each data table in the text of your report.

 *Example: Show the calculations for determining the base line. Show how the amount of spontaneously decomposed over a 24 hour period was determined.*

 *Data table used to record results of decomposition of H2O2 in the presence of catalase:*

***Rate of H2O2 Decomposition in the presence of Catalase***

 *Time (seconds)*

 *KMnO4 (mL) 10 30 60 90 120 180 360*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *a) base Line* |  |  |  |  |  |  |  |
| *b) Final Reading with catalase* |  |  |  |  |  |  |  |
| *c) Initial Reading with catalase* |  |  |  |  |  |  |  |
| *d) Amount of kMnO4 Consumed (C minus B)* |  |  |  |  |  |  |  |
| *e) Amount of H2O2 Used (A minus D)* |  |  |  |  |  |  |  |

 *Record all data from your data table on the class data table on the board including the mean of each value. Also include this class data in your write up. This accounts of replication of the experiment*

g. Data Analysis

Present the data in a graph: independent variable vs. the dependent variable in the appropriate graph form. Statistical analysis should be used when necessary.

**5. Conclusions** (30 pts)

Discuss implications of the data. Discuss what your results mean when you consider the original question or hypothesis Discuss whether the hypothesis was supported or not supported by the data. Point out the statistical significance of your results. Relate your conclusions to the concepts learned in class. If the results are unexpected or contradictory, you should attempt to explain and point out possible avenues for further research.