What Fuel's You   Chemistry 3202   Name:_____

1. (a) Calculate the fuel value of hexane - C_6H_{14} - if 4.00 g of hexane produces 214.4 kJ of heat.

   (b) What mass of hexane must be burned to produce 250 kJ of heat?

2. If we are limited to a small mass of fuel on our next journey to the moon, would our spaceship travel further by using a compound with high fuel value or a low fuel value?   _____

3. Which fuel - hydrogen or gasoline - is more convenient to fuel our cars?   _____

4. A 4.75 g sample of airplane fuel is exploded in a bomb calorimeter with a heat capacity of 30.58 kJ/°C. The calorimeter contents increase in temperature from 22.35 °C to 34.90 °C. What is the fuel value of the airplane fuel?

5. Use the formula for food fuel value, determine the fuel value from the product's food label in Figure 1 ?

6. To determine the correct fuel value for food, the water must be removed before the food is burned. Would the experimentally determined value be lower or higher than the actual value if water were not removed?   _____

7. A pro cyclist has two 30 g servings of dry cereal and then trains on her bike for 30 minutes. The cereal has the average food value of carbohydrates - 17.5 kJ/g - and she expends energy at a rate of 2750 kJ/h. Using calculations, explain why the cyclist would experience weight loss after her training?

8. Several companies hire Bocknek Laboratories, Inc., to determine the food energy (and Calorie) values for their food products. A cheese manufacturer supplies Bocknek Labs with samples of cheddar for testing. The results of the bomb calorimetry experiment are provided below, directly from Bocknek's lab books:

Determination of Cheese Sample Size

mass of cheese + beaker:	6.84g
mass of empty beaker:	1.32g
mass of cheese:	_____

Calorimetry Data and Results

Heat Capacity of Calorimeter: 10.27 kJ/°C

final temperature of calorimeter: 24.95 °C
   (after complete combustion)

initial temperature of calorimeter: 20.82 °C
   (before combustion)

temperature change: _____

Determine:

(a) the fuel value of the cheese

(b) the food energy (in kJ) and the Calories (in Cal) in a 50 g serving of the cheddar.

9. A college student on a steady diet of hamburgers, french fries and other fast foods receives 170 g of fat in his diet per day.

(a) Determine the number of Calories the student obtains from fat daily on this diet. (average FV for fat = 9.1 Cal/g)

(b) If the student's total daily food intake is 3920 Calories, determine the percentage of the student's daily Calorie intake from fat.

10. The Nutrition Label on a 270 g bag of Krusty® potato chips states that a serving is 28 g (about 20 chips). The Calorie content in one serving of potato chips is 644 kJ or 154 Cal.

a) How many servings are in a single bag of Krusty® potato chips?

b) How many calories are consumed if the full bag is eaten?

c) For the following activities, calculate the number of hours it would take doing the activity to "burn off" the full bag of Krusty® chips:

(i) running at 10km/h

(ii) rowing

11. Zeke is trying to lose a few pounds, so he goes for a half hour walk each night at 6 km/h. As a little reward afterwards, he hangs out in front of the TV and has a "small" 70g bag of Krusty® chips.

Is Zeke's physical activity going to provide him with the weight loss he is looking for?