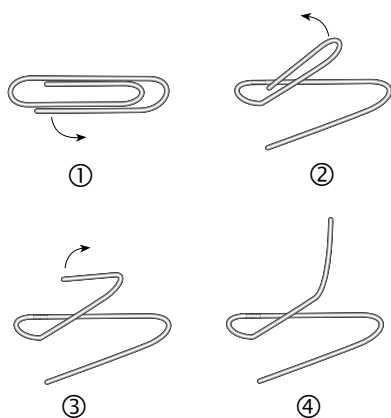


Calories in Snack Foods

Athletes need a lot of energy to compete in sporting events. This energy comes from the foods they eat. Foods high in fat are also high in energy. The measure of energy in food is the calorie. Many snack foods are particularly high in calories because of high fat content. In this activity, students discover how much energy is present in cheese snacks.

Stuff You'll Use: ▶Cheez-It® crackers or cheese ball snacks ▶square piece of aluminum foil (10 cm x 10 cm) ▶paper clip ▶balance ▶100-mL graduated cylinder ▶water ▶empty soft-drink can ▶ring stand ▶three-pronged clamp with 6.3-cm (2½-inch) grip size ▶alcohol or metal cooking thermometer ▶matches or lighter

What to Do:



- 1 Fold the edges of the foil square up to make a small tray.
- 2 Make a small stand out of the paper clip as follows. (See figure at left.)
 - a. Lay the clip on the table. Make the base of the stand by bending the outermost end out, horizontally to the table.
 - b. Bend the inner loop up to about 45°.
 - c. Bend the innermost (short) end up, vertically, so that the end is pointing straight up.
- 3 Use a graduated cylinder to measure 100 mL tap water. Pour the water into the soft-drink can.
- 4 Fasten the can into the three-pronged clamp on the ring stand.
- 5 Place the thermometer in the open can top and measure and record the initial temperature of the water.
- 6 Determine and record the mass of the cheese snack.
- 7 Impale the cheese snack on the straight vertical end of the paper-clip stand and put the cheese snack with its stand onto the aluminum tray.
- 8 Place the tray containing the cheese snack assembly on the base of the ring stand underneath the can and lower the clamp so that the bottom of the can is about 4–5 cm above the cheese snack. Arrange the setup so that the cheese snack is centered directly under the suspended can.
- 9 Ignite the cheese snack and allow it to burn.
- 10 When the cheese snack is finished burning, gently stir the water with the thermometer and record the maximum temperature reached.
- 11 Using the formula below, calculate the number of calories absorbed by the water in the can:
$$100 \text{ mL water} \times 1.0 \text{ g/mL} \times \text{rise in temperature (}^\circ\text{C)} \times 1.0 \text{ calorie/g degree} = \text{number of calories}$$
- 12 Divide this number by 1,000 to obtain the amount of nutritional Calories in the cheese snack.

Important...

Light the snack as quickly as possible and extinguish the match properly. Do not touch the cheese snack or tray during burning.



How It Works:

In this experiment, the fat and other food components of the cheese snack burn when the snack is ignited. The products of this process are carbon, carbon dioxide (CO_2), water, and heat. Most of the heat energy will be transmitted to the can of water, and thus will raise the temperature of water. However, measuring the temperature change of the water gives only a rough estimate of how much energy the cheese snack contained because some of the heat is lost to the air and the metal can.

In this activity, it's important to understand the difference between scientific calories and nutritional (food) Calories (with a capital "C"). In this activity, you measured scientific calories. A scientific calorie is the amount of heat needed to raise the temperature of 1 gram of water 1 Celsius degree. This unit is so tiny that to avoid using very large numbers in describing the energy content of food, nutritionists use the kilocalorie (1,000 calories) as their unit of Calories. This is why you divided the results by 1,000 in step 12 to get results in food Calories. So when you gobble that snack containing 100 Calories, you're really consuming 100,000 scientific calories.

More Fun?

Learn more about the properties of fats. Terrific Science Press (www.terrificscience.org/sciencestore) offers the following books that include activities involving the science of fats and the foods we eat:

- ▶ [*Fat Chance: The Chemistry of Lipids*](#)
- ▶ [*Science Fare: Chemistry at the Table*](#)

