New Paltz High School
Science Department

Name:……**Due Date**……..

Lab Title:…*Death of a Cheesy-poof*…….. **Lab #**:……..

Lab Partners:……

Your Lab Score will be based on the following:

Neatness: All labs must be **well-written and done in pencil** unless directed otherwise. There are to be no cross-outs or misspelled words. Questions should be answered in complete sentences.

Accuracy: Certain **questions will be checked** for accuracy.

Completeness: All questions are to be answered completely. There are to be **NO BLANKS** or incomplete sections.

Lab Class Procedure: You are to **follow directions** and use lab equipment properly, work for the entire period, and follow proper clean-up procedures

Rubric:

Lab Score Category	Points Earned
Neatness	0 1
Accuracy	0 1 2 3 4
Completeness	0 1 2 3
Lab Class Procedure	0 1 2
Total Lab Score	0 1 2 3 4 5 6 7 8 9 10

You are to submit all lab material with this lab report:

Comments:

Mr. Ulrich
Regents Biology

Death of a Cheesy Poof

A Laboratory Experiment

Problem: How many calories per gram does the average cheesy poof contain?

Background Information:

Would you believe that a single cheesy poof contains enough energy to allow a 65–kg person to bicycle for two minutes? Or that the same cheesy poof will burn two minutes after being ignited by an ordinary match? In this experiment you will determine just how much energy is in a single cheesy poof using a simple calorimeter.

There is energy involved in the bonds holding atoms together into molecules. Often (but not always) when the atoms in a molecule are forced apart, the energy in the bonds is released to do other things such as send the atoms banging into other particles (heat) or released as radiation (light, etc.). Fat and gasoline are examples of molecules that release energy when broken down.

Oxygen is a molecule involved in some chemical reactions that break up these large molecules, releasing energy. We call this combustion or burning if it happens quickly. In your cells, the burning is much slower, and energy is released more slowly, but oxygen is still needed. We call this "slow burning" **cellular respiration.**

Calories are the units we measure energy in just like meters are the units for distance. When we talk about food having 100 calories, we are talking about how much energy is stored in the food. You need a certain number of calories each day to run all the processes in your body. Fats contain the most energy; hence they are highest in calories. **One calorie is the energy needed to raise 1 g of water 1 degree Celsius.** We will use a water to trap the heat of burning food in water.

IMPORTANT FORMULAE

Calculate the number of **calories** using the following formula:

Number of calories = # of degrees the temperature rose X mass of water

Calculate the number of **calories per gram** using the following formula:

Number of calories per gram = # of calories/mass of food that was burned

Pre-lab Questions: Please, answer the following.

1. How many calories would you guess are in a cheesy poof?

2. Why does a candle go out when a jar is placed over it?

3. Why do we breathe oxygen? What cellular process uses the oxygen?

Procedure:

What you'll need:

- Nasty, carbonized beaker
- Beaker tongs
- Paper clip
- Mr. Ulrich to provide you with matches
- A cheesy poof
- Celsius thermometer
- Stirring rod

How you'll do it (Use the data table provided to organize your data.):

1. Determine and record the mass of the paper clip (in grams)
2. Bend the paper clip into a "cheesy poof stand".
3. Mercilessly (but carefully) impale the sacrificial cheesy poof on the cheesy poof stand so that it is suspended over the lab table.
4. Determine and record the mass of the sacrificial cheesy poof and the paperclip. (Use this data to determine the weight of the sacrificial cheesy poof alone.)
5. Determine and record the mass of the nasty, carbonized beaker. Don't touch the outside. It's nasty!
6. Measure 50 mL of H_2O into the nasty, carbonized beaker using a graduated cylinder.
7. Determine and record the mass of the nasty, carbonized beaker with the 50 mL of H_2O. (Use this data to determine the weight of the H_2O alone.)
8. Determine and record the initial temperature of the water in degrees Celsius. ***Take the thermometer out of the beaker!***
9. **Put on your safety glasses!**
10. Choose one partner to be *The Executioner.* This person's job is to safely ignite the sacrificial cheesy poof. This person may also wish to thank the sacrificial cheesy poof for offering up its body for the furthering of scientific knowledge.
11. The other partner will be the *Grand Collector Of Released Energy* or G-CORE for short. This person's job is to use the beaker tongs to hold the nasty, carbonized beaker of water over the cheesy poof once it has been ignited. The G-CORE's job is not over until the cheesy poof has completely burned and all of the energy available for combustion in the cheesy poof has been released and absorbed by the water (as well as some other things perhaps!) in the form of light and heat.
12. Give the heated water a quick stir with the stirring rod and determine and record the final temperature of the water in degrees Celsius.
13. Use all of your recorded data to determine and report the number of calories in your sacrificial cheesy poof as well as the calories **per gram** of cheesy poof. Use the important formulae from the first page.
14. Get data from two other groups and determine average calories per cheesy poof as well as calories **per gram** of cheesy poof.

Did *YOU* remember to use the data table and the formulae?

Data:

Cheesy poof #	Mass of paperclip (g)	Mass of paperclip + cheesy poof (g)	Mass of cheesy poof (g)	Mass of empty beaker (g)	Mass of beaker + H_2O (g)	Mass of H_2O (g)	Initial H_2O temp (^oC)	Final H_2O temp (^oC)	Temp change (^oC)	**calories in cheesy poof** (cal)	**Calories per gram of cheesy poof** (cal)
1 group:											
2 group:											
3 group:											

Average calories in a cheesy poof = _____

Average calories per gram of cheesy poof = _____

More on the back

Analysis: Please, answer the following in complete sentences in the space provided

1. How close was your prediction of the cheesy poof's caloric content to your determined value?

If your determined caloric content was way off, that's OK. What you think of as a calorie and what dieticians at the USDA report on food labels are actually *kilo*calories. Remember, the prefix kilo means 1000. This means:

1 kilocalorie (Kcal or Cal) = 1000 calories (cal)
or
1 dietary Calorie = 1000 chemical calorie

2. Notice how dietary Calories are written with a capitol "C" and chemical calories with a lower-case "c". How many dietary Calories did you determine to be in the average cheesy poof? Now compare this to your initial prediction. Closer?

3. Was *all* of the energy contained in the cheesy poof released? What evidence do you have that combustion was incomplete?

4. Was the G-CORE able to collect *all* of the energy released from the cheesy poof (Did *all* of the energy from the cheesy poof make it into the water)? Identify at least three different things also absorbed the heat released?

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5. Write a definition for cellular respiration.

6. Observe someone in your lab group. What can you observe that indicates cellular respiration is occurring in them?

7. Mr. Guggenheim wants to find the best wood to burn to heat his home. Describe how you could use the calorimeter you used in this lab to help him solve his problem.

8. Since you don't need all this energy right away, how does your body store the energy for later use? (Do some research to try to track down the answer.)