Watching Photosynthesis

Summary

Students will use bromothymol blue as an indicator of carbon dioxide absorption by water plants.

Time Frame

1 class periods of 90 minutes each

Group Size

Small Groups

Materials

- student sheet
  (attached)
  two large test tubes
  elodea or other water plant
  bromothymol blue indicator (prepare the solution by adding concentrated bromothymol blue to water until you get a bright blue but transparent solution)
  stoppers
  light source (sunlight works best)
  straw
  test tube rack or glass beaker
  ruler

Background for Teachers

Bromothymol blue is blue in a neutral or basic solution. It turns greenish and then yellow as it is acidified. Photosynthesis in water plants can be observed by acidifying the bromothymol blue with carbon dioxide from breath through a straw to change the solution to yellow. Placing a plant in the solution will remove the CO2 from the water, changing it back to blue. Sunlight works best as a light source and can make the color change in about 20 minutes. If artificial light is used it will take at least 30 minutes if not more, depending on the strength of the bulb.
It is important that the bromothymol blue solution is not too heavily acidified by the students' breath. If too much CO2 is added, it will be difficult for the plant to remove it in a timely fashion. You can create a "standard" color by acidifying a test tube with bromothymol solution and placing a stopper on it. The CO2 will diffuse out of the solution without the stopper. Students can use this solution as a standard to make their own from.

Instructional Procedures

Have a student demonstrate bubbling breath through a beaker with the bromothymol solution. Discuss with the students how CO2 from your breath creates a weak acid in the solution and changes the pH, altering the color. Since it was respiration that created the CO2 in the students breath, photosynthesis by a plant should reverse the color change.
Show students where the materials are and read procedures. You may wish for different student groups to use different light sources to compare results.
Allow time for data collection.
Have students present their results and answer the analysis questions and write a conclusion.

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

Authors

Utah LessonPlans