

Eggstra-ordinary Gas Pressure

from **Celebrating Chemistry**



Chemists Celebrate Earth Day

Think about what happens when you open a new bottle of soda. What do you feel and hear as you are twisting the cap? Gas escaping! When soda is packaged into a plastic bottle, a gas called carbon dioxide is added to the liquid. Once the bottle is sealed, there is nowhere for the liquid or the gas to go. Gas pressure builds up in the bottle, which is why it is so hard to squeeze a full, closed plastic bottle! Once the seal is broken by twisting off the cap, the carbon dioxide gas has somewhere it can go! You can actually hear the gas as it escapes and you can see the gas as bubbles in the soda! In this activity, you will use simple household items to show the existence and usefulness of gas pressure.

Materials

- ❖ 2 zip-closing plastic bags (1 gallon-size)
- ❖ Egg
- ❖ Packing tape, clear
- ❖ Meter stick or measuring tape
- ❖ Blunt scissors (optional)
- ❖ A hard-surfaced floor, preferably outside (sidewalk, deck, etc...)
- ❖ Paper towels, soap, and water (for clean up, if needed)

*NOTE: This activity could get messy! Try the experiment outside or in an area easily cleaned. Raw eggs could contain salmonella, a bacterium that can make you sick! If your egg does break, be sure to clean up the mess well, and **wash your hands immediately** with soap and warm water.*



The egg can be hard-boiled by an adult to reduce the mess and participants can check for cracks in the shell. This could safely be checked by touch or with use of a magnifying glass.



Be sure to follow Milli's Safety Tips and do this activity with an adult! Do not eat any of the materials in this activity.

Procedure

1. Open the first zip-closing bag about 5 centimeters (two inches) and leave the rest sealed. Cup the open end of the bag in your hands and blow as much air into the bag as you can, sealing it when it is as full as possible.
2. Repeat step 1 with the other bag.
3. Gently push on each bag to make sure air is not leaking out. If there is a leak, seal the leak with tape or try a new bag.
4. Place one inflated bag on a flat surface. Hold the egg on top of the bag, in the center.
5. Carefully put the second inflated bag on top of the egg, "sandwiching" the egg between the two bags.
6. Without squeezing so hard that you crack the egg, wrap packing tape around the bags to hold the two bags together.
7. Go to your test site (a place where the ground is very hard and that your adult partner approves).
8. Using the meter stick or measuring tape, measure one meter straight up from the ground and drop the bags from that distance.
9. Pick up the bags and examine the egg. Did anything happen to it? Why? Why not?
10. Write down what happened in the "What Did You Observe?" section and draw a picture of your egg with the bags cushioning it.
11. Thoroughly clean the work area and wash your hands. **Place the egg in the trash, even if it is not broken.** Do not put it back into your refrigerator.



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What Did You Observe?

Draw a picture of the egg when it is taped inside the bags.



What happened after you dropped the egg with the inflated bags from one meter high?

Did the egg break or crack?

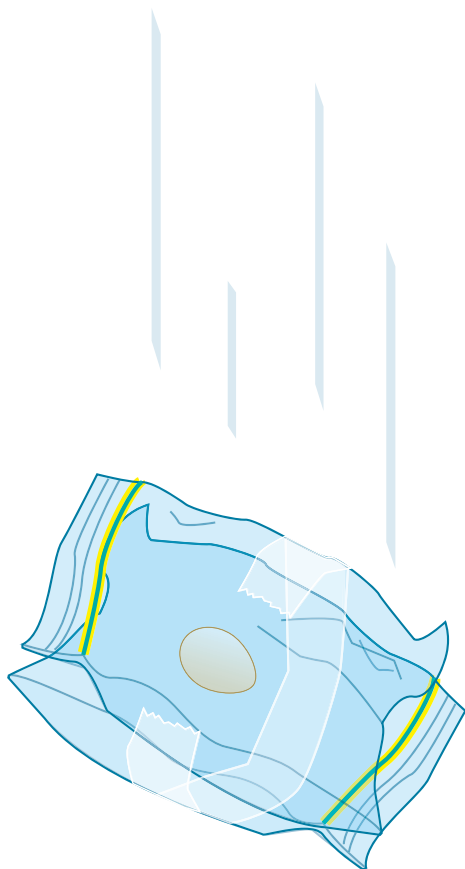
Where's the Chemistry?

By inflating and then sealing the zip-closing bags, you created gas pressure inside the bags. There was nowhere for the air inside the bag to go. The more air you added, the greater the gas pressure became inside the bag. Because of this gas pressure inside the bags, the bags served as a pillow for the egg. The egg did not break because it never hit the ground. As long as the egg is secured by the gas "pillows," it will not break. Gas "pillows" are used in many ways. When something fragile is being mailed, sometimes gas "pillows" are placed around the object so it does not break. Gas pillows have even been used to help spacecraft land on Mars.

The gas "pillows" can be very large, or very small, like those in bubble wrap. Can you think of other ways where gas "pillows" are used to keep something from getting broken or hurt?

Try this...

Keep dropping the egg in its zip-closing bag "sandwich" from greater distances (try increasing in ten-centimeter increments each time) from the ground, but make sure you get approval from your adult partner. How high can you drop the bags without the egg breaking? See if smaller bags give enough cushioning effect.



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".

