

Calorimeter Lab

Name _____

Purpose:

To become familiar with "how big" a calorie is and determine how many calories are in certain foods.

Collect Information:

People talk about calories, count calories and cut calories from their diet. But just what is a calorie? Calorie is defined as the amount of energy needed to increase the temperature of one gram of water (that's not much) by one degree Celsius (again - that's not much).

Because of regulations by the FDA, one bit of information food manufacturers must reveal on packages is how many calories are contained in the food. In order to do that they use some sophisticated equipment. Essentially though they take the food (a cracker, piece of cake, hamburger, carrot stick, or whatever) and burn it. All of the heat that the food gives off while burning is directed toward a container of water. Then they take the number of grams of water and multiply it by how much the temp of the water increased. This gives them how much energy (calories) was given off by the food item. The more calories that the food item contains, the hotter the water gets.

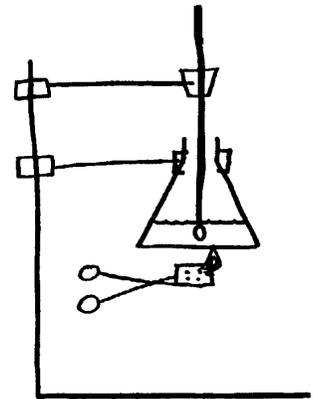
Hypothesis:

I think the low fat crackers will give off _____ calories.

I think the high fat crackers will give off _____ calories.

Test It:

1. Record the mass of the crackers in the data table.
2. Set up the lab equipment as shown in the diagram. Note that the end of the thermometer DOES NOT touch the bottom of the flask.
3. Put 20 ml of water in the flask. Record the initial temperature of the water in the data table.
4. Use the bunsen burner to get the food to burn. It is important to keep it burning continually as much as possible.
5. As soon as the food is completely burned, record the temperature of the water.
6. Repeat the steps using the other food items. Make sure you start with fresh water each time.



| Types of Food | Mass of Food | Initial water Temp | Final Water Temp | Mass of water | Change in water temp | # of calories produced | # of Calories per gram of cracker |
|-----------------|--------------|--------------------|------------------|---------------|----------------------|------------------------|-----------------------------------|
| Low Fat Cracker | | | | | | | |
| Regular Cracker | | | | | | | |

Conclusions:

- List three uncertainties (sources of error) in this lab.
- Which type of food gave off the most heat energy per gram?
- Define calorie in your own words.
- Two foods were burned in a calorimeter. The following data is collected. Which would provide a person with more energy? (Show your work!)

Food A

mass of water = 250 g
 initial water temp = 25 °C
 final water temp = 32 °C

Food B

mass of water = 100 g
 initial water temp = 25 °C
 final water temp = 38 °C

- How do we get energy out of the food we eat?

Determine what the relative deviation. Relative Deviation = _____ + or - _____ cal/g of cracker

| | |
|--|--|
| Group Calculations for calories per gram of cracker (Add them together and put total at bottom) | Determine the difference between each groups calculation and the mean. (Add them together and put total at bottom) |
| Group 1 = _____ cal/g of cracker | Difference = _____ |
| Group 2 = _____ cal/g of cracker | Difference = _____ |
| Group 3 = _____ cal/g of cracker | Difference = _____ |
| Group 4 = _____ cal/g of cracker | Difference = _____ |
| Group 5 = _____ cal/g of cracker | Difference = _____ |
| Group 6 = _____ cal/g of cracker | Difference = _____ |
| Group 7 = _____ cal/g of cracker | Difference = _____ |
| Group 8 = _____ cal/g of cracker | Difference = _____ |
| Group 9 = _____ cal/g of cracker | Difference = _____ |
| Group 10 = _____ cal/g of cracker | Difference = _____ |
| Group 11 = _____ cal/g of cracker | Difference = _____ |
| Total = _____ cal/g of cracker | Total Difference = _____ |
| Take the amount from above and divide it by the number of groups. This is the <i>mean</i> . | Now divide this number by the number of groups This is the acceptable deviation. |