

Burning Peanuts Laboratory:

Lisa Morine

Teacher's Guide

Goals

- To learn about the energy content of food
- To learn about energy transfer

The Laboratory

In this laboratory, students burn a peanut, and use the heat that it gives off to heat a can of water. Thus, they learn about the energy content of food and about energy transfer processes. This makes it easier to understand the meaning of calories and energy.

Materials for Each Group

- Electronic balance—one for all
- Several peanuts
- A piece of wire
- Cork stopper to hold wire
- 4"x4" aluminum foil to protect cork from the fire and a sheet of aluminum foil to work on
- Two empty tin cans
- 250 ml graduated cylinder
- A stand with ring clamp
- A thermometer
- Matches
- Tap water

SAFETY

Wear goggles at all times during the laboratory period.

Take extra care when working with fire.

Stay away from flammable liquids (alcohol, ethers, acetone, etc) and do not touch hot parts with bare hands.

Work on a sheet of aluminum foil to avoid burning the bench-top.

Lecture Notes

What does calorimetry mean? We are looking for how many calories: that's the unit of heat energy.

We are going to find out how much heat it (the peanut) releases and calculate how many calories it has. And calorie is just a fancy way of saying potential energy.

When we eat the food, it goes into our stomach, we digest it, and when the bonds break they release energy.

Burning Peanuts Laboratory: Teacher's Guide, page 2

When you measure the volume of the water, be careful. You are going to use the electronic balance to measure the mass of a whole peanut.

See how the peanut catches on fire? That's because it has a lot of energy.

Teaching Tips From Ms. Morine

This exercise is supposed to help students understand that there's energy in food. It is stored energy—potential energy—and this one exercise uses pure liquid water to help calculate a heat change seen when you burn something. A combustion. There is a similar reaction in our body, we burn the food out in combustion, but we don't use a match, we use enzymes. In today's experiment, they used a match, they burned the peanut, and they measured the temperature change in the water. It made it very real to them, that food contains energy.

Comment

You could use different sources of food, not just peanuts, burn them, and compare to food content tables to learn what's in them—see these sites:

http://www.hoptechno.com/nightcrew/sante7000/sante7000_search.cfm
Use the Search form to find contents of foods.

<http://www.fda.gov/opacom/backgrounders/foodlabel/newlabel.html>
An interactive food label from the FDA.

Also, it may be interesting to learn how the body does the “combustion” process within living cells, and how it uses up the energy by some biochemical cycles of the food groups (carbohydrates, fats, etc)—see any book about biochemistry.

References: Links

http://www.sciencebyjones.com/energy_content_of_food.htm
A lab procedure for the calorimetry of foods.

<http://ag.arizona.edu/pubs/health/az1128.pdf>
A fact sheet on the calcium and calorie content of foods.