

Unit 10: Thermochemistry Lab

Measuring the Specific Heat of a Metal

Names _____

Block # _____

Metals have low specific heat capacities. This means that while metals heat up quickly, they also lose the heat quickly. In this experiment, we will heat up a piece of metal and transfer it to water. Because nature wants to reach a balance, the heat from the metal will be transferred into the water. Using the formula $Q = m \cdot s \cdot \Delta T$, we will calculate the amount of heat the water absorbed and use this data to determine the specific heat capacity of the metal. Then we will compare the specific heat we calculated in the lab to the scientifically accepted specific heat for that metal in order to calculate the percent error.

DATA TABLE:

Type of Metal		
Mass of Styrofoam Cups		
Mass of Water		
Initial Temp of Water		
Final Temp of Water		
Mass of Metal		
Initial Temp of Metal		
Final Temp of Metal		

CALCULATIONS:

Show all work on separate paper, or use the back of this sheet. Repeat steps 1 – 3 for each metal.

1. Calculate the amount of heat absorbed by the water. Use $Q_{\text{water}} = m \cdot s \cdot (T_{\text{final}} - T_{\text{initial}})$.
2. The law of energy conservation says that energy is neither created nor destroyed. Therefore, the heat absorbed by the water is the same amount of heat lost by the metal. In other words, $+ Q_{\text{water}} = - Q_{\text{heat}}$. Using algebra, the specific heat formula can then be rearranged to solve for the specific heat of the metal, as shown below:

$$\left(\frac{-Q_{\text{metal}}}{(\text{mass of metal}) \cdot (T_{\text{final metal}} - T_{\text{initial metal}})} \right) = c_{\text{metal}}$$

3. Now use the list of known specific heats that your teacher provides to determine your percent error.

$$\frac{\text{big number} - \text{small number}}{\text{true number}} \times 100 = \% \text{ error}$$