

Specific Heat Worksheet

Data Table

	Trial 1	Trial 2	Average
Mass of Metal (g)			
Mass of Calorimeter (g)			
Mass of Calorimeter and Water (g)			
Mass of Water (g)			
Initial Temperature of Water in Calorimeter (°C)			
Initial Temperature of Heated Metal Sample (°C)			
Final Temperature of Water and Metal Sample (°C)			

Post-Lab Questions and Calculations

1. Calculate and record the average of the two trials for each value in the data table.

Show all work below. Use a separate sheet of paper if additional space is necessary.

2. Calculate the
 - a. temperature change of the water, ΔT (water), by subtracting the initial temperature of the water from the final temperature. Be sure to include the correct sign with your answer.
 - b. temperature change of the metal, ΔT (metal), by subtracting the initial temperature of the heated metal sample from the final temperature of the water and metal sample in the cup. Be sure to include the correct sign with your answer.
3. Use Equation 2 to calculate the heat energy gained by the water.
4. Use Equations 4 and 5 to calculate the specific heat of the unknown metal in J/g °C.

5. Determine the identity of the unknown metal used by comparing the experimental specific heat value to the published literature specific heat values listed in Table 2 below.

Table 2.

Metals	Specific Heat	
	(in cal/g·°C)	(in J/g·°C)
Aluminum	0.215	0.899
Copper	0.092	0.385
Steel	0.110	0.460
Tin	0.053	0.222
Zinc	0.092	0.385

6. Experimental procedures will no doubt lead to some degree of difference from the published literature value. Determine the percent error for specific heat for the metal used. This can be done by comparing the value obtained in the lab (experimental value) with the literature value. Use the equation for percent error below.

$$\% \text{ Error} = \frac{|\text{Experimental value} - \text{Literature value}|}{\text{Literature value}} \times 100\%$$

7. Suggest possible reasons for discrepancies between the experimental and literature values.
8. Calculate the amount of energy needed to heat up 240 mL (8 oz) of ice-cold water (0 °C) to body temperature (37 °C) after drinking it. The mass of 1 mL of water is 1 gram.