MOLAR MASS OF BUTANE LAB

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   _____g
                   mass of lighter after gas collection   _____g
                   mass of butane collected   _____g

                   volume of gas (1st collection)   _____mL
                   volume of gas (2nd collection)   _____mL
                   volume 1 + volume 2   _____mL

                   Temperature   _____°C

                   Barometric Pressure   _____mm Hg
                   Vapor Pressure of water at observed temp.   _____mm Hg
                   Pressure of Butane (barometric – vapor)   _____mm Hg

CALCULATIONS / QUESTIONS

1. Calculate the molar mass of butane using the ideal gas law.
        Show work clearly. Include units with all numbers!!
2. What is the actual molecular formula of butane. Calculate your percent error for
        your molar mass calculation in #1.
3. 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?
4. Write the balanced equation for the combustion of butane.
5. The heat of combustion for butane is 2859 kJ/mol butane. If all the heat from the
        combustion of the butane you collected was used to heat 20.0 grams of water at an
        initial temperature of 50°C, would the water reach the boiling point? Would all
        the water boil away or would some be left "unvaporized"?   You must show
        calculations to support your answers.   (The heat of vaporization of water is
        40.7 kJ/mol.)

CONCLUSION: Explain the math used to determine the molar mass of butane.