Energy in a Snack (Calorimetry) Lab

Purpose: To calculate the energy in a snack by empirical evidence and compare to posted values. The idea is to burn the snack (literally) and capture the heat given off in a sample of water of known mass, contained in a soft drink can, suspended from the tab on a stir rod or pencil hung across a ring clamp above the burning food sample. It is best if the food sample is held above a cork by a paper clip. The change in mass of the food sample before and after burning must be determined in order to calculate the calories per serving. At least 3 trials should be performed and averaged together at the end. Students should include all error and uncertainty calculations as specified in posted presentation.

Formula: $mc\Delta T = q$
m = mass of water (g)
c = specific heat of water (a constant); either 1cal/(g °C) or 4.184 J/(g °C)
ΔT = temperature change (°C) (How do you get the *change* in temp.?)
q = heat energy, expressed in calories or Joules, depending on which constant used
Note: 1000 calorie (cal) = 1 kilocalorie = 1 Calorie (food label)
1 cal = 4.184 J

Data Table

Snack type:	Trial 1	Trial 2	Trial 3
Initial mass with cork & paper clip (g)			
Final mass with cork & paper clip (g)			
Mass Burned (initial – final) (g)			
Volume of water in can, mL			
Initial temperature of water, °C			
Final temperature of water , °C			

Show work and answers for all trials of all calculations.

1. Mass of water heated in grams
2. Temperature change in the water:
3. A. What is the energy absorbed by the water for the snack in calories?
   B. How many Calories did the water absorb? 1000 cal = 1 Cal
4. How many grams of food were burned?
5. Calculate the Calories per gram burned for the snack.
6. What is the serving size in grams from the package label?
7. Calculate how many Calories of energy were released per serving of food burned. Next, average the three trials for this answer before proceeding.
8. How many Calories per serving of this food are listed on the package label?
9. Calculate the percent error. Use the package label of Calories per serving as the accepted value (Question #8) and the experimental value calculated in question #7.

$$\frac{\text{Accepted value} - \text{experimental value}}{\text{Accepted value}} \times 100 = \%\ \text{error}$$

10. What can account for the percent error in a Calorimeter lab?

Don't forget to write a thoughtful, complete conclusion, including error analysis.