

Science 9-Chemistry

Activity 4B

The Energy Stored in Food



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Name _____	
Due Date _____	
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Purpose:

To determine the amount of **energy stored in a peanut** and to calculate the **energy per gram of peanut**.

Procedure:

- Set up the apparatus as described on pages 64 and 65 of SP text. Make sure you limit the amount of heat that escapes into the air. Also make sure you have a stable holder for your peanut!
- Do **Procedures 2-8** on page 64 of SP. As you are working through this, record the information in the following data table: **NOTE: You don't need to fill in numbers 2, 5 and 8 until you do the calculations on the next page.**

Observations:

Data Table

1	Volume of Water	mL
2	Mass of Water	g
3	Final Temperature of Water	°C
4	Initial Temperature of Water	°C
5	Change in Temperature (Δt)	°C
6	Mass of Peanut Before Burning	g
7	Mass of Peanut Remaining	g
8	Mass of Peanut that Burned	g

Calculations and Questions:

1. Calculate the **Mass of the Water** you used. **NOTE: 1 mL of water has a mass of 1 gram.**
Put the answer in # 2 in the Data Table on page 1 of your lab.

$$\text{Mass of Water} = \underline{\hspace{2cm}} \text{ g}$$

2. Calculate the **Change in Temperature (Δt)** of the water in the beaker.

$$\Delta t = \text{Final temperature} - \text{Initial temperature}$$

Put the answer in # 5 in the Data Table on page 1 of your lab.

$$\text{Temperature Change } (\Delta t) = \underline{\hspace{2cm}} \text{ } ^\circ\text{C}$$

3. Calculate the **Mass of Peanut that Burned.**

$$\text{Mass of peanut burned} = \text{Mass of Peanut Before Burning} - \text{Mass of Peanut Remaining}$$

Put the answer in # 8 in the Data Table on page 1 of your lab.

$$\text{Mass of Peanut that Burned} = \underline{\hspace{2cm}} \text{ g}$$

4. Calculate the **Heat Energy given off by the Burning Peanut.**

The formula is:

$$\text{Heat Energy Given Off (J)} = \text{Mass of H}_2\text{O Heated (g)} \times 4.2 \text{ J/g} \cdot ^\circ\text{C} \times \Delta t (^{\circ}\text{C})$$

$$\text{Heat Energy Given off by the Burning Peanut} = \underline{\hspace{2cm}} \text{ J}$$

5. Calculate the **Energy Given Off per Gram of Peanut.**

The formula is:

$$\text{Energy Given Off per Gram of Peanut} = \frac{\text{Energy Given off by Burning Peanut (J)}}{\text{Mass of Peanut that Burned (g) (Calc. \#3)}}$$

$$\text{Energy Given Off per Gram of Peanut} = \underline{\hspace{2cm}} \text{ J}$$

6. When you eat food (like peanuts), chemical reactions in your body release the energy that was in the food.

- a) Using your results for Calculation #5, calculate the amount of **energy stored in a 500 g bag of peanuts.**

$$\text{Total energy stored (J)} = \text{Energy per gram of peanut (J/g)} \times \text{Mass of peanuts (g)}$$

$$\text{Energy Stored in a 500g Bag of Peanuts} = \text{_____ J}$$

- b) Convert the answer to 6a into kilojoules (kJ)

$$\# \text{ of Joules} \div 1000 = \# \text{ of Kilojoules}$$

$$\text{_____ J} \div 1000 = \text{_____ kJ}$$

- c) Your body used approximately 21 kJ/min when walking. How long could you walk using the energy in a 500g bag of peanuts?

$$\text{Time (min)} = \frac{\text{Energy Stored in a 500g Bag of Peanuts (kJ)}}{21 \text{ kJ/min}}$$

$$\text{Time (min)} = \text{_____} = \text{_____ minutes}$$

- d) Your body uses approximately 84 kJ/min when running. How long could you run using the energy stored in a 500g bag of peanuts?

$$\text{Time (min)} = \frac{\text{Energy Stored in a 500g Bag of Peanuts (kJ)}}{84 \text{ kJ/min}}$$

$$\text{Time (min)} = \text{_____} = \text{_____ minutes}$$

7. Is burning a peanut **exothermic** or **endothermic**? _____