Absolute Zero Lab　　　　　　　　　　　　　　　　Name ____________________

Purpose: To experimentally determine the lowest possible temperature.

Procedure:

1. Fill a pneumatic trough with tap water at about 25°C. Set up a 250 mL flask with a stopper containing a glass bend with a right angle. Mark the depth of the stopper with a ball-point pen. Clamp the flask with the stopper and bend on a ring/screen inside a 600 mL beaker ready to be heated. Fill the beaker no more than 2/3 full of water. **Note: Be sure the <u>inside</u> of the flask and tubing are absolutely dry.** Any moisture inside the flask will produce poor results. Heat the water in the beaker to <u>gently</u> boiling. Use extreme caution – once it boils it will create large amounts of pressure under your flask!

   Temperature of your boiling water: T_1 = ______________ °C

2. Put your finger over the tube and immerse the flask mouth and tube upside down in the pneumatic trough. Use tongs to transfer the beaker, for it will be hot! **Do NOT allow air to enter the system, only water once it is submerged!** Push the entire flask into the water to equalize the temperature (about 10 minutes). When no more water enters the flask, remove the flask and record the temperature of the water inside the flask:

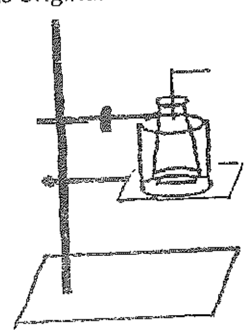
   Temperature of the water inside the flask: T_2 = __________ °C

3. Pour the water from the flask into a graduated cylinder and record the volume:

   Volume of water entered upon cooling: v = ____________ mL

4. Fill the flask and its tube completely with water. Be sure to return the stopper to its original depth. Then pour out and measure the amount of water of the entire system:

   Volume of water in the entire system: V_1 = ____________ mL



5. The volume of air in the flask at water temperature is equal to:

   $V_1 - v$ = __________ mL (V_2)

Volume of air in system	V_1	mL
Volume of air at room temp	V_2	mL
Temperature of boiling water (hot air)	T_1	°C
Temperature of air at water temp (cooled air)	T_2	°C

6. Plot the points (V_2, T_2) and (V_1, T_1) on graph paper and extend the line to zero volume. The temperature at this point is the experimental absolute zero value.

   Experimental absolute zero = ________________ °C (from graph)

7. Use the slope-intercept form for the equation of a straight line: $y = mx + b$ and the points (V_2, T_2) and (V_1, T_1) to find the experimental value of absolute zero. Show your work!

Experimental absolute zero = ______________________ ^{0}C (from data)

8. Knowing that absolute zero is -273^{0}C, find the percent error. Show your work!

9. Report the class average for absolute zero: ______________________ ^{0}C