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## Self-Inflating Balloons

AS-800

### To use:

Look at one of the transparent balloons and locate the packet of liquid. You can find this packet in the opaque balloons by feeling around for it. Carefully squeeze the packet (or press it against a hard surface like a table) until it bursts. That's all there is to it! In a few moments, the balloon will inflate completely. You need take no further action. The balloon should stay inflated for quite a while—for several days or more likely a week or more.



### How does it work?

These balloons contain a small packet of a liquid, and a solid material. One of these is acidic, and the other basic. When the packet of liquid is squeezed hard enough to burst it, the two components mix. This triggers an acid-base reaction (see below) which in this case generates carbon dioxide gas, filling the balloon. Both components involved in the reaction are non-toxic.

### Do it yourself!

You can create a similar reaction with materials around your own house. All you will need is:

- White vinegar (other kinds will work too)
- Baking soda
- A tall glass or similar container

Put about one tablespoon of baking soda into the glass, and rapidly pour in about  $\frac{1}{2}$  cup of vinegar. Instantly it will bubble up. Most likely, the bubbles will fill the entire container and, depending on the size of the container you are using, the vinegar solution may overflow. That's why it's wise to do this experiment in a sink, on a plate, or on an edged cookie sheet.

So what exactly happens when you mix vinegar and baking soda? Since vinegar is an acid and baking soda is a base, they undergo an acid-base reaction. Generally, when an acid and a base are mixed together, the acid and base neutralize each other and form water and a small amount of a salt.

In the case of vinegar and baking soda, the acetic acid (that's the vinegar) and sodium hydrogen carbonate (the baking soda) combine to form water, carbon dioxide gas (which is responsible for all the bubbles), and sodium acetate (which is a salt).

# NGSS Correlations

Our Self-Inflating Balloons and these lesson ideas will support your students' understanding of these Next Generation Science Standards (NGSS):

## Elementary

### 5-PS1-3

Students can use Self-Inflating Balloons to make observations and measurements to identify materials based on their properties.

### 3-5-ETS1-3

Students can use Self-Inflating Balloons to plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

## Middle School

### MS-PS1-2

Using the Self-Inflating Balloons, students can to analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

### MS-ETS-3

Students can use Self-Inflating Balloons to analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

## High School

### HS-PS1-2

Using the Self-Inflating Balloons, students can construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.

### HS-ETS1.B

Developing Possible Solutions. Both Physical models (Self-Inflating Balloons) and computers can be used in various ways to aid in the engineering process.

## Suggested Science Idea(s)

### 5-PS1-3 • MS-PS1-2 • HS-PS1-2

Students can use Self-Inflating Balloons to plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. Two Self-Inflating Balloons allow students to make observations, make a claim and revise ideas based on new observations of the second balloon.

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## Take Your Lesson Further

As science teachers ourselves, we know how much effort goes into preparing lessons. For us, “*Teachers Serving Teachers*” isn’t just a slogan—it’s our promise to you!

Please visit our website  
for more lesson ideas:

[TeacherSource.com/lessons](http://TeacherSource.com/lessons)

Check our blog for classroom-tested  
teaching plans on dozens of topics:

<http://blog.TeacherSource.com>

To extend your lesson, consider these Educational Innovations products:

### **Microscale Vacuum Apparatus** (VAC-10)

Students can now safely produce a vacuum in a small bell jar right at their lab stations. By reducing the pressure in the microscale bell jar, they can expand a balloon, boil warm water, and even transfer liquids from one pipet to another. They can watch a marshmallow or shaving cream increase in volume as the pressure is reduced and learn about how extremely low pressure affects the world around them. Instead of passively observing a demonstration, students can actively experiment on their own and observe the results right before their eyes.



### **Milk Bottle & Egg Demo** (BOT-800)

Use this sturdy glass milk bottle for an egg-cellent demonstration of air pressure. All you need is a hardboiled egg and a little bit of fire. If you drop some lit paper inside the milk bottle and then place the egg on top, the fire goes out and the egg is mysteriously pushed into the bottle, intact! Warm air expands, cool air contracts—it's the cooling of the heated air inside the bottle that allows the atmosphere to 'push' the egg inside.

### **Air Pressure Bundle** (AIR-900)

Six air pressure demo goodies will certainly prove that science never sucks! Start with a Tornado Tube or Fountain Connection for hours of water play (and learning). Learn about lift with a balloon-powered helicopter. Your Harbottle is the perfect tool to demonstrate atmospheric pressure. How does that balloon stay inflated without being tied shut? The Pressure Pullers and Atmospheric Mat are guaranteed to baffle anyone who doesn't (yet) know about the pushing force of the air around us.

