

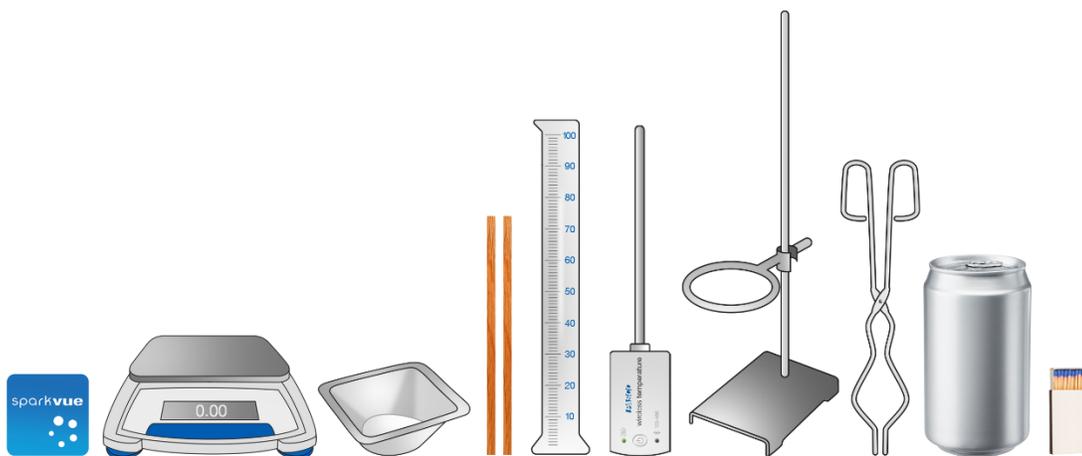
## 4C – ENERGY FROM FOOD

### INQUIRY

How much energy is stored in your food?

### MATERIALS

- Device with SPARKvue software
- Temperature sensor
- Graduated cylinder, 100-mL
- Ring stand
- Iron ring
- Balance (readability: 0.01 g)
- Weighing dish
- Crucible tongs
- Wood splints (2)
- Paper clip
- Tape
- Matches
- Aluminum cans (3, same type)
- Aluminum foil
- Food items (chips)



### BACKGROUND

Chemical and physical processes either absorb heat from their surroundings or release heat into their surroundings. Energy comes in a variety of forms including light and heat. Food energy is calculated from the heat released when food is burned. Released energy is reported in kilocalories, or Calories. A Calorie is the quantity of energy it takes to raise the temperature of 1 kg of water by 1 degree Celsius. Food labels show how many Calories are available per gram of food. This energy is converted into a usable form by chemical reactions in the human body. The number of food Calories that you eat indicates the amount of energy made available to your body. In this lab you will experimentally determine the Calories per gram of food.

### SAFETY

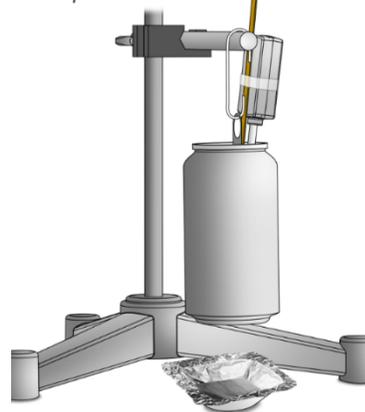
Follow these important safety precautions in addition to your regular classroom procedures.

- Wear safety goggles at all times.
- Tie back long hair, roll up long sleeves, and remove dangling jewelry.
- Never eat or drink in the lab even when working with food.

## PROCEDURE

1. Open SPARKvue.
2. Open the 04C Energy from Food lab file in SPARKvue.
3. Use the Bluetooth icon to connect the Temperature sensor.
4. Measure about 50 mL of water and record the exact volume used in Table 1 on your answer sheet. Pour the water into an aluminum can.
5. Tape one wooden splint parallel with the temperature sensor probe so the splint is 3-5 mm longer than the end of the probe. Place the sensor in the can. The probe should only be contacting water, not the can. The splint should be resting on the bottom of the can.
6. Use the paper clip to suspend the can and probe from the iron ring as shown.
7. Record the types of food items you are testing in Table 1.
8. Wrap foil over the weighing dish so the top is completely covered.
9. Place the first food item in the dish. Record the initial mass of the dish and food in Table 1.
10. Place the dish under the can. Use tongs to gently hold the outer edge of the food just under the can without contacting it. Adjust the can height so there are 2-3 inches of space between the food item and the foil-covered dish. The dish should be placed where it can catch pieces of food that may fall during burning.
11. Start collecting data. Light the other wooden splint with a match. Extinguish the match.
12. Hold the food under the can as before and ignite it with the splint from below. Extinguish the splint as soon as the food is burning.
13. Stop data collection when the food stops burning and temperature has begun to decline.
14. Drop the burned food into the dish. Make sure all the mass from the tongs is transferred to the dish, including any oil that may have dripped during burning.
15. Record the final mass of the dish and food in Table 1.
16. In SPARKvue, use the Statistics tool to find the minimum (initial) and maximum (final) temperature. Record the initial and final temperatures in Table 1.
17. Dispose of the burned food and wipe the dish and tongs to remove food mass. Repeat Steps 4 - 17 with a new can for each remaining food item. You may re-use the wooden splints.

*Tape wood splint to temperature sensor.*



## ANALYSIS

Complete the analysis on your answer sheet.

## QUESTIONS

Answer the questions on your answer sheet.