

Calories from Fat in Peanuts and other Nuts

Background

- Food scientists measure the energy produced by food combustion in kilocalories. The Calories found on food labels are actually kilocalories, abbreviated Cal.

1000 calories = 1 kcal = 1 Cal

- Peanuts and other nuts will burn in a combustion reaction with the oil (fat) found in the nuts.
- In this experiment, the Calorie contents you determine will be the Calories from Fat (oil) using a soda can calorimeter.

The specific heat of water is 1.0 cal/g°C (note: different units than J/g°C).

- $q_{\text{H}_2\text{O}} = \text{specific heat}_{\text{H}_2\text{O}} \times \text{mass}_{\text{H}_2\text{O}} \times \Delta T_{\text{H}_2\text{O}}$
- $q_{\text{nuts}} = (-)q_{\text{H}_2\text{O}}$

Calculations

- Energy released by the peanut

$$q_{\text{H}_2\text{O}} = 1 \text{ (cal/g}^\circ\text{C)} \times \text{mass H}_2\text{O(g)} \times \Delta T(^\circ\text{C)}$$

$$q_{\text{nuts}} = (-)q_{\text{H}_2\text{O}}$$

(– sign shows exothermic process)

convert q_{nuts} in cal to Cal (kcal)

- Calories from fat in a serving

$$\frac{\text{Cal}_{\text{serving}}}{\text{serving size}} = \frac{\text{Cal}_{\text{experiment}}}{\text{experimental mass}}$$

Solve for $\text{Cal}_{\text{serving}}$; the serving size is given

- Average the results
- Calculate % error of the average $\text{Cal}_{\text{serving}}$ (experimental) as compared to Nutrition Label (theoretical) value of $\text{Cal}_{\text{serving}}$.

$$\% \text{ error} = \left(\frac{\{\text{Theoretical} - \text{Experimental}\}}{\text{Theoretical}} \right) \times 100\%$$

- Repeat for the other type of nut data.