

ENERGY TO BURN



STUDENT WORKBOOK

ACCELERATE



MEASURING MY FOODS

Have you ever roasted marshmallows or other foods over a fire? Have you ever wondered why marshmallows and other foods catch fire and burn over a flame?

FIERY FOODS

In this activity, you will observe two different foods as they burn and heat a beaker of water.

Work with your teacher to find a safe place to set up your experiment. Use the materials in this kit to measure the change in temperature of the water.



WHAT YOU NEED:

FROM THE KIT:

- 2 corks
- 2 steel pins
- Almonds, small pack
- Aluminum foil sheet
- Aluminum pie plate, 9-inch diameter
- Beaker, 250 mL
- Marshmallows, small pack
- Matches
- Plastic graduated cup
- Plastic stir rod
- Thermometer
- Wire stand

OTHER:

- Hot pad or dishcloth (optional)
- Knife
- Water



WARNING! CHOKING HAZARD - Small parts. Not for children under 3 years.

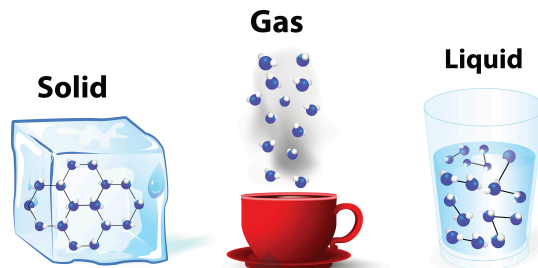
WARNING! DO NOT EAT OR DRINK anything in this kit.

WARNING! Be careful with fire and flame. Don't use in windy areas or near objects that can catch fire. Get an adult to help!

WARNING! Sharp objects can cause injury. Don't cut or poke yourself. Get an adult to help!

The burning food heated the water with a certain amount of energy, which can be measured in calories. A **calorie** is the amount of energy required to raise the temperature of 1 gram of water by 1 °C.

If the fire was hot enough, the water would change from liquid to gas, or boil. This change in state is an example of a **physical change**, a change in which a substance becomes different in appearance but does not change its identity. Boiling water is still water, it only changes to a gas – water vapor. Similarly, when water freezes into ice, it keeps its identity as water.



A physical change of size, shape, or state is common. For example, chopping wood for a fire is a simple physical change. The wood is cut into smaller pieces, but it is still the same wood in a different size or shape. Breaking wood into smaller pieces does not change the amount of energy stored in the wood.

However, burning the wood is a chemical change because the wood has turned into ashes. The burning wood releases energy, which is transferred into the surroundings (the air). The wood becomes new substances: ash, carbon dioxide gas, and water vapor. Also, as the wood burns and releases energy, its amount of stored energy gets smaller.



THINK ABOUT IT!

For each example, choose if it is a chemical reaction or physical change. Explain your answer.

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1. Dropping a glass of water on the ground:



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2. Baking dough to make bread:

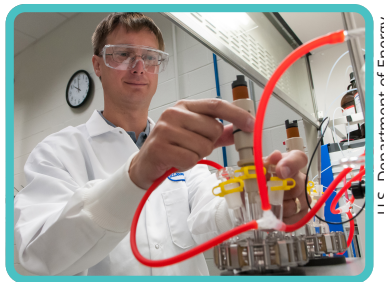


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3. Melting ice cream in the sunshine:



Scientists use calorimeters to measure more than calories in food. A calorimeter can also be used to measure the energy released by burning jet fuel or the activities of organisms.



Chemists use bomb calorimeters to measure the heat released by chemical reactions.



THINK ABOUT IT!

1. List two chemical reactions that you would like to test in a calorimeter.
2. Choose one of your reactions listed and describe how it would need to be adapted to a closed-system or isolated-system calorimeter.

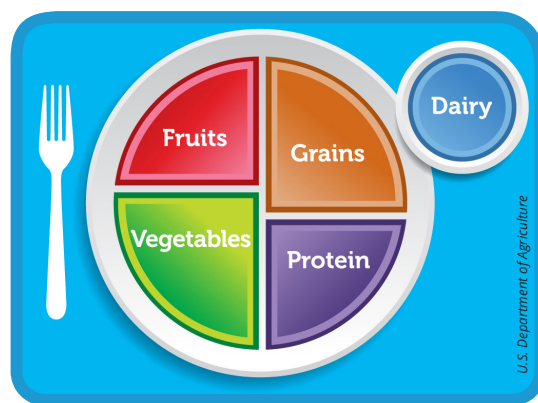
JUST THE FACTS

Carbs, Proteins, and Fats! Oh, My!

Different foods in the combustion reaction in Activity 1 increased the temperature of the water by different amounts. How does this connect to the information on the packing of your everyday food items?

Food packaging lists energy in the form of Calories or “C,” which stands for kilocalories. A **kilocalorie** (kcal) is the amount of energy needed to raise the temperature of 1 kilogram of water by 1 °C.

The extra information listed on nutrition labels is an overview of the substances that make up your food. You may have seen an image explaining how to eat a balance of healthy foods. This diagram suggests eating large portions of grains – bread, rice, pasta, etc. – and vegetables. Smaller portions of fruit, dairy, and meat (or meat substitutes) are recommended by the guidelines.



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Kit	SU-ENBURN
Instructions	IN-ENBURNS
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