

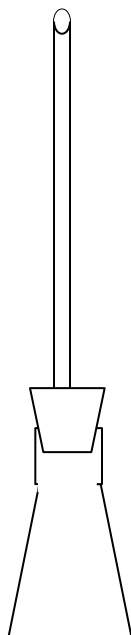
Introduction

In this activity you are going to make observations of a flask of water when the water is at three different temperatures – room temperature, warm water 50 – 60°C, and cold water 0–10°C. You will use the *particle theory of matter*, to explain your observations of the effect of temperature on the volume of water.

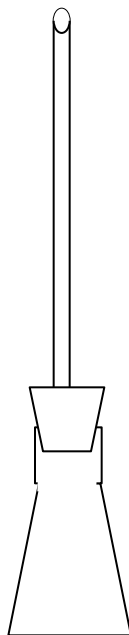
Procedure **You MUST put on goggles whenever standing near the hot plate.**

Add three drops of food coloring to the flask (this simply makes the column of water in the narrow tube easier to see), fill to overflowing with tap water, then twist to insert the stopper and glass tube. Be careful to avoid any air bubbles underneath the stopper. The water should extend approximately halfway up the glass tube. If not, or you think you have air bubble problems, try again, then consult the teacher if you are still having problems.

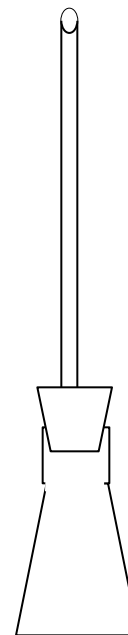
Record your observations in the space and on the diagram below, mark the water level with the marker directly on the glass tube at room temperature, then put the flask on the hot plate set at medium, allow time for any changes (Stop heating before the water pushes all the way out the top of the tube.), then mark the water level on the diagram below. Lastly, place the flask in the ice water bath and observe any changes in the water level and mark it on the diagram below.



Cold Temp



Room Temp

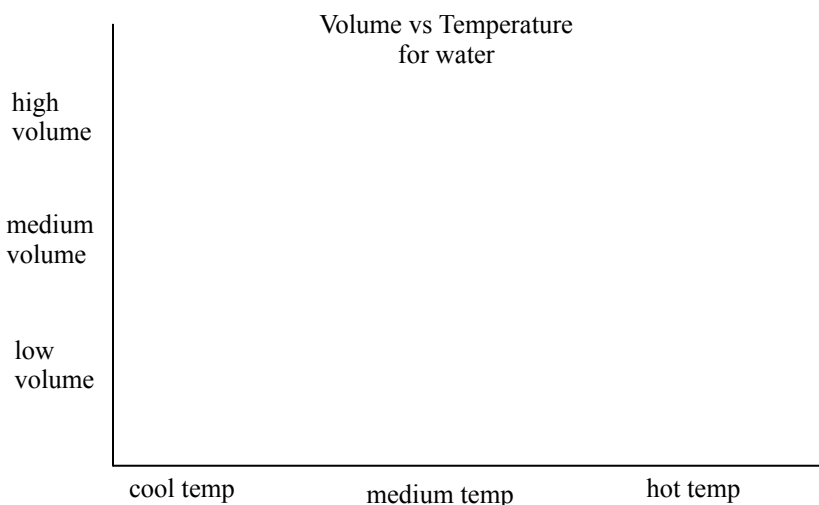


Hot Temp

1. How is the water level change associated with temperature changes?
2. During this experiment the number of water molecules in the flask does not change since you were not adding or removing any water at the different temperatures. What are the molecules doing that causes the volume to change your observed? (Be sure and use the words kinetic energy in your explanation.)

Graphing the Data

Make a sketch of a graph below that plots volume of water (y-axis) vs the temperature (x-axis)



3. Association statements compare two actions that are related to each other.
- An example of a *direct* association statement might be: Studying *more* effectively produces *higher* chemistry grades.
 - An example of an *inverse* association statement might be: Brushing teeth *more* often results in *less* cavities.

What is the difference between an *direct* and an *inverse* association?

4. Write an association statement (the law) that compares temperature to volume. Is this a direct or inverse association?

5. Explain why (the theory) we think the previously stated correlation or law occurs. Consider this relationship $T \propto KE = \frac{1}{2}mv^2$ while considering the numbers of dancers that can fit on a crowded dance floor during fast dances vs slow dances