

Calculating Energy in Food

HS-PSC-3.2 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

[Click here for a video.](#)

Procedure:

1. Collect a food sample.
2. Record the initial mass of the food in a disposable evaporating dish.
3. Measure out 50 ml of water. This will have a mass of 50 g.
4. Attach a temperature probe to a databot and connect to Vizeey on your phone or chromebook.
5. Measure the temperature of the water.
5. Hang a pop can from a ring stand using a stir rod.
6. Put the water in the pop can.
7. Away from the can, light the food sample on fire. This is harder than it sounds.
8. Once the food sample is burning, put the tray under the can of water.
9. When the food sample has burned as much as it is willing to burn, record the new temperature of the water and the new mass of the food item.
10. Calculate the energy gained by the water. $q = mc\Delta T$. Use the mass of the water (50g) and 4.184J/g C for the constant for water.
11. Since you might be burning different masses of the food, divide the energy gained by the water by the grams of food burned. This will allow you to compare different foods.
12. Repeat for another food sample as often as you have time.

Food	Initial Mass of food in grams	Final mass of food in grams	Mass of food burned in grams	Initial temperature of the water in °C	Final temperature of the water in °C	Change in temperature of the water in °C	Energy gained by the water in Joules	Energy gained by water per gram of food in Joules/gram

Analysis Questions

- Which food sample had the highest energy content per gram? What factors might explain this result?
(Consider macronutrient composition, such as fat content, in your explanation.)
- What sources of error could have affected your results?
(Think about heat loss, incomplete combustion, measurement inaccuracies, etc.)
- How could you improve the accuracy of your energy measurements in future trials?
- Explain the energy transfer process in this lab. Where does the energy go, and how is it measured?
- If one food burned poorly or inconsistently, how might that affect your energy calculation?
- In what ways do the findings of this lab relate to real-world nutritional decisions and energy balance in the human body?