



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Michael McPhie; Pranav Moudgalya	Project Number 36817
Project Title Extraordinary Elodea: A Look into the World of Pollution	
Objectives/Goals In our project, we wanted to address the worldwide crisis of pollution, so we investigated the effect of pH levels on underwater plants. By doing this, we would be able to analyze the effects of acid rain (a common form of pollution) on plants- thereby proving how harmful different kinds of pollution are to the very essence of life, oxygen. Specifically, we wanted to know how the pH of a solution would affect the oxygen (O ₂) respiration rate of a plant called Elodea anacharis. Abstract In our project, we wanted to address the worldwide crisis of pollution, so we investigated the effect of pH levels on underwater plants. By doing this, we would be able to analyze the effects of acid rain (a common form of pollution) on plants- thereby proving how harmful different kinds of pollution are to the very essence of life, oxygen. Specifically, we wanted to know how the pH of a solution would affect the oxygen (O ₂) respiration rate of a plant called Elodea anacharis. Methods/Materials We measured Elodea in three different levels of pH. We first choose 6 pH, which is the average acidity of normal rain, to serve as the normal amount of oxygen that the elodea plants produced- under optimal circumstances. Then, we choose 3 pH and 9 pH solutions to represent our acidic and alkaline solutions, respectively. We combined vinegar, water, and a substance called Qore water (water alkalized with minerals) to create our three solutions of 3 pH, 6 pH, and 9 pH. With a total of fifteen 15 mL test tubes, we put 3 inch strips of elodea into each and set them out in the sun for two hours, checking on them every 15 minutes. Results Our results were very interesting. By measuring the amount of oxygen bubbles produced by the plants during the two hour period, we found that on average, the plants in the 6 pH #optimal# solution produced an average of 0.96 mL of oxygen per plant, while the plants in the 9 pH alkaline solution produced 0.82 mL of oxygen, only 15% less than the 6 pH solution. The Elodea 3 pH acidic solution, however, only produced 0.36 mL of oxygen, 63% less than the optimum solution. Conclusions/Discussion In short, throughout the course of this experiment, we learned that alkaline pollution is far less harmful to plants than acidic pollution. Many methods, such as the #cleaner coal# method and the Integrated Gasification Combined Cycle (IGCC) method, change the pH of the resulting pollution from acidic to alkaline by pulverization and conversion into a gas called synthesis gas, respectively. Further development of these methods, refinement, and widespread use of these procedures can bring a tremendous change over the entire planet for the better.	
Summary Statement In our project, we showed that acidic pollution is much more detrimental to the oxygen production of plants than alkaline pollution.	
Help Received Our project was designed to measure accurate, informative, and useful data without requiring the help of outside professional research laboratories or equipment.	