

## Food Energy

Last week, we learned about chemical energy and observed the amount of energy produced by chemical reactions. This week we will learn about energy stored in food, which is another form of chemical energy. Last week, we talked about how we can burn coal to produce heat in power plants. When we burn coal, we are breaking down the chemical bonds to produce heat. When we eat food, our bodies are able to break down the chemical bonds in the food so that we have energy to (live,) regulate temperature, breathe, eat, pump blood, move, taste, etc.

Main lesson points:

- People get energy from food
- Food has stored (chemical) energy that is measured as calories
- There are different ways to store energy in food -- for example, as starch or sugar

Materials:

- 1 pencil per student
- Crayons/color pencils for group to share (red, brown)
- 1 Food energy worksheet per student
- 3 small cups per group
  - 1 with iodine
  - 1 with water
  - 1 with water + constarch
- 1 stick per student
- Potato, apple, carrot, cereal (~1 piece of each per student)
- Bowl/plate
- 1/2 cup milk + 1/2 teaspoon vanilla + 1 tablespoon sugar per student
- 4 cups crushed ice + 4 tablespoons salt per student
- 2 quart size Zip-loc bags per student
- 1 gallon size Zip-loc freezer bag per student

### Burning Food Demonstration (10 mins)

#### Materials for Demo

2 large beakers  
2 pieces of foil, bent to form a "peanut stand"  
2 small glass beakers  
2 clamp stand with clamp to hold small beaker over large beaker  
2 Thermometers (thermocouples would be great for this)  
Some water  
Some peanuts and cheerios

We will assemble two simple calorimeters (unfortunately, they will not be "the bomb"), and will attempt to burn both cheerios and peanuts to release heat energy. The assembly should be pretty obvious, but you might have to play around with the height of the little beaker to get a good burn.

Ask the kids which has more energy: peanuts or cheerios? How can they tell? Hopefully, they will say that you can look at the label. How do they figure out what to put on the label? Explain that burning food is very similar to what your stomach does: it breaks down chemical bonds. So, food that burns more has more bonds and therefore more energy. Light both of them and have a kid monitor each of the thermometers to see which beaker of water gets hotter. See if you can get the kids to think of other foods with lots of calories.

### **Starch in Food Experiment (20 mins)**

Many foods have starch in them – starch is one of the basic energy sources for most people. What foods have starch in them? We can try and find out by using iodine. Iodine mixes with starch in foods and turns them a purplish color. If the food does not contain starch, the iodine will remain its reddish color.

#### Procedure:

1. First we'll see what it should look like – put some water in a cup and mix in iodine. Put some cornstarch in a cup with water and add iodine. Compare the two colors.
2. Put the foods into a bowl (we have potatoes, apples, carrots, and cereal)
3. Using the eye dropper or sticks, try applying iodine to each food and see what color shows up
4. Note down your observations and compare to the cups of water and iodine. Which foods have starch?