Introduction to Specific Heat **Name:** _____

Objective: Analyze 6 different substances and determine their specific heat.

Specific heat (also called specific heat capacity) is the amount of thermal (heat) energy required to raise the temperature of 1.00 g of a substance by 1.00°C. In other words, it is how much heat (thermal energy) is needed to increase the temperature of an object.

The specific heat values for substances are determined by experimentally determining the amount of heat transferred by a substance of known mass as its temperature rises or falls. Specific heat is important because it lets us determine how much heat is transferred during a chemical change.

Using a virtual lab, we are going to determine which substances have higher and lower specific heat. Six different substances (wood, copper, glass, silver, sodium, and water) are represented; each absorbs energy when heated with a Bunsen burner flame.

Predict which substance (wood, copper, glass, silver, sodium, or water) has the highest specific heat and the lowest specific heat.

HIGHEST = _____ LOWEST = _____

Instructions:

1. Go to the following website:
http://employees.oneonta.edu/viningwj/sims/specific_heat_s.html
2. Select your first sample
3. Select 10.00 g samples
4. Select the quantity of heat to be transferred by adjusting the flame time to be 3 seconds for each sample.
5. Click on the Heat button to light the Bunsen burner and begin the experiment.
6. Observe the initial and final temperatures for each substance and record the results in the table below.
7. Click on the Reset button to begin a new experiment.

Record all data and summarize the results of your experiment in the data table below:

Substance	**Weight of substance (g)**	**Quantity of Heat transferred (J) (50 J * # seconds)**	Initial Temperature (degrees C)	Final Temperature (degrees C)	**Change in Temperature (degrees C)**	Specific Heat (J/g*C) (see back for equation and example)
Wood	10	150	20	28.5	8.5	1.76
Copper						
Glass						
Silver						
Sodium						
Water						

Calculating Specific Heat:

When an object is heated or cooled, its temperature change (ΔT) depends on three things:

- The mass of the material (m), usually measured in grams
- The amount of heat transferred to or from the object (q), usually measured in Joules
- The specific heat (specific heat capacity) of the material (c)

These variables can be combined into the following equation:

q = (m)(c)(ΔT)

In this activity, we want to measure the specific heat of each sample. To solve for specific heat use the following equation:

c = (q) / ((m) (ΔT)) ****/ means to divide****

Use the example for calculating the specific heat of wood below to calculate the specific heat for the other 5 materials.

The quantities we found for wood are:
q= 150 J (energy transferred)
ΔT= 8.5 C (change in temperature)
m = 10 g (mass)

c = (q) / ((m) (ΔT))

c_{wood} = (150 J) / (10 g * 8.5 C)
c_{wood} = 1.76 J/g*C

Show your calculations for the other 5 samples below or on a separate sheet of paper.

Analysis:

1. List the substances in order of highest specific heat to lowest specific heat.

2. Explain if your results support your original predications for highest or lowest specific heat?

3. Think back to the concept of elements that make good conductors. Which of these 6 substances seem like they would also be good conductors? In your explanation use the words, “conductor,” and “specific heat.”

4. Do the specific heat values match the reference table values exactly for copper, silver and water? Name 2 reasons why the specific heat may be different from those values. (Incorrect calculation is not an example ☺)