Thermochemistry Problem Set

Now that you have looked at the variables that affect the heat involved in a chemical reaction, practice the calculations using Q = CmT. Remember that C is specific heat and the values are in your reference tables. Show all work and use units!

1. A chemist performs a calorimetry experiment on a peanut with a mass of 0.756 g. The calorimeter contains 1150 g of water at 25oC. If the temperature of the water increases to 27oC, what is the energy content of the peanut?
2. How many peanuts would you be able to package into a 100-Calorie snack pack? (Hint: 1 cal = 4.18 J and 1 food Calorie = 1000 cal)
3. The kiddie pool in Mrs. Harvey’s back yard holds 170 L of water. When the sun comes up, the temperature of the water is 20oC. How much heat is needed for the water to warm to a balmy 24oC?
4. On a winter day in December with a temperature of 8oC, you find a penny on the ground and put it in your pocket. If the penny has a mass of 1.92 g, how much heat energy must be transferred from your body to warm the penny to your body temperature, 37oC?
5. A baking sheet has a mass of 357 g. If it takes 104 kJ to raise the temperature from 25oC to 350oC, what is the specific heat of the cookie sheet? What metal is the sheet made from?
6. In a calorimeter experiment, a sample of oatmeal (breakfast of super students) raises the temperature of 2.5 kg of water from 25oC to 28oC. The mass of the oatmeal is 1.76 g. What is the energy content of the oatmeal in kJ per gram?
7. Let’s say you’re cheering at the West conference championship in November and the temperature of your digits is 31oC. The mass of one Hot Hands warmer packet is 107.7 grams and the specific heat of the iron powder inside is 0.45 J/goC. If 91.3 g of the packet is iron, how much energy is released if the final temperature of the packet is 47oC, assuming it started at the chilly 31oC?
8. If 350 J of heat energy are added to 100 g of a metal and the temperature changes by 25 oC, what is the specific heat of the metal? What is the identity of the metal?
9. What is the specific heat of a 124 g sample of brass if 3.94 x 103 J raises the temperature of the brass from 12.5 oC to 97.0?

This website provides additional practice for heat calculations

<http://mrstullis.weebly.com/uploads/5/0/5/6/5056296/chapter_12_heat_problems_wkshts.pdf>