**Calorie Lab**

**Background**

A **calorie** is defined as the quantity of heat required to raise the temperature of 1 g of water 1 ºC. The calorie is also equivalent to 4.184 J. When people say they are counting calories, they are actually counting kilocalories. There are 1000 calories in a kilocalorie. We can determine the number of calories in food if we are able to burn it and measure temperature change in water due to the burning food. It is a good idea to include nuts in a winter survival kit as there are many calories in nuts. You will discover today that they will burn for a considerable amount of time.

**Objectives**

-Calculate the number of calories in two different nuts.

-Convert calories into food calories or kilocalories.

**Materials**

Thermometer, pop can, ring, ring stand, nuts, pin, aluminum foil, Bunsen burner, matches, goggles

Sample Problem

1. You have 76.8 mL of water that is 20.2 °C and warms to a final temperature of 85 °C after a 7.54 g nut is burned to 5.45 g. How many calories are in that nut?

2. Determine the change in temperature of the water before and after the combustion of your nut.

∆ T = Final temperature – Initial temperature

∆ T = 85 – 20.2 = 64.8 ºC

3. Determine the heat that was absorbed by the water.

Q = m × s × ∆ T

M = mass

S = specific heat of water (4.184 J/g °C)

Q = 76.8g × 4.187 J/g °C × 64.8 ºC = 20,800 J

4. Convert joules into calories.

1 calorie = 4.184 J

28,800 J × 1calorie/4.184J = 6889.9 calories

5. Convert calories to kilocalories or food calories.

1000 calories = 1 food calorie

6889.9 calories × 1 food kilocalorie /1000 calories= 6.8 food calories

**Procedure**

1. Measure 70 mL of water, and place it in an empty pop can.

2. Take the initial temperature of the water in the pop can, and place it on an iron ring attached to a ring stand.

Initial Temperature of Water-

3. Place a pin through a layer of aluminum foil, and stick your nut on the end of the pin.

6. Light your nut on fire, and place it under the can as close as you can to the can.



Make sure the fire is close to the bottom of the can.

7. After your nut burns out you must take the final temperature of the water.

Final Temperature of Water-

**Data—Show your calculations**

1. Calculate the change in temperature of your water.

2. Calculate the heat absorbed by the water in the pop can that was given off by the nut.

3. Convert your joules into calories.

4. Convert your calories into food calories.

**Answer all of the analysis questions with complete sentences.**

1. What are some sources of human error in this lab?

2. Why did you light your nut on fire before placing it under the pop can?

3. Define specific heat, and what is the specific heat of water?

4. Why do nuts make a good food to store in a winter survival kit?

5.What was your job in the lab?