

Gas Law Experiment #1: Egg in a Bottle

Teacher Demo (This should not be performed outside of the Chemistry lab)

1. A lit piece cotton ball is dropped inside a milk jug and a hard-boiled egg is placed on the neck of the bottle.

Observe and record what you see.

Gas Law Experiment #2: Invisible Giant

Teacher Demo (This should not be performed outside of the Chemistry lab)

1. A small amount of water is placed at the bottom of a pop can and placed on a hot plate until the water is boiling. The can is then flipped into a bucket of ice water.

Observe and record what you see.

Gas Law Experiment #3: Marshmallow Surprise

Part I

1. Remove the plunger from the syringe and place a mini-marshmallow in the syringe. Replace plunger and cap syringe.
2. Push down on plunger until it just reaches the marshmallow. Record your observations (**Don't let plunger touch marshmallow**)
3. Pull the syringe and observe what happens to the marshmallow. Record your observations.
4. Repeat if necessary.

Part II

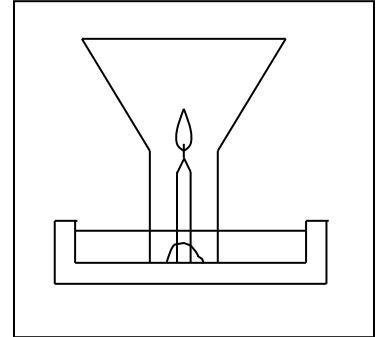
1. Remove the cap from the syringe. Push the plunger down as far as you can without touching the marshmallow.
2. Recap the syringe. Pull up slowly on the plunger and observe the marshmallow.

Gas Law Experiment #4: The Cartesian Diver

1. You will need a clear plastic bottle with a cap and a medicine dropper.
2. Fill the bottle to the very brim with water. Drop the medicine dropper into the bottle with the bulb *up*. The dropper should float in the water.
3. Close the bottle tightly.
4. Squeeze the bottle gently. Record your observations in the **Data and Observations** section.
5. Stop squeezing the bottle. Record your observations.
6. Squeeze the bottle again but this time closely watch the water inside the dropper.
7. Answer the questions in the **Conclusions** section.
8. Pour the water out of your bottle. Leave the bottle and dropper for the next lab section.

Gas Law Experiment #5: Happy Birthday

1. You will need a shallow dish, a birthday candle, some petroleum jelly, and Erlenmeyer flask, and possibly some food coloring.
2. Put a *small* glob of petroleum jelly in the center of the shallow dish. Stand a birthday candle upright in the petroleum jelly. Don't use a lot of extra petroleum jelly or the demonstration won't work properly.
3. Add 1 – 2 centimeters of water to the dish. You may add *one or two* drops of food coloring to make the water more visible. It isn't mandatory that you do so. Don't get the wick of the candle wet as you pour the water.
4. Light the birthday candle.
5. Place the Erlenmeyer flask mouth down over the candle. Stand it up right in the dish over the candle. Refer to the diagram at right.
6. Observe and record your observations.
7. Be careful when removing flask from petri dish. Pour the water in the sink. Clean the petroleum jelly out of the dish. Return the candle to the teacher.



Gas Law Experiment #6: Zinc Reaction

1. Obtain two comparable pieces of zinc from the container at your lab bench, using forceps, and add each piece to a separate well in a 24 well plate.
2. Add 10 drops of 1 M HCl to one of the wells containing zinc, and start timing the reaction. The gas bubbles are representing the amount of gas produced in this reaction.
3. Stop timing the reaction when the reaction no longer is producing gas bubbles.
4. Add 10 drops of 3 M HCl to the other well containing zinc, and start timing the reaction.
5. Stop timing the reaction when the reaction no longer is producing gas bubbles.
6. Use forceps to remove metal samples and place in solid waste container. Pour liquid in liquid waste container. Clean and dry well plate.

Gas Law Experiment #7: Syringe Temperature

1. Remove cap from syringe and draw about 20 cc of air into the syringe. Replace cap.
2. Place a thermometer in water and record the temperature (don't let the thermometer touch bottom of beaker). Temperature should be around 90°C.
3. Hold syringe by the stopper under the hot water. Make sure the bottom of plunger is under water.
4. Wait 3 minutes remove syringe from hot water quickly push down on plunger and record syringe measurement _____cc.
5. Pull outward on the plunger and record syringe measurement _____cc. **The actual volume** is the average of these two measurements. _____cc.
6. Repeat steps 3-5 with room temperature.
7. Repeat steps 3-5 until ice cold water.

Gas Law Experiment #8: Strange Balloon

1. Add about 10mL of water to a 50mL Erlenmeyer flask.
2. Place a small balloon over the opening of the flask and place the flask on the hot plate (hot plate should be set to 8) until the water boils. When the balloon performs its trick, remove it *soon after* so that you don't get scalded with hot water!
3. Record your observations.
4. Using the thermal glove, place the Erlenmeyer flask and balloon in the beaker of ice cold for water for five minutes.
5. Record your observations.

Gas Law Experiment #9: Syringe Pressure

1. Remove cap from syringe and draw about 30 cc of air into the syringe. Replace cap. Insert syringe into smallest hole of the large wooden base. Using the thin wooden block gently press the top end of syringe into the hole
2. Carefully stack the textbook (one at time) on the top block of the apparatus. Tap the table a couple of times to help overcome static friction. Record number of books and syringe amount. (Trial 1).
3. Un-stack books one, at a time, and record syringe measurements. (Trial 2)

Materials needed for each experiment/group

Gas Law Experiment #1: Boiled egg, milk jug, lighter, paper towel

Gas Law Experiment #2: Clean and empty soda can, water, hot plate or Bunsen burner, container of water.

Gas Law Experiment #3: Syringe, End cap and Mini-marshmallow

Gas Law Experiment #4: Clear plastic bottle with cap, water, and glass medicine dropper

Gas Law Experiment #5: Petroleum jelly, birthday candle, Erlenmeyer flask, food coloring, lighter, and water

Gas Law Experiment #6: pieces of zinc, 1M and 3 M HCl, micro well plate, clock with second hand

Gas Law Experiment #7: balloon, 50 ml Erlenmeyer flask, and water

Gas Law Experiment #8: Syringe, thermometer, hot plate, container of crushed ice, and container of hot water, and container of room temperature water

Gas Law Experiment #9: Boyles's Law Apparatus, 4 books (borrow from English department)