

Fast Food Packaging Lab

Introduction

When we think of energy and food we usually only think of the Calories in the food itself. These are the Calories, which give us the energy to do our daily activities, grow, etc. However, there also is a significant amount of energy, which goes into getting our food to us.

All energy measurements can be calculated using Calories as the energy unit. Packaging food is a major consumer of energy in the United States. Sometimes the energy to transport and package our food is greater than the Calories we receive from eating the food.

Materials

1. Each student is to bring to class all the packaging that comes from a fast food meal. If possible, students should bring any extra packaging obtained when the food was purchased such as: the sales slip, paper or plastic sacks, plastic toys, etc.
2. Each student needs to bring a chart showing the food Calorie content of each food item (these charts should be available at the restaurant; you may also be able to find the information online).

Procedures Record ALL data in Table 1

Part I Weighing the Packaging Material

It takes energy to make containers made of aluminum, steel, glass, paper (cardboard) and plastics. Your first task is to determine how much of these materials make up your container.

1. Take all the packaging materials and separate into piles based on the material (paper, plastic, aluminum, etc.).
2. Weigh each pile and record in Table 1.
3. Convert grams (g) to kilograms (kg) for each package item. Record in Table 1.

1000 g = 1 kg
454 g = 1 lb
28 g = 1 oz
2.2 kg = 1 lb

Part II Calculating Calories From Packaging Materials

Use the conversion factors below to calculate Calories from packaging material. Record in Table 1.

Estimated Energy Needed to Produce Materials (based on crude oil consumption)
Paper, cardboard = 6,000 Calories/kg
Steel, bimetal = 12,000 Calories/kg
Aluminum = 64,000 Calories/kg
Glass = 7,500 Calories/kg
Plastic = 3,500 Calories/kg

Part III CO₂ Saved by Recycling Packaging

Calculate the CO₂ saved if the recyclable parts were actually recycled. Any material with grease cannot be recycled, but the rest may be. Use the conversions below and record in Table 1.

Recycling one kg of aluminum saves 6.8 pounds of CO₂.
 Recycling one kg of a plastic saves 0.68 pounds of CO₂.
 Recycling one kg of paper saves 1.6 pounds of CO₂.
 Recycling one kg of glass saves 0.15 pounds of CO₂.

Part IV Determining the Calories in a Meal

1. Determine the Calories provided by the food from the Calorie chart. Record in Table 2 (A).
2. Determine the Calories used to make the packaging material. Record in Table 2 (B).
3. Determine the percent Calories in your meal compared to Calories in Packaging by dividing B by A.

Student Questions

1. When you buy packaged foods, do you think that you pay a price for the package? How much of a price? Back up your answer with data from this lab.
2. What do you usually do with the package portion of your food? Is this the best use of such materials (especially since plastics come from oil, paper from trees, and metals from the non-renewable earth)? Explain.
3. Choose one:
 - a. Why do you think packaging uses so much energy?
 - b. Why is aluminum energy so much higher than others?
 - c. Why is food packaged as it is in the U.S.?
4. What can you do in your own life about this problem? Discuss 2 solutions.
5. The average produce item in the U.S. is transported 1,300 miles from farm to store. If we took this into account, how would this increase the non-food Calories in your meal?

Table 1 Energy in Packaging

Item	Grams (g)	Kilograms (kg)	Conversion	Calories per item (kg X conversion)	Pounds of CO ₂ per kg of material	Pounds of CO ₂ saved by recycling material
Paper			6,000 Calories/kg		1.6 pounds of CO ₂ /kg	
Plastic			3,500 Calories/kg		0.68 pounds of CO ₂ /kg	
Aluminum			64,000 Calories/kg		6.8 pounds of CO ₂ /kg	
Glass			7,500 Calories/kg		0.15 pounds of CO ₂ /kg	
Total						

Table 2 Percent Food Calories Compared to Packaging Calories

Calorie content of food (A)	
Calorie content of packaging (B)	
% of packaging Calories to food Calories (B/A)	