Science 8 Name: _____

LAB #16: HEAT TRANSFER Date: _____

Heat Transfer Lab #16

Discussion: Suppose your tea is too hot to drink. You would like to add some cool water to the tea and get it to just the right temperature. But how do you know how much cool water to add? To determine this information, we will measure the amount and temperature of a sample of hot water and a sample of cool water. After mixing them together, we will measure the final temperature of the mixture.

Purpose: To determine how to calculate heat transfer.

Hypothesis: Since thermal energy is the total energy, the total of the energy in the cold water before mixing and the total energy of the hot water before mixing should equal the total energy in the mixture after putting the cool water and the warm water together.

Theory: According to the law of conservation of energy, energy is neither created nor destroyed during energy conversions or thermal energy transfers. The equation for calculating thermal energy is:

$$q = mC\Delta T$$

Materials:

2 foam cups thermometer hot water cool water
balance

Method and Data Collection:

1. Mass the two foam cup calorimeters and record the mass for each on the data table.
2. Fill one calorimeter about 1/3 with warm water and fill the other calorimeter about 1/3 with cool water. Record the mass of the cup and water for each calorimeter.
3. Measure and record the starting temperature in each of the calorimeters using a thermometer.
4. Poor the water in the cool calorimeter into the warm calorimeter and record the final temperature in the cup. (The final temperature will be the same for both the cool and the warm water.)

Data Table and Results						
	mass of cup (g)	mass of cup and water (g)	mass of water (g)	starting temperature (°C)	final temperature (°C)	change in temperature (°C)
cool water						
warm water						

Analysis:

1. Calculate the mass of cool water and the mass of warm water in the separate calorimeters before mixing. Show your work for the cool water below and record the values for both in the data table.

2. Calculate the change in temperature for both the cool and warm water. Show the calculation for the cool water in the space below and record both results in the data table.

3. Calculate the change in thermal energy for both the cool and hot water using the equation in the theory section. The specific heat of water, C, is 4.18 J/g•°C. Show your calculation for the cool water in the space below and record both results in the data table.

Conclusions:

1. Compare the amount of thermal energy gained by the cool water to the amount of thermal energy lost by the warm water.

2. Does your data and analysis support the law of conservation of energy?