

MOLAR MASS OF BUTANE LAB

MATERIALS: Lighter, 100 ml cylinder, balance, thermometer

PURPOSES: To use the Ideal Gas Law to determine the molar mass of an unknown gas.
To do stoichiometry calculations involving gases

PROCEDURE: Look at data table below for hints.

DATA:	mass of lighter before gas collection	<u>13.73</u> g
	mass of lighter after second gas collection	<u>13.29</u> g
	mass of butane collected	_____g
	volume of gas (1 st collection)	<u>91</u> mL
	volume of gas (2 nd collection)	<u>83</u> mL
	volume 1 + volume 2	_____mL
	Temperature	<u>20.7</u> C
	Barometric Pressure	<u>754.38</u> mm Hg
	Vapor Pressure of water at observed temp.	<u>18.7</u> mm Hg
	Pressure of Butane (barometric – vapor)	_____mm Hg

CALCULATIONS / QUESTIONS

1. Convert the total volume of gas from ml to liters.
2. Convert inches Hg to mm Hg.

OMIT ON DRY LAB

3. Convert temperature from C to K.
4. Calculate the molar mass of butane using the ideal gas law. Show work clearly.
Include units with all numbers!!

$$P V = (\text{mass/molecular weight}) R T$$

5. What is the actual molecular mass of butane? Calculate the percent error for your molar mass calculation in #1. $\% E = \frac{|\text{Experimental} - \text{Known}|}{\text{Known}} \times 100 \%$
6. When determining the pressure of the butane, why was it necessary to subtract the vapor pressure of water from the barometric pressure of the atmosphere?
7. Write the balanced equation for the combustion of butane.
8. The heat of combustion for butane is 2859 kJ/mol butane. How much energy was released when you burned the butane?