

# The effect of acidic solutions on the rate of photosynthesis of *c. demersum*

[Science](#), [Biology](#)



## Statement Of Purpose

The purpose of this experiment is to evaluate the effects of acidic pHs, specifically 5 and 6.5, on the rate of photosynthesis, determined through production of oxygen, in *C. Demersum*. The variable groups are aqueous solutions with pHs of 5 and 6.5, making the independent variable the pH of the solution. The control group would be an aqueous solution with a pH of 7.3, seeing as that is in the middle of the optimal conditions.

## Background

*C. Demersum*, also known as *Ceratophyllum Demersum* or Coon's Tail, is a free-floating submerged plant native to Florida that produce tiny flowers pollinated within the water. The plants provide habitats, affect the nutritional levels in the water, increase visibility in water, stabilize shores, affect the levels of dissolved oxygen, and contribute to muck accumulation. The known water pollution throughout South Florida affects the submerged plants in many ways, but one of the many is acidifying the water. The established pH levels tolerated by the *C. Demersum* fall within the range of 6.0 to 8.6. With the threat of the increasingly acidic pH's of water, the survival of plants native to the environment is at stake. *C. Demersum* has already exhibited properties within certain experiments that it is able to absorb zinc, copper, and lead allowing the equilibrium to reach in just 20 minutes. The issues that copper and zinc, for example, pose to the underwater ecosystems are damaging various organisms and surrounding soil, inhibit enzymes, cause genetic damage, hypertension, and many other issues in humans and other organisms. *Ceratophyllum Demersum*'s ability to absorb these metals

provides a whole new need to keep this plant around other than preserving the native species of South Florida. This concept is further supported by how people who drink polluted water become more else with this pollution being the result of industrialization and increases in the population. This clear effect of water pollution on both human and animal health emphasizes the importance of having plants that can help reduce some of the factors of this pollution, such as heavy metals. The problem posed by the decrease in pH of the water bodies of Florida is that, studies have shown that an increase in hydrogen ion levels seem to be toxic to plants in soil affecting the growth of the plants, whether this passes on into water is still to be determined.

The focus is placed on more acidic pH is due to the fact that water pollution tends to make water more acidic rather than approaching basic to neutral qualities. By establishing a midline for the optimal pH of the plant and then proceeding to decrease the pH by intervals allows one to observe the effect of a gradual change in pH on C. Demersum. The heavy metals as mentioned above have serious effects on the well-being of organisms and these metals come from pollution. See you tomorrow son has been able to absorb some of the heavy metals, specifically copper, zinc, and lead, but in order for the absorbent properties to come into effect, they must survive the acidic pH resulting from the pollution. The method being used to quantify the rate of photosynthesis, uses the established idea that photosynthesis occurs at a fixed rate with certain amounts of products being produced based on the amount of reactants. Photosynthesis is known to provide oxygen as a reactant which is what will be measured in the experiment by using a set up

created by C. Demersum, a graduated cylinder, a basin, and an Erlenmeyer flask. To create this set up, one would fill the basin halfway with water, and proceed to place the plant within the Erlenmeyer flask filled with water as well. By placing the graduated cylinder upside down on top of the Erlenmeyer flask filled with water as well it would allow to measure the amount of oxygen produced by the displacement of water out of the graduated cylinder. The amount of oxygen produced directly relates to the rate of photosynthesis of the plant which can then be compared to the different pHs. Determining the ability of Ceratophyllum Demersum to survive and continue with photosynthesis in more acidic pHs help determine their ability to survive after water pollution and remain present as a native plant in South Florida.

## **Hypothesis**

If C. Demersum conducts photosynthesis the most efficiently in pHs of 6 - 8. 6, then as the pH gets more acidic the rate of photosynthesis will lower with the lowest point at a pH of 5, but still producing oxygen.