**Molar Mass Lab** Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Lab Partner \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Objective:** Use the Ideal Gas Equation to determine the molar mass of a volatile liquid.

**Prelab. Questions:**

1. What are the units for molar mass?
2. If .00345 moles of butane have a mass of 0.20grams, what is the molar mass of butane?
3. Rearrange PV=nRT to find moles.

**Safety:** Ethanol is flammable and must be kept away from an open flame. Put the cap on tight after using.

Wear safety goggles at all times.

**Procedure:**

1. Weigh and record the mass of a dry Erlenmeyer flask, rubber stopper and glass tubing.

2. Record the atmospheric pressure.

3. Add about 1.5 mL of ethanol, using a 10 mL graduated cylinder, to the flask.

4. Put the stopper on the flask and place the flask in boiling water for at least 10 minutes. Record the temperature of the water.

5. Remove the flask from the boiling water and allow it to cool about five minutes.

Dry the exterior with paper towel if needed.

6. Weigh and record the mass of the flask, rubber stopper and condensed ethanol.

7. Find the volume of the flask by filling it with water and using a graduated cylinder to measure the volume of water.

**Data:**

|  |  |
| --- | --- |
| Mass of flask, stopper and glass tubing |  |
| Atmospheric Pressure |  |
| Boiling water temperature |  |
| Mass flask, stopper, glass tubing and condensed ethanol. |  |
| Volume of flask |  |

**Calculations and Conclusion:**

1. Use the Ideal Gas Equation todetermine the moles of ethanol in the flask at the conclusion of the experiment. **Show your work and include units on all numbers.**
2. Calculate the molar mass of ethanol. **Show your work and include units on all numbers.**

Molar Mass = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Error Analysis:**

How would the calculated molar mass be affected for the following scenarios? Expain how your calculations would be affected by the change in your data.

1. All of the vapor did not condense before it was weighed.
2. The actual temperature of the vapor was less than the reported temperature.
3. The student did not measure the actual volume of the flask, and reported that the volume was 250 mL instead of the actual volume of 270 mL.