Purpose:    Determine the amount of stored energy in a cheeto that can be converted into thermal energy. Use known specific heat value of water to determine calories per serving of various snack foods.

Procedure: Hint: Words in **bold** indicate values you’ll have to measure, calculate and record in your data table.

1.  Measure out between 100 ml to 150 ml of water.  It really doesn’t matter how much, as long as you know the exact amount, so the math works out when you plug into the equation.

2.  Convert ml to grams. (remember the density of water is 1g/ml). Record as **mass (g) H2O**

3.  Set up the ring stand and soda can apparatus. See drawing.

4.  Skewer the cheeto with an unfolded paperclip.

5.  Record the **initial temperature of water**.

6.  Carefully light the cheeto on fire and position the flame under the can.

7.  Watch until the thermometer rise to it's greatest value. This is the **final temperature**. Make sure the Cheeto completely burns -you may have to relight the cheeto.

8. Repeat with other food products.

Data Table:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cheeto | Pork Rind | Pretzel |
| 1. Mass(g) H2O |  |  |  |
| 1. Initial Temp of Water °C |  |  |  |
| 1. Final Temp of Water °C |  |  |  |
| 1. ΔT= Tf-Ti |  |  |  |
| 1. Food energy Joules (J) |  |  |  |
| 1. Food energy kilocalories (kCal) |  |  |  |
| 1. Experimental Kilocalories in a serving |  |  |  |
| 1. Real Values of kilocalories in a serving according to nutritional label | 150 Calories per 13 piece serving | 80 Calories per 5 piece serving | 110 Calories per 17 piece serving |
| I) % Error Calories per serving:  Experimental (g)– Real Values (h) x 100  Real values (h) |  |  |  |

Analysis:

1. Determine the amount of heat given off by the cheeto, pork rind and cashew.  This means, determine how much heat was received by the water.

**Qwater = mwater x Cwater x T**

**m = mass of water in grams**

**C = Specific heat of water (4.186 J/g**°**C)**

**T = change in temp of water in soda can (Tfinal-Tinitial)**

Using **Qwater = mwater x Cwater x T,** show your work below each of the three foods. Record values as **food energy in Joules**

|  |  |  |
| --- | --- | --- |
| Cheeto | Pork rind | Pretzel |

2. Show your work. Convert Joules to calories (4.18 Joule= 1 calorie)

|  |  |  |
| --- | --- | --- |
| Cheeto | Pork Rind | Pretzel |

3.  Convert your calories to kilocalories Keep in mind, 1000 calories= 1 Calorie = 1 kilocalorie. Record in your data table as **food energy in kilocalories. Show your work**

|  |  |  |
| --- | --- | --- |
| Cheeto | Pork rind | Pretzel |

4.  Multiply the kilocalories by the serving size indicated on the nutritional labels..

Record in your data table as **experimental kilocalories in a serving**. (Show your work)

Cheetos multiply by 13 pork rind, multiply by 5 Pretzels multiply by 17

|  |  |  |
| --- | --- | --- |
| Cheeto | Pork rind | Pretzel |