

Green plants can use water, carbon dioxide from the air, and the energy from sunlight to make their own food in a process called photosynthesis. This amazing process takes place in that powerful and popular plant part - the leaf.

Materials:

- 4 bean seeds
- 4 identical planting containers (pots)
- Potting soil
- Petroleum jelly
- Aluminum foil

Procedures:

1. Plant the same type of bean seeds in the same kind of potting soil in each of four identical containers. (Soaking the seeds over night in a shallow dish of water before planting will speed up their germination.)
2. Water the soil and allow the bean to sprout and start growing. When each bean plant has at least two true leaves, you should label each container as follows:
 - Control
 - Less Carbon Dioxide
 - Less Light
 - Less Carbon Dioxide and Less Light



3. Don't do anything to the control plant.
4. To the Less Carbon Dioxide plant, smear a thin coating of petroleum jelly on the underside of the leaves. Since air enters the leaf through the tiny openings on the

underside of the leaf, the petroleum jelly should block some of the carbon dioxide from entering the leaves.



5. To the Less Light plant, use your aluminum foil to cover the upper surface of each leaf. Since most light strikes the leaf on the upper surface, the aluminum foil should block most of the light from striking the leaf.



6. To the Less Carbon Dioxide and Less Light plant, do what you did in both step 4 and step 5 to each leaf.
7. Place all plants in the same location so they will be exposed to the same temperature and same amount of sunlight. Also, be sure to give them the same amount of water. As new leaves grow on plants, wait until they get large enough and treat them the same way you did with the first two leaves. Observe your plants and notice any differences between them. What do your observations seem to mean?

Think about this ...

Why do you think the experiment uses a control plant that is not changed in any way?

Where's the Chemistry?

Since carbon dioxide and light each enter the plant through a different part of the leaf, these different parts can be blocked separately to see what effect less carbon dioxide and less light has on the plant.



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The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

