**The Energetic Yeast: Cellular Respiration and Enzymatic Activity**

*Graded out of 24 points*

1. Write your hypothesis for each experiment. Specifically indicate how oxygen levels will change with each independent variable. (3 pts)

Food Source:

Temperature:

pH

1. Calculate the change in Dissolved Oxygen (DO) in Table 1 by using the Max DO and Min DO columns. (2pts)

**Table 1:** Evaluating Changes in Environmental Conditions and Reaction Components on the Performance of Cellular Respiration.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Group | Variable Tested | Max DO (%) | Min DO (%) | Change in DO (%, Max-Min) | pH | Amount of Food (g) | Type of Food Source |
| 1 | Table Salt | 108.9 | 108.9 |  | 7 | 30 | Table Salt |
| 2 | Table Sugar | 108.8 | 86.9 |  | 7 | 30 | Table Sugar |
| 3 | pH 4 | 88.0 | 79.8 |  | 4 | 30 | Table Sugar |
| 4 | pH 10 | 103.2 | 96.9 |  | 10 | 30 | Table Sugar |
| 5 | Heat (32-38 °C) | 39.6 | 0.9 |  | 7 | 30 | Table Sugar |
| 6 | Cold (2 – 10 °C) | 95.0 | 93.7 |  | 7 | 30 | Table Sugar |

1. As a class, we investigated the influence of several variables. For each variable listed below, place an “X” whether we affected enzymatic activity and/or the substrates/products of cellular respiration. (3 pts)

|  |  |  |
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| **Variable** | **Enzymatic Activity** | **Component** |
| Food Source |  |  |
| Temperature |  |  |
| pH |  |  |

1. A. Make a graph comparing change in dissolved oxygen to pH. You should graph the data from groups 2-4. Be sure you graph the correct data. (4 pts) *Note: You can make the graph in Excel or GOOGLE SHEETS and then paste it in the space below OR you can use the graph provided below by following the directions at the bottom of this document.*

B. Using your graph from Part A, what is the optimal pH for maximum cellular respiration for yeast? Relate this to a property of enzymes. (2 pts)

C. Why did you plot the data from group 2? Explain. (2 pts)

1. Considering only your physiological state and the processes occurring, would you expect to produce more energy when you are jumping rope or when you are standing in line waiting for the bus? Use the temperature data to explain. That is, (a) relate oxygen consumption for each activity from the temperature data and (b) explain how this relates to the amount of energy produced. (3 pts)
2. When you changed the food source to salt, you actually investigated two different properties of enzymes. Name these two properties. Discuss your conclusions for salt by mentioning both of these properties. (3 pts)
3. When you make bread, you not only add sugar, water, and yeast, but other ingredients including flour, oil, or better, etc.
4. On what side of the cellular respiration equation do these other ingredients (i.e., flour, oil, butter) belong? That is, are they substrates or products? (1 pt)
5. When you mix all of the above ingredients, the dough rises and the bread becomes bigger and fluffier. What actually causes the bread to rise (i.e., become bigger and fluffier)? Hint: A product of the cellular respiration equation is the answer. (1 pt)

\*Note – Please fill in the graph title, axis titles (X and Y) and the axis numbers (in the small individual boxes).

To fill in the graph please follow these instructions:
1. Select “Insert” from the menu bar.

2. Select the “Shapes” drop down menu

3. Depending on the kind of graph you’re trying to make select either a line or a rectangle and place it on the graph in the appropriate place.

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