**Environmental Effects on Algal Growth Marcus Stevens October 3, 2015**

1. Introduction

In this experiment, various concentrations of a given chemical/stock solution were tested for the effects on the growth of a representative aquatic life form (algae). Other bacteria and waters were amalgamated with the solution containing the given chemical, urea. The bacteria and waters that were used during the testing were, Chlamydomonas, Euglena, soil water, and spring water. The amount of growth within the three test tubes used, each containing a different concentration of the given chemical, was measured using a spectrophotometer over the course of the experiment. The spectrophotometer is an instrument that is able to measure the amount of light of a specific wavelength which passes through a medium. The amount of light absorbed by a medium is proportional to the concentration of the fluid, in this case the given chemical/stock solution, that is presented to the machine.

**The Purpose:** The purpose behind this lab is todiscover whether a varying concentration of the given chemical, urea, has an effect on the growth of the algae by using a spectrophotometer to quantify the effect from the differing concentrations.

**The Hypothesis:** When four differing concentrations are tested for their effects on algae, the different dosages will not have a significant impact on the growth of the algae.

1. Materials and Methods (Procedure)

**Materials:**

**1.** Algal population (Chlorella, Euglena, Chlamydomonas, etc) **2.** 10 x 13 mm borosilicate culture tubes (an inexpensive alternative to spectrophotometer tubes) **3.** Spring water **4.** Pipets **5.** Wax paper or parafilm **6.** Spectrophotometer **7.** Vortex for suspending algae.

**Procedure:**

1. Pipet 2 mL of Algae into each tube. (This volume might be changed based on density of original culture).
2. Pipet 1 mL of spring water into each tube.
3. Add the appropriate volumes of variable stock solution and spring water (total of 2 mL combined) to generate the desired variable concentrations in each tube. Notice that each tube will contain a total of 5mL.

Examples:

A) 2mL Algae + 2 mL spring water + 1 mL of 10% NaCl stock = a final NaCl concentration of 2%.

B) 2 mL Algae + 1 mL spring water + 2 mL of 0.2M ammonia = a final concentration of 0.08M ammonia

1. Cover the top of each tube with a piece of wax paper or parafilm and mix by inversion (or vortex gently, if available).
2. Immediately measure the absorbance at 430 nm using a spectrophotometer. This wavelength is within a maximum absorbance peak for chlorophyll. Thus, population density is measured indirectly by quantifying the amount of chlorophyll present in a sample. (Other wavelengths can be used, representing non-optimal absorbance).
3. Place all tubes in an area of equal lighting and temperature.
4. Measure absorbance at selected time intervals (Monday, Wednesday, and Friday for 2-3 weeks would suffice). Remember to mix the tubes by inversion or vortexing prior to spectrophotometer readings.
5. Record all data and present as a population growth graph as shown below. The y-axis (dependent variable) represents absorbance, and the x-axis represents elapsed time in days (dependent variable).
6. Results

**Graphs and Tables:**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Tube 1 | **Tube 2** | **Tube 3** |
| Chlorella/Euglena | 2 mL | 2 mL | 2 mL |
| Spring Water | 1 mL | 1 mL | 1 mL |
| [X] Chemical  (Name and Concentration of Chemical stock solution used) **urea and 10%.** | 0 mL | 1.5 mL | 1 mL |
| Spring Water | 2 mL | .5 mL | 1 mL |
| Total Volume | 5 mL | 5 mL | 5 mL |
| Final Concentration of Chemical in Test Tube | 0% | 30% | 20% |

**TO CALCULATE DILUTIONS OF CHEMICALS USE THIS FORMULA:**

Number of mLs of Stock Solution X [Concentration of Stock Solution] = Final Concentration of Chemical

Total Volume of Dilution 1 in Test Tube

**Example:** Test Tube #10ml x 10% = 0% as Final Concentration of Chemical

5ml 1