

Name(s): _____

Section: _____
Date: _____

Gas Particles in Motion

Activity 3: Changing Volume Through Temperature

<http://sunshine.chpc.utah.edu/javalabs/>

Getting Started : The Balloon Problem

Explain why you think your balloons have deflated.

Lab Procedure

1. Write down the independent variable and the dependent variable.

2. Predict how temperature might cause the balloons to change in volume. Write down your predictions.

3. To select a temperature, click on the thermometer and drag it to a different temperature.

4. The gas will be heated or cooled, then after any volume changes, you can record the data in the data table by clicking the *Record* button. **Remember to copy the data down in the tables on the next page.**

5. When you have sampled at least six temperatures, proceed to the analysis questions and the graphing section.

Table 1: Pressure = _____ mm Hg

| Temp. (Kelvin) | Volume (Liters) | |
|-------------------|--------------------|--|
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Analysis Questions

1. What variables were you testing in this lab? Which ones changed? Which stayed the same?
2. How did your prediction match the data? Were you right or wrong?
3. What happened when the temperature was raised? What happened when the temperature was lowered? In this experiment, what is the relationship between the temperature of the gas and the volume of the gas? Is it direct or inverse?

Graphing Activities

1. If you heat your gas to 120 K, what volume will the gas have?
2. If you heat your gas to 73 K, what volume will the gas have?
3. Predict what the volume would be for temperatures of 190 and 440 K. These numbers are not on the graph, but do the best you can.
4. Label the third column of your data table V/T (Volume divided by Temperature). Now, divide your volumes by their corresponding temperatures and put the new figures in the third column. Did you get the same number each time? What do we call this kind of number?

Analysis Questions (continued)

1. If a gas with a volume of 19 L is at a temperature of 29 Kelvin, what is the temperature if the volume has changed to 27 L?
2. If you were to place an inflated balloon in a warm oven for a few minutes, what would happen to it? (How would its volume and temperature change?)
3. Why does a hot dog expand when it is cooked over a fire?
4. Why did the balloons deflate when they came out of the store?

Historical Science

Use the ASPIRE biography to learn about Jacques Charles, the scientist who discovered the gas law you just learned.

To find the biography, bring up the ASPIRE website - <http://sunshine.chpc.utah.edu/>
Go to *Interactive Labs*, and follow the path to *Gas Laws Activity Three*. In the *Student Lab*, scroll down until you reach the *History* section, then click on the link for *Jacques Charles*.

Below list at least 4 ideas you found most interesting or important about Charles.

1.

2.

3.

4.