



Can You Observe a Chemical Change in the Atmosphere as Plants Grow?

Furnished as a Free Service to Home Educators

By

The Backyard Scientist

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The following experiment from the Backyard Scientist was developed expressly for use in newsletters serving home educators. This experiment is NOT contained in the award-winning *Backyard Scientist* books and science kits. As in the *Backyard Scientist* books, it is designed to be simple, fun, and of course to teach an important scientific concept.

Gather the following supplies:

- 2 clean, dry shallow plastic containers with airtight lids
- Bromthymol blue (a chemical indicator sold at pool supply stores and at most pet stores
 - as a testing tool for acid levels in aquariums
- Marking pen
- 2 clean caps from a soda or other beverage container
- A package of **fresh** (not dried) pumpkin seeds
- Medicine dropper (or make your own pipette with a plastic straw)
- Cotton (available in the first aid section of the drug store)
- Tap water

Adult supervision is required when using chemicals such as Bromthymol blue.

Begin experimenting.

1. Mark one container “Bromthymol blue” and the mark the other container “non-Bromthymol blue.”
2. Around the inner edges of the containers lay down some of the fluffed cotton.
3. Between the cotton and the inner edges of the containers, add about six pumpkin seeds—spread them out
4. Place one bottle cap in the center of each container.
5. Use the medicine dropper or pipette to fill the caps with tap water.
6. Add several drops of Bromthymol blue to the water-filled caps.
7. Again, use the medicine dropper to dampen the cotton in only **one** of the shallow containers. The cotton in the second container should remain dry.

8. Seal both containers.
9. Set the containers side-by-side in a lighted area, but out of direct sunlight.
10. Observe the color of the indicator solution and the appearance of the seeds daily and record your observations.

Can you answer the following questions based on your observations?

1. What was the purpose of the Bromthymol blue indicator?
2. Why was water added to the cotton.
3. Why was the cotton in only one container wetted with water?
4. Describe the color change in the Bromthymol blue indicator.

Backyard Scientist solution to the experiment.

As seeds germinate, they use oxygen to convert sugar molecules. The process is called respiration—earthworms similarly respire through their skin rather than breathe. The respiration process releases the required energy for seeds to wake from dormancy. As sugar is metabolized, carbon dioxide and water vapor are produced. The composition of the gases in our closed system changes as indicated by the Bromthymol blue indicator. The indicator reacts to the carbon dioxide gas and radically changes in color.

We wetted the cotton in one container to quickly begin the germination process. Wetting the cotton in only one container gave us a “control unit” for the experiment.

The Bromthymol blue indicator changed from a blue color to the yellow color indicating an increase in the amount of carbon dioxide gas present in the sealed system.

Plants through the process of photosynthesis can convert the carbon dioxide gas found in the atmosphere into oxygen.

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About the author.

Jane Hoffman, the Backyard Scientist, is the internationally known author of the award-winning *Backyard Scientist* hands on science books and science kits. The nine science books and three kits will excite, motivate and instruct any student.

Also available from the Backyard Scientist is the “Parent Guide to Teaching Science.” This work covering grades

K –12 helps parents insure they are teaching the science subjects and materials their students should be learning by grade level. Her newest book, *A Science Wonderland for the Very Young* targets children ages 2-7 years.

In addition to writing and developing these exciting materials, Jane is a sought-after speaker at Home School and other educational conferences nationwide where she makes science come alive. Everyone

leaves her sessions better informed as well as motivated and enthused to apply the concepts they learned. Hoffman's teacher inservice workshops for teachers are rated the best available by teachers and administrators. She has been serving the homeschool and educational markets with quality materials for more than 20 years.

For a free brochure, send a self-addressed, stamped (\$.55) envelope to: Backyard Scientist, PO Box 16966, Irvine, CA 92623 or visit her on the Worldwide Web at: www.backyardscientist.com