Flamin' Fritos

Introduction

In this lab, you will determine the number of Calories provided by each gram of Fritos and Cheetos. You will do this by burning the chip or cheese curl and measuring the amount of heat given off. Remember that heat is one of the many forms of energy. Heat can be calculated using the following equation:

$$q = mC\Delta T$$

where q is the heat, m is the mass, c is the specific heat (a measure of resistance to temperature change), and ΔT is the change in temperature. It is difficult to measure this amount of heat directly, so you will be using a calorimeter (basically a soda can filled with water). If you assume that the heat given off by the chip is equal to the heat absorbed by the water in the can above it, you can measure the mass of the water and its temperature change when heated by the chip. The specific heat of water is 1 cal/g°C. and 4.184 J/g°C

This means that it takes 1 calorie or 4.184 J to raise the temperature of 1 gram of water 1 degree Celsius.

Conversions: **1calorie = 4.184 Joules** **1000 calories = 1 Calorie (dietary Calorie)**

Materials

- 3 Fritos and 3 Cheetos
- empty soda can
- 2 paper clip
- ring stand
- iron ring
- matches
- balance
- Watch glass

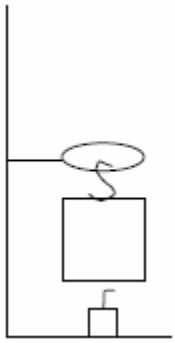

Figure 1: calorimetry apparatus

Procedure:

1. VERY CAREFULLY cut the top off a soda can and poke a hole in the aluminum near the top of the can. **Mass the can and place this value in the table.**

2. Fill the can ½ full of water. **Mass again and place this value in the table.**

3. Create the stand for the food using a paperclip, tape and the watch glass as shown in the prelab.

4. **Mass the food and holder using the 0.01 balance and record this mass in the table.**

5. Hang the can from the iron ring and adjust the height so the food item is just below the bottom of the can.

6. Take the initial temperature of the water and keep the thermometer in the water. **Record the initial temperature of the water in the table.**

7. Ignite the food item and allow it to burn. **Record the final temperature if the water.**

8. **Place the burnt food item and holder back onto the scale and record the value in the table.**

9. Empty the can when it is cooled and repeat the process twice more with fritos and then (3) times with Cheetos.

Frito Table

	Trial 1	Trial 2	Trial 3
Mass of can (g)			
Mass of can + Water (g)			
Mass of water only (g)			
Initial water temperature °C			
Final water temperature °C			
Change in water temperature °C			
Initial mass of food holder and Frito (g)			
Final mass of food holder and Frito (g)			
Mass of Frito burned (g)			

Calculations for Frito:

1. Heat absorbed by water (J) = Heat released by Frito. Use $q = mC\Delta T$ where: m = mass of water, C = specific heat of liquid water and ΔT is change in temperature of water.

2. Heat absorbed by water (calorie) = Heat released by Frito.
   Convert using 1 calorie = 4.184 Joules.

3. Heat absorbed by water (Calorie) = Heat released by Frito.
   Convert using 1000 calories = 1 Calorie

4. Heat (Calorie) per gram of Frito. Divide Calories by # grams of Frito burned

5. % Error. Calculate using $\frac{\text{Difference between your value and the Published value}}{\text{Published value}} \times 100$

Cheeto Table

	Trial 1	Trial 2	Trial 3
Mass of can (g)			
Mass of can + Water (g)			
Mass of water only (g)			
Initial water temperature °C			
Final water temperature °C			
Change in water temperature °C			
Initial mass of food holder and Cheeto (g)			
Final mass of food holder and Cheeto (g)			
Mass of Cheeto burned (g)			

Calculations for Cheeto:

1. Heat absorbed by water (J) = Heat released by Cheeto. Use $q = mC\Delta T$
where: m = mass of water, C = specific heat of liquid water and ΔT is change in temperature of water.

2. Heat absorbed by water (calorie) = Heat released by Cheeto.
Convert using 1 calorie = 4.184 Joules.

3. Heat absorbed by water (Calorie) = Heat released by Cheeto.
Convert using 1000 calories = 1 Calorie

4. Heat (Calorie) per gram of Cheeto. Divide Calories by # grams of Frito burned

5. $ Error. Calculate using $\frac{\text{Difference between your value and the Published value}}{\text{Published value}} \times 100$

Questions

1. Do you think this experiment would be appropriate for finding the number of Calories in every type of food? Why or why not?

_____

_____

2. What are (3) possible sources of error in this experiment?

_____

_____