Name:_____

Heat of Combustion of Butane Gas

Collect the following data/calculations as per class instructions:

mass pop can plus water	
mass empty pop can	
calculate mass of water being warmed	

mass of butane lighter before use	
mass of butane lighter after use	
calculate mass of butane consumed	

temperature of water before heating	
temperature of water after heating	

Calculations and Conclusions:

1. Calculate the heat of combustion of butane from the experimental results (Five distinct steps including writing equations – a combination problem!!)

2. Determine the heat of combustion using heats of formation from pg 799 (three distinct steps – includes writing the equation twice!)

3. Calculate the percent error in your heat of combustion determination experiment assuming that the answer from #2 is the accepted "theoretical value". Please note that you will need to use absolute values for this comparison.

4. Calculate the percentage efficiency of the warming of water using the combustion of butane. Why is your percentage efficiency less that 100%? Give reasons!

5. Outline all sources of error in this experiment. Suggest possible improvements.

6. Using your experimental value from #1 (not the theoretical value from #2) and the heats of formation for $CO_2(g)$ and $H_2O(l)$ from page 799, determine the heat of formation for butane. (This is a heat summation problem.)

7. Calculate the percent error in for your heat of formation versus the accepted "theoretical value" from page 799.

8. Why is your percentage error answer for #7 so much worse than you answer for #3?

USEFUL FORMULA:

$$\% \text{ error} = \left| \frac{|\text{experimental value} - \text{theoretical value}|}{\text{theoretical value}} \right| \text{ x } 100\%$$

$$\% \text{ efficiency} = \frac{\text{heat produced}}{\text{heat expected}} \text{ x } 100\ \%$$