

SIDE DISPLAY **Balloon in a Flask**

Visitors observe a flask with a balloon attached over the mouth and inverted inside the flask. The balloon looks like it has been blown up inside the flask.



OBJECTIVES:

Visitors learn that air is a gas and that gas molecules exert pressure. They learn that liquids take up less space than gases. They infer the change of state from a gas to a liquid.

SCIENCE TOPICS	PROCESS SKILLS	VOCABULARY
Temperature	Observing	Gas
Phase Changes	Inferring	Liquid
Pressure of a Gas		Molecule
Properties of Gases		Physical Property
Properties of Liquids		Volume



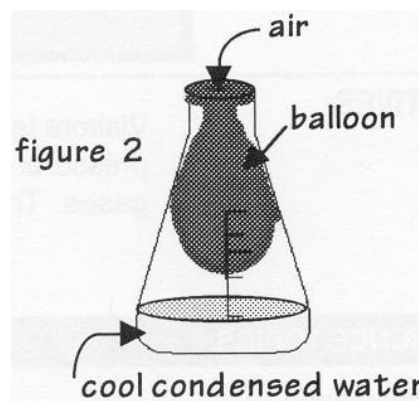
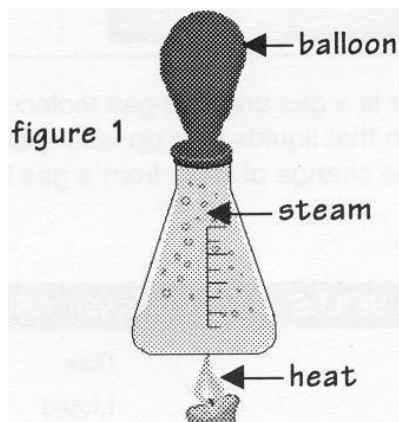
Balloon in a Flask

To do and notice:

1. Look at the flask with the balloon.
2. How do you think the balloon got inside the flask?
(Hint: What else is in the flask?)

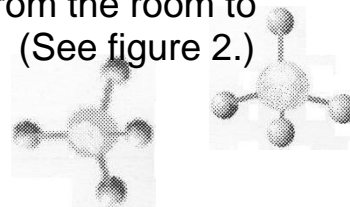
What is going on?

This activity shows the difference in physical properties between a liquid and a gas. A gas takes up much more space than a liquid because its molecules are faster moving and further apart from each other. The molecules in a liquid move more slowly and are very close together.



The flask you see was first filled with steam (a gas) by the heating of a little water (a liquid) in the bottom of the flask (figure 1). The balloon was then placed over the mouth of the flask. As the flask and steam cooled, the steam turned back into water again.

Liquid water takes up less space than steam, allowing air from the room to rush into the flask, pushing the balloon down into the flask. (See figure 2.)



MATERIALS

(with amounts to have on hand)

- One large balloon (8- or 9-in. size)
- One 125-ml Erlenmeyer Flask
- H₂O (water) (10-15 ml)
- One hot plate
- Insulated gloves (general storage)

Setup/Takedown Procedures**WEEKLY SETUP**

- Pour 10-15 ml of H₂O (water) into the flask. The exact amount is not important- it should cover the bottom of the flask to a depth of about 1 cm.
- Have the balloon ready. Use two or three fingers on each hand to stretch the neck of the balloon open. This should enable you to slip it over the mouth of the flask in one easy motion. Practice this move. The faster you can attach the balloon, the more effective the demonstration.
- Turn on the hot plate. Heat the flask until the water has reached a vigorous boil and steam is coming out of the flask. (**Don't boil away all the water!**)
- Using gloves, quickly (**but carefully!**) place the flask on the counter and place the balloon over the mouth of the flask.
- Allow the flask to cool. (You can speed the process by waving the flask in the air or by holding it under a stream of cool water.) As it cools, the balloon will be pushed into the flask. You may have to guide the balloon because it sometimes gets stuck on the side of the flask.

DAILY SETUP

- Set out the public copy in a Plexiglas stand.
- Set the flask next to the public copy.
- Check to see whether the display has been tampered with. If the balloon is no longer in the flask, redo the weekly setup.

WEEKLY TAKEDOWN

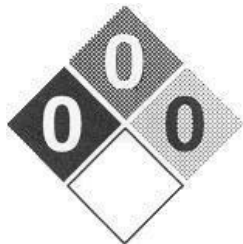
- Remove the balloon from the flask, rinse it, and return it to the Unit 1 side display storage.

**RUNNING SUGGESTIONS**

- ◇ Prepare a second flask with a differently colored balloon or use a different size of flask.
- ◇ Do this as a live demonstration for the visitors.
- ◇ Get visitors to think about air pressure. What is stretching the balloon? What happened to the air inside the flask? What purpose does the water serve?

**EXTENSIONS**

Relate this to the Crushing Can demonstration.

SAFETY & DISPOSAL

Use of the hot plate requires continuous monitoring. Follow the specified safety precautions.