DEHYDRATING VEGETABLES & BOMB CALORIMETRY *Kitchen*

NEW! GRADE 7 | SCHOOL PARTNER LESSON PLAN

Grade 7 • 140 mins • Fall, Winter, Spring

SUBMITTED BY
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ESSENTIAL QUESTIONS

• How much energy is in our food and how do we measure it?

MATERIALS

• Lighter (teacher only)
• 2 types of vegetables from garden
• Refrigerated water
• Ringstand
• Wire Gauze
• Empty Soda Cans
• Cloth for insulating can
• Tape
• Graduated Cylinders
• Food
• Dehydrater

VOCABULARY

• Calorie
• Temperatur
• Heat
• Thermal energy
• Kinetic energy

ASSESSMENT

Students will submit design drawings of their bomb calorimetry systems and **observational checklist**.

PREPARATION (ESTIMATED TIME VARIES)

At least two types of vegetables need to be ready for harvest in the garden. Lab supplies need to be predistributed to lab groups.

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Belle Chasse Academy in 2022

TEACHER BACKGROUND

Students already have comprehension of thermal energy as a phenomenon of particle mechanics. They can predict changes in molecular motion as a function of temperature and pressure changes. Additionally, they can identify chemical reactions and understand conservation of mass and energy.

LESSON DESCRIPTION

Students will dehydrate garden vegetables. After this dehydration process they will build bomb calorimeters in order to calculate the amount of energy in the different types of dehydrated vegetables.

LEARNING OBJECTIVES

- I can plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- I can develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- I can explain the process of dehydrating food and how it helps with long term food storage.

ACADEMIC STANDARD CONNECTIONS

7-MS-PS3-4: Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

7-MS-LS1-7: Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

HEALTH STANDARD CONNECTIONS

The calculation and examination of caloric content of food will serve students in bettering their understanding of energy content of food and their own personal energy requirements.

Lesson Sequence

Engage **Ignite Interest (20 mins):**
Students will harvest different vegetables from the garden and be asked how they can calculate the amount of calories in each food.

Explore **Stir Discoveries (50 mins):**
Students will dehydrate vegetables and design bomb calorimeters to test the amount of calories in different vegetable samples.

Explain **Clarify New Ideas (20 mins):**
Students will journal about and discuss why different food samples were able to generate different amounts of heat (by heating water different amounts).

Elaborate **Watch It Rise (30 mins):**
Students will design a scaled up laboratory version of a bomb calorimeter that could be used to calculate caloric content of food at an industrial level.

Evaluate **Reflect (20 mins):**
Students will discuss and critique the calorimeter designs of their peers. Here they will predict what sorts of errors their classmates devices are likely to yield.

CONNECTIONS TO GARDEN LESSONS
Vegetables to be dehydrated and test will be harvested from the school garden

POSSIBLE EXTENSIONS
Engineering design principle applied in this lesson will serve the students in many future science lessons.

ADDITIONAL RESOURCES
The teacher should google images of bomb calorimeters for students to discuss how they work.

OTHER COMMENTS
This lesson will take two days.

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