**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Specific Heat Lab**

Guiding Question: Which substance is a better conductor of heat: copper or aluminum?

Pre-lab Questions:

1. Explain what a calorimeter is used for.
2. If you place a sample of a room temperature metal in boiling water in a beaker on a hot plate, what would happen to the temperature of the metal after several minutes?
3. If you place a sample of hot metal in room temperature water, what will happen to the temperature of the water and metal?

Procedure:

1. Mass your metal and record on the data table below.
2. Heat the metal in a hot water bath, as demonstrated by your teacher. **Record the highest temperature that you heated your metal to in the data table**.
3. While heating the metal sample, mostly fill the inner container of the calorimeter with water. Be sure to measure how many milliliters were used to fill the container (but leave room for your metal sample). Recall the density of pure water is 1.00g/mL.
4. Record the initial temperature of the water in the calorimeter and record in the data table.
5. Place the hot metal into the calorimeter, close the lid, and place the thermometer in the calorimeter.
6. Allow the metal & water to come to thermal equilibrium (temperature stops changing between the metal and water). Record the final temperature in the data table.
7. Trade data with a team that has the other metal.

|  | Copper | Aluminum |
| --- | --- | --- |
| Mass of **metal** |  |  |
| Volume/Mass of **water** in **calorimeter** |  |  |
| Initial temperature of **calorimeter water** |  |  |
| Initial temperature of **HOT metal** |  |  |
| Final temperature of the **metal in water** |  |  |

Analysis Questions:

1. Did the water in the calorimeter gain or lose energy over time in **both metal examples**?
2. Did the metal sample in the calorimeter gain or lose energy over time in **both** **metal** **examples**?
3. Calculate the energy (q), in Joules, gained by the water **from the copper metal**.
4. What is the amount of energy, in Joules, lost by the **copper** **metal** sample? How do you know?
5. Calculate the specific heat of the **copper** **metal** sample, with units.
6. Calculate the energy, in Joules, gained by the water **from the aluminum metal**.
7. Calculate the specific heat of the **aluminum metal**, with units.
8. Calculate the percent error for the specific heat values you calculated. Label and show your work. Copper’s specific heat = 0.39J/gC and Aluminum’s specific heat = 0.90J/gC.
9. Does the number of particles or mass of a sample of a substance influence the specific heat of that substance? Explain your answer.
10. Draw a particle diagram of how the one metal sample and water in the calorimeter transferred heat.
11. Answer the Guiding Question using evidence from this lab to support your answer: Which substance is a better conductor of heat: copper or aluminum?

