

Lab - Exploring Properties of Gases

Purpose: By using a variety of experiments, to determine some physical properties of air.

Procedure: Eight stations have been set up around the laboratory. At each station, you will perform the experiment indicated. The experiments can be done in any order. For each station:

- read the procedure
- make a prediction on what's going to happen
- perform the experiment
- record your observations
- explain why the experiment happened the way it did

Station 1

- 1) Place an un-inflated beach ball on the balance. Record the mass.
- 2) Inflate the beach ball completely.
- 3) Place inflated beach ball on the balance. Record the mass.

Station 2

- 1) With its open end facing downward, lower an empty drinking glass into a large container of water.
- 2) With the open end still under water, slowly tilt the glass.



Station 3

- 1) Take an uninflated balloon and insert the round end of the balloon halfway into a 2 liter bottle. Instead of dropping the balloon into the 2 liter bottle, stretch the neck of the balloon over the mouth of the 2 liter bottle to create a seal, as shown in the diagram to the right.
- 2) Blow air into the balloon.

Station 4

- 1) Fill a test tube to the rim with water.
- 2) Cover the test tube rim with a plastic cover slip.
- 3) Press down on the plastic to make a tight seal with the mouth of the test tube.
- 4) While continuing to press the plastic to the test tube, invert the test tube above a sink or pan.
- 5) Without causing any jarring, gently remove your fingers from the piece of plastic.
- 6) Repeat the process with the test tube half full of water.

Station 5

- 1) Locate the plastic bottle with a small hole in its side.
- 2) Cover the hole in the side of the bottle with your finger.
- 3) Fill the bottle with water.
- 4) Replace the cap tightly.
- 5) Holding the bottle over a sink, remove your finger from the hole.
- 6) Still holding the bottle over a sink, remove the cap.

Station 6

- 1) Fill a test tube to the rim with water.
- 2) Cover the test tube opening with a plastic cover slip.
- 3) While continuing to press the plastic to the test tube, invert the test tube and partially immerse it in a container of water.

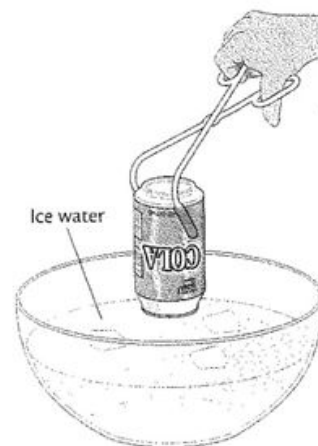
- 4) Remove the piece of plastic.
- 5) Move the test tube up and down, keeping the opening of the tube under water
- 6) Repeat the process with the test tube half full of water.

Station 7

- 1) Draw air into a syringe.
- 2) Seal the tip by placing your finger over the end.
- 3) Holding your finger over the end, gently push down on the plunger with your thumb.
- 4) Release the plunger.
- 5) Remove your finger and push almost all the air from the syringe. Replace your finger over the end.
- 6) Pull the plunger out to almost the end of the syringe.
- 7) Release the plunger.

Station 8

- 1) Place about 10 ml of water in a clean, empty aluminum soft-drink can.
- 2) Place the can on a hot plate, and bring the water to a rapid boil.
- 3) Using tongs to handle the can, quickly remove it from the heat and immediately invert the can into a container of ice water (see figure to the right).



Questions:

- 1) Which experiments are useful in demonstrating that air is matter? Explain.
- 2) Which experiments are useful in demonstrating that air exerts pressure? Explain.
- 3) Explain any differences between your predictions and the actual outcomes of the experiments.
- 4) For any station at which you performed experiments,
 - a) describe your observations in detail
 - b) explain the role of air in the experiment
 - c) draw particle models showing the interactions between the gas particles and the other particles of matter in the experiment.
- 5) Describe an additional activity or experience you have had that demonstrates that
 - a) air matter
 - b) air exerts pressure
- 6) Perform the following activity at home (or in the lunchroom at school): Put one end of a straw in a glass of water. Hold another straw outside the glass. Place the ends of both straws in your mouth and try to drink the water through the straw in the glass.
 - a) Describe what happens.
 - b) Based on your observations, what makes it possible to drink liquid through a straw?

Conclusion