

## Calories = Energy Lab

### Introduction:

Let's imagine that you are not only hiking through the woods but backpacking. Backpacking is a special kind of hiking where you carry with you the bare essentials to survive; a tent, a sleeping bag, a few warm clothes for the nighttime, a flashlight, a lighter or matches, water and a few basic foods. Usually, backpackers like to go places where most people don't take the time or energy to find. Today, while you're backpacking miles from any sign of civilization, you come upon an abandoned cabin in the woods. There are only a few things left: old cans, some small skewers, a basic sewing kit, a couple of corks from empty bottles, a thermometer and for some reason- bags of different kinds of nuts; peanuts, walnuts, pecans, cashews and almonds.

You have packed your pack very carefully and you only have room and weight available for one of the bags. You're not a picky eater so taste doesn't concern you. What does concern you is the caloric value of these nuts, that is, how much energy you can get from these nuts. The more energy you get from the nuts the longer you can backpack to reach the remote lake 20 miles away.

To measure the caloric value of nuts we can use calorimeters. A calorimeter is a device used to measure the amount of energy in a substance. You will be constructing your very own calorimeter based on your instructor's good homemade example. We are going to use some of the objects from the cabin to figure out how much energy the different nuts have in them. Once we figure out their energy potential, you then will pick the type of nut to take with us for the rest of the trip. Is there a method we can figure out their caloric value using these items? This is your challenge. Good Luck.

### Some Helpful Hints:

The specific heat of water – the energy required to heat one gram of water one degree Celsius is  $4.184 \text{ J g}^{-1} \text{ K}^{-1}$ .

1 mL of water = 1 gram of water. **Energy = mass x specific heat x change in T.**

You will want to document your successful calorimeter by drawing a diagram of your invention. You will also want to document the amounts of energy from the different nuts tested so you can pass on the information to other backpack enthusiasts.