

The gases in magma are under extreme pressure far beneath the earth's surface. When magma gets near the earth's surface where the pressure is lower, the gas expands to such an extent that it can blow a hole in the volcano! In this activity, let's see how releasing pressure allows gas to expand and come out of a liquid.

Materials:

- Club soda (unopened, 1 or 2 liter)
- 2 Plastic bottles with lids (from about 1/2 liter bottled water, empty)
- Ice
- Hot water (from tap)
- 2 bowls
- Clock or timer

Procedures:

1. Look at the soda in the bottle. Can you see any gas bubbles in the soda? Do you think there is gas in the soda?
2. Feel the outside of the bottle. Does it feel hard or soft? If it feels hard, it is because the soda has been packed in the bottle under a lot of pressure.



3. Open the bottle very slowly and observe the soda. As you opened the bottle, you released the pressure on

the soda. Did you see any bubbles form while opening the bottle?

Think about this ...

Gasses escape from a liquid when the pressure is released but do you think the temperature of the liquid matters? Do you think more gas bubbles will form when pressure is released from hot liquid than from cold liquid? Try the following activity to find out!

1. Carefully pour the club soda into each of your smaller bottles until they are about half full. Put the lids on securely. Place one bottle in hot tap water and the other in ice water. Let the bottles sit for about three minutes.



2. Slowly unscrew the cap from the bottle in ice water. Listen for any gas escaping and watch to see any new bubbles form.
3. Now, slowly unscrew the cap from the bottle in the hot water. Again, listen to the gas escaping, and watch for any new bubbles forming.

How did the amounts of gas coming out of the two bottles compare? Did one seem to have more gas escaping than the other?

Where's the Chemistry?

In the first part of the activity, the unopened bottle should have felt very hard. This is because the soda pop company puts carbon dioxide gas in the soda to give it lots of fizz. They shoot a lot of gas into the cold soda liquid and then quickly cap the bottle tightly. The gas is pushing hard against the inside of the bottle resulting in a lot of pressure. This gas will escape as soon as the bottle is opened even a little bit and the pressure is released.

In the second part of the activity, more gas should come out of the soda placed in hot water. When the soda is placed in hot tap water, the heat from the water warms up the soda in the bottle. The gas molecules move faster and increase the pressure in the bottle. When the cap is removed, these gas molecules will quickly come out of the liquid. For the bottle placed in cold water, the gas molecules are not moving as quickly, have not spread out as much, and have not increased the pressure in the bottle as much. When the bottle in cold water is opened, not as much gas will escape.



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".

