Heat of Combustion Lab Name: _____

In this lab, you will measure the heat of combustion (H_c) for paraffin (candle) wax, butane, and Cheetos. You will use a simple aluminum can style calorimeter, remembering the 1st law of thermodynamics: the heat lost by the fuel equals the heat gained by the water to which the heat is transferred.

Procedure

part 1, H_c for paraffin: Assemble soda can calorimeter as was shown in class. Weigh ca. 100 mL of cold water, pour into calorimeter. Record mass of candle. Place candle directly under calorimeter. Record initial temp. of water. Light candle & allow to burn for about 5 minutes. Carefully extinguish candle. Record highest temp. reached by the water. Wait for candle to cool, and record its final mass.

part 2, H_c for butane: Reset calorimeter with ~50 mL cool water. Record mass of a butane lighter. Use lighter to warm the water for about 1 minute. Record highest temp. reached by the water. Record final mass of lighter.

part 3, H_c for Cheetos: Reset calorimeter with ~50 mL cool water. Impale a Cheeto on the nail mounted to the wooden block. Record this mass. Ignite Cheeto with a bunsen burner & place under calorimeter (* if Cheeto goes out, relight it w/ the bunsen burner). Record highest temp. reached by the water. Record final mass of Cheeto/nail/block assembly.

Data/Calculations

part 1

mass of water: _____

specific heat of water (J/g˚C) 4.184

initial T of water: _____

final T of water: _____

ΔT of water: _____

q gained by water (J): _____

initial mass of candle: _____

final mass of candle: _____

mass of paraffin burned: _____

H_c of paraffin (kJ/g): _____

part 2

mass of water: _____

specific heat of water (J/g˚C) 4.184

initial T of water: _____

final T of water: _____

ΔT of water: _____

q gained by water (J): _____

initial mass of lighter: _____

final mass of lighter: _____

mass of butane burned: _____

H_c of butane (kJ/g): _____

part 3

mass of water: _____

specific heat of water (J/g˚C) 4.184

initial T of water: _____

final T of water: _____

ΔT of water: _____

q gained by water (J): _____

initial mass of set-up: _____

final mass of set-up: _____

mass of Cheeto burned: _____

H_c of Cheeto (kJ/g): _____

Analysis

Part 1. The actual H_c for paraffin is -41.5 kJ/g. Calculate your % error.

Part 2. The actual H_c for butane is on the table printed on your reference sheet, in units of **kJ/mol**. Recalculate your H_c for part 2 to match these units (butane = C_4H_{10}). Then, calculate your % error.

Part 3. The actual Hc for Cheetos is printed on the bag, in units of **Cal/g**. Recalculate your H_c for part 3 to match these units. Then, calculate your % error.

List several sources of experimental error: