**BOD Lab Report**IV: Temperature of Water  
DV: Time of Oxygen Depletion (By Oxygen Indicator)

Topic Introduction

Aquatic organisms depend on dissolved oxygen in water to survive, which is why ocean acidification and eutrophication is such a big issue in the ecosystem today. In order to prevent these phenomena, we must first find the optimal conditions of aquatic living: a body of water that can carry the most dissolved oxygen. In the proposed experiment, 3 temperatures will be compared (hot, cold, and room temperature) to find which temperature is the best for sustaining life.

Pre-Lab Questions

***What are two sources of dissolved organic matter in runoff from urban areas?***A. Processing industries  
B. Sewage plants

***What are two sources of dissolved organic matter in runoff from agricultural areas?***A. Dairy waste  
B. Decaying plants and animals

***List dissolved organic materials and possible sources that may decrease oxygen levels as a result of decomposition when present in water.***Dissolved carbon dioxide and the respiration of oxygen in bacteria could decrease oxygen levels in water.

***List possible organisms that may act as decomposers of dissolved organic material in aquatic systems.***Bacteria and fungi.

Experimental Question

In this experiment, we will try to find out the optimal temperature conditions of an organism dependent on oxygen by using yeast as a decomposer model and milk as the nutrients that the yeast will feed on. We will determine a conclusion by testing 3 samples: one with hot, one with cold, and one with room temperature water. We will mix each sample with the yeast, milk, and oxygen indicator to find out which sample has the least dissolved oxygen capacity by timing each mixture and its oxygen depletion.

Hypothesis

I predict that the cold water sample will hold more dissolved oxygen than the hot and room temperature samples.

Protocol

To perform the experiment, acquire 2 beakers filled with 30 ml of water. In one beaker, mix 2 tsp. of powdered milk with the water. In the other, mix 2 tsp. of yeast.

Fill 3 beakers with 10ml of lukewarm water, and set aside one (constant). Heat one beaker to approx. 40C (independent) and chill one to about 3C (independent 2). Set both aside.

In 3 test tubes, pour 5 ml of yeast, then 5 ml of milk. Add 2-5 drops of indicator (dependent) into the tubes, then mix. Pour each beaker into their respective tubes and start timer. Stop timer when no blue is visible in each tube, then record times.

Data



Conclusion

According to the results of the experiment, I concluded that my hypothesis was deemed correct, since the cold temperature water held the most dissolved oxygen out of the 3 samples. With hot at 1:48, room/control at 6:16, and cold at 13:48, the results are dramatically different from one another, thus proving that temperature is a major factor in ocean ecosystems and organisms, and that the higher the temperature, the less DO capacity is present.

Post Lab Questions

***Which test tube contained the most food for the decay organisms (decomposers)? Which tube had the least food? Explain.***-Each tube contained equal amounts of milk, but each tube had differing amounts of oxygen due to their differing temperatures.

***Your test tubes may have had a ring of blue color at the surface even after the remainder of the liquid had changed color. What might account for this?***-This ring of color may have been due to the different densities of the liquids, or unmixed indicator detecting oxygen in the air.

***In which tube did the change occur most rapidly? Is this what you expected? Why?***-The hot water tube changed most rapidly, which was expected because the amount of DO is attributed to temperature.

***Develop an explanation that accounts for the differences in time needed for the change to occur in each of the three tubes.***-The time differences in the changes were all due to the differing temperatures, with cold water having the highest DO capacity and hot water having the lowest.

***What effect would an increase in temperature have on these mini-systems? How could you find out?***-The effect of the increase in temperature would be, as stated above, problematic for the organisms because of its low DO capacity. This was already found out in the experiment performed.

***How would your systems have been affected if more decomposers (yeast) had been present at the beginning of your experiment?***-The system’s oxygen levels would decrease more rapidly due to the increased levels of decomposers, which feed on oxygen.

***Decay organisms often reproduce rapidly when conditions are favorable and nutrients are plentiful. What do you think would happen to the supply of dissolved oxygen in a river if the decay organisms began to multiply?***-If decay organisms started to multiply in a river, the river would slowly be deoxidized to the point where no organisms would be able to live there.