Heat of Combustion Lab Calculations Names: **MOCK DATA**

_____

Chemistry Date: _____ Hour: _____

Complete answers will show work, be labeled with the proper units and rounded according to the rules of significant figures. Refer to the introduction and the prelab calculations for formulas and help.

Data Table

Data Required	**Team 1: Paraffin**		**Team 2: Ethanol**	
Initial mass of fuel (m_i) & Final mass of fuel (m_f)	m_i	m_f	m_i	m_f
Mass of fuel burned *Initial fuel mass - Final fuel mass*	**0.36**		**10.07**	
Mass of can & water ($m_{c\&w}$) & Mass of can (m_{can})	$m_{c\&w}$	m_{can}	$m_{c\&w}$	m_{can}
Mass of water *can & water mass - empty can mass*	**100.01**		**97.81**	
Final/peak Temperature (T_f) & Initial Temperature (T_i)	T_f	T_i	T_f	T_i
ΔT *Change in Temperature* *Final Temperature - Initial Temperature*	**20.8**		**20.1**	

Post-lab Calculations (*Use your prelab to guide you through the calculations)*

1. _____ grams of fuel was completely combusted to heat up _____ grams of water. The initial temperature of the water was _____ ℃ and peaked at _____ ℃. Calculate the amount of heat that has been absorbed by the water in **kilojoules** for each fuel source.

Paraffin	Ethanol
Answer: _____	Answer: _____

2. Using your answer from question 1, determine the amount of heat energy released from the combustion reaction in kilojoules. *Hint: Use LOCOE! Show all work and include units!*

Paraffin	Ethanol
Answer: _____	Answer: _____

3. Calculate the heat of combustion (kJ/g) of the fuel using the answer you calculated in calculation #2 and the mass of the fuel that was combusted. *Show all work and include units!*

Paraffin	Ethanol
Answer: _____	Answer: _____

4. Calculate the percent efficiency of each fuel using the efficiency formula. The formula for percent efficiency can be found in the prelab. Show all work and include units!

Paraffin (accepted value: - 41.5 kJ/g)	Ethanol (accepted value: - 30.0 kJ/g)
Answer: _____	Answer: _____

5. Calculate the number of moles of fuel that were combusted. *Show all work and include units!*

Paraffin (chemical formula: $C_{25}H_{52}$)	Ethanol (chemical formula: C_2H_5OH)
Answer: _____	Answer: _____

6. Calculate the molar heat of combustion (kJ/mol). *Hint: use $q = mol\Delta H$*

Paraffin	Ethanol
Answer: _____	Answer: _____

7. Is the combustion of these fuels (paraffin and ethanol) exothermic or endothermic? How do you know?

8. Based on your calculation from number 4, which fuel is more efficient? How do you know?

9. In calculating the heat of combustion of your fuel, you assumed that all thermal energy from the burning fuel went to heating the water. Was this a good assumption? Explain.

10. Balance and incorporate the heat term (*molar heat of combustion from #6*) for the following thermochemical equations for the complete combustion of paraffin ($C_{25}H_{52}$) and ethanol (C_2H_5OH).

$$\_\_\_\_\_\ C_{25}H_{52} + \_\_\_\_\_\ O_{2(g)} \rightarrow \_\_\_\_\_\ CO_{2(g)} + \_\_\_\_\_\ H_2O_{(g)}$$

$$\_\_\_\_\_\ C_2H_5OH + \_\_\_\_\_\ O_{2(g)} \rightarrow \_\_\_\_\_\ CO_{2(g)} + \_\_\_\_\_\ H_2O_{(g)}$$

11. How many moles of ethanol must be burned to release 271 kJ of energy? *Hint: use stoichiometry/dimensional analysis.*

Answer: _____

12. If 343 kJ of heat energy was released into the surroundings, how many grams of oxygen gas was consumed during the combustion of paraffin? *Hint: use stoichiometry/dimensional analysis.*

Answer: _____