Lab 10- Molecular Mass of the Gas in a Disposable Lighter

In this lab you are going to try to determine the molecular mass of the gas inside of a disposable lighter using similar ratios.

Procedure:

1. Fill a large plastic container ¾ full with water at room temperature. Use a thermometer to determine the temperature of the air and then make the temperature of the water match.

   Temperature of the air _____ ^{O}C

   Temperature of the water bath _____ ^{O}C

2. Submerge a disposable lighter in water then dry it off and find it's mass on a balance. The lighter needs to be submerged first as water will fill nooks and crannies in the lighter that will throw of the mass of the lighter after gas is collected if you don't.

   Mass of the lighter _____ g

3. Fill a 150mL beaker with water and invert it in the water trough so that no air remains inside the beaker.
4. Submerge the lighter so that it is below the opening of the inverted beaker and open the valve with your thumb so that gas is released and captured inside the inverted beaker. Continue to release gas until you have collected 100mL of gas.
5. Remove the lighter, dry it off as you did before and find the new mass of the lighter.

   New mass of lighter _____ g

6. Find the difference between the two lighter mass measurements, this is the amount of gas released in grams.

   Difference between lighter measurements _____ g of gas released.

7. The ratio between a mole of gas (its molecular mass) and 22.4 L is equal to the ratio between the mass of gas you released and the volume of gas collected (100mL). Use this ratio of similar proportions to determine the molecular mass of the gas. Remember that 100mL of gas is 0.1 L of gas.

$$\frac{\text{Molecular mass of gas}}{22.4\text{ L of gas}} = \frac{\text{grams of gas}}{0.1\text{ L}}$$

Experimental molecular mass of the gas in the lighter is _____

8. The actual gas in the lighter is butane. Determine the chemical formula for butane and then its molecular mass.

   Molecular mass of butane _____ g

9. Determine the percent error between your experimental molecular mass and that of the actual molecular mass of butane.

   $$\text{Percent error} = \left| \frac{\text{Actual molecular mass - Experimental molecular mass}}{\text{Actual molecular mass}} \right| \times 100$$

   Percent error = _____ %

   Be sure to write up a report on this lab in your journal.