

## Thermo-chemistry Lab: The Heat Content of Doritos

**Objective:** To experimentally determine the number of Calories in one Doritos chip and to compare our measured result to the actual number of Calories the chip has.

**Procedure:** using the diagram on page 2 to set up your ring stand and connect a glass rod to your can and suspend it above the table as shown. You will need a piece of aluminum foil approximately 6 x 6 inches. Metal tweezers will be needed also.

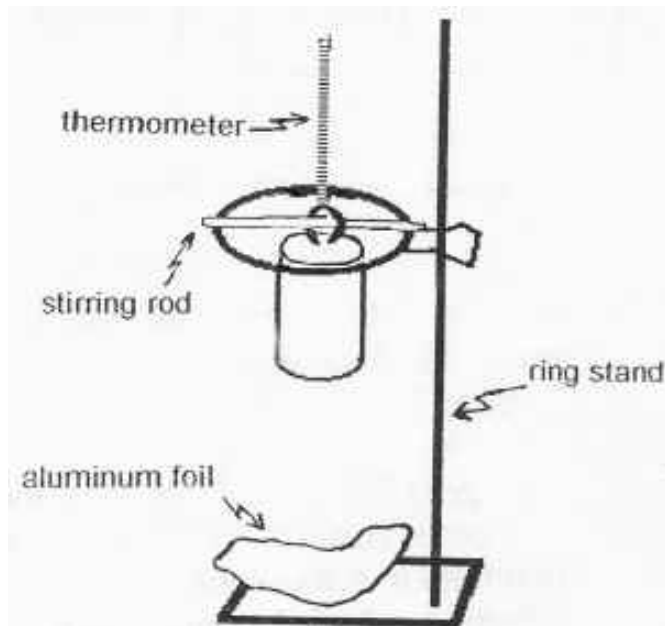
**NOTE:** Do not heat the water in the can with the Bunsen burner. This Bunsen Burner is not in the diagram because it should not be near the can.

1. Find the mass of your dry can.
2. Add approximately 100 mL deionized water. Use a graduated cylinder & funnel.
3. Mass the can with the water.
4. Prepare set up as shown in the diagram.
5. Measure your initial water temperature. 3 significant figures.
6. Mass your chip on the balance.
7. Get a metal tongs or tweezers to hold the chip. NO PLASTIC covered tongs!
8. Set chip on fire and IMMEDIATELY move the burning chip under the can to heat the water up. Partner number 2 shuts the Bunsen burner off for safety. Partner number 2 then holds the foil up to direct some heat upwards and to catch any chip that falls away.
9. Record the HIGHEST water temperature.
10. When chip ash cools off throw it away.
11. Wipe off the thermometer and tools, including the can. The black soot on the can will stain your hands, be careful. Clean lab area.

YOUR LAB REPORT	PARTS TO EACH SECTION	POINTS
cover page	Title and descriptive introduction	1 + 1
2	data table (create your own, neat)	2
3	calculations and problems	2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 + 2 = 18
4	<p style="text-align: center;">conclusion</p> What was the general plan of the lab. What then did you measure and calculate to figure this all out. What was your percent error, and explain it. What can you conclude about calorimeters made from cans, and from expensive materials?	3
Lab due on: _____		Total points: 25

CALCULATIONS (8 x 2 = 18 points):

1. Determine the amount of heat gained by the water from the burning chip. Use heat formula and use correct units.
2. Convert that number of joules in question one into Calories (kcal). Remember that FOOD CALORIES are really kilo calories, 1 C = 1000 cal, or 1 C = 1kCal and that 4.18 Joules = 1 calorie). This is your measured value of Calories.
3. The nutritional information provided by the Doritos states that 28 g = 150 C. Determine how many Calories were in your chip. This is your actual value of Calories.
4. Determine your % Error for this experiment - number of Calories absorbed by the water vs. the number of Calories that are really in your particular chip.
5. Explain your error. Be sure to recognize if your error is under or over and make sure your explanation reflects this.
6. Explain why a bomb calorimeter would have a much smaller % Error than the one you just created. What's different between our can "calorimeter" and a real one?
7. Convert 150 Calories (the energy in one serving of Dorito's chips) into calories, Joules, and Kilo-Joules are in one serving of Doritos.



Number 8 & 9 are thermochem problems that are unrelated to the lab you just did.

8. If you have 50.0 grams of solid ice at 273 K and it gets warmed to a soothing 318 K so that you can soak your achy feet in, how much energy is needed to do this? (hint, 2 steps)
9. Calculate the energy in joules required to change 1.25 liters of pure water at standard pressure into steam at 373 K, if it starts out at a relatively cool 292 K. (hint, this is another 2 step problem, and turn liters into mL, then into grams first)