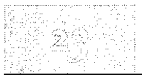
Name _____ Section _____ Date _____



LABORATORY 23 *Specific Heat of Metals*

PRE-LABORATORY ASSIGNMENT

1. What is the definition of specific heat?

2. What is the name for a device that provides a thermally isolated environment in which substances exchange heat?

A heated piece of metal at a temperature T_1 is placed into a calorimeter containing water and a stirrer. The temperature of the calorimeter, water, and stirrer is initially T_2 where $T_1 > T_2$. The system is stirred continuously until it comes to equilibrium at a temperature of T_3. Answer Questions 3–5 concerning what happens.

3. The final equilibrium temperature of the system is such that

(a) $T_3 > T_1 > T_2$ **(b)** $T_1 < T_2 < T_3$ **(c)** $T_1 < T_3 < T_2$ **(d)** $T_1 > T_3 > T_2$

4. The heat lost by the metal ΔQ_m and the heat gained by the calorimeter system ΔQ_c obey which of the following relationships?

(a) $\Delta Q_m > \Delta Q_c$ **(b)** $\Delta Q_m < \Delta Q_c$ **(c)** $\Delta Q_m = \Delta Q_c$

5. What is the purpose of stirring the system continuously?

6. A 350 g piece of metal is at an initial temperature of 22.0°C. It absorbs 1000 cal of thermal energy, and its final temperature is 45.0°C. What is the specific heat of the metal? Show your work.

7. A 250.0 g sample of metal shot is heated to a temperature of 98.0°C. It is placed in 100.0 g of water in a brass calorimeter cup with a brass stirrer. The total mass of the cup and the stirrer is 50.0 g. The initial temperature of the water, stirrer, and calorimeter cup is 20.0°C. The final equilibrium temperature of the system is 30.0°C. What is the specific heat of the metal sample? (The specific heat of brass is 0.092 cal/g–C°.) Show your work.