Name_____

The simulation software is located at
http://www.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/thermochem/heat_metal.html

ALL work must be shown to receive full credit.

Activity 1. Comparison of the heat exchanged by metals

Choose two metals to work with from the menu according to the table below;

Student Number (last digit)	Metal #1	Metal #2
0 - 1	Silver	Copper
2 - 3	Gold	Iron
4 - 5	Silver	Iron
6 - 7	Copper	Gold
8 - 9	Iron	Copper

The goal of this experiment is to investigate what happens when a piece of hot metal is added to a sample of water at or near room temperature.

ACTIVITY #1:

Make a prediction of which of the two metals assigned to you will raise the temperature of water the highest.

You need to make a fair comparison. For example if you use 10 g of metal #1 at 80°C and 50 mL of water at 25°C, you should use 10 g of metal #2 at 80°C and 50 mL of water at 25°C. The initial temperature of the metal (T_i) should be greater than the initial temperature of the water ($T_i^{'}$).

Complete the following:

Identify your Metal #1: _____   Identify your Metal #2: _____

Prediction (which metal will raise the temperature of the water the highest?): _____

Explain how you arrived at your answer.

Use the computer simulation to do your experiment. Record your data below. The

specific heat of water is $4.18 \frac{J}{g \cdot °C}$. The density of water is 1.00 g/mL.

DATA:

Experiment #1				
	Mass	Initial Temperature	Final Temperature	ΔT
Metal _____ (#1)				
Water				

Experiment #2				
	Mass	Initial Temperature	Final Temperature	ΔT
Metal _____ (#2)				
Water				

Did your prediction match your experimental results? Explain.

In the two experiments above, heat was transferred from

_____ to _____

CALCULATIONS:

For each experiment calculate the heat that was exchanged (absorbed or released) by the water. You may use the formula q = mcΔT. Show all steps and be sure to include units in all steps and in your answer. Be sure to indicate the "sign" (i.e. positive or negative).

For each experiment calculate the heat that was exchanged (absorbed or released) by the metal. Show all steps and be sure to include units in all steps and in your answer. Be sure to indicate the "sign" (i.e. positive or negative).

Compare the values of the heat exchanged by the water and the metal. Within experimental error, was the Law of Conservation of Energy obeyed?

ACTIVITY #2:

If you double the mass of metal #1, keeping everything else the same, what will happen to the ΔT of the water?

If you double the mass of water, keeping everything else the same, what will happen to the ΔT of the water?

Do these two experiments using the computer simulation.

DATA:

Experiment #1				
	Mass	Initial Temperature	Final Temperature	ΔT
Metal _____ (#1)				
Water				

Experiment #2				
	Mass	Initial Temperature	Final Temperature	ΔT
Metal _____ (#2)				
Water				

Did your predictions match the results of the computer simulation? Explain.

How did the ΔT in the two experiments performed above compare to the ΔT of the two experiments performed on Page 2?

ACTIVITY #3: **Determination of the specific heat of an unknown metal**.

Choose one of the unknown metals (Metal X or Metal Y) to work with from the menu in the simulation according to the table below;

Student Number (last digit)	Unknown Metal
0 - 4	X
5 - 9	Y

Your Metal is, _____

Design and carry out an experiment that will help you determine the specific heat of this metal.

Describe the Procedure you used to determine the specific heat of the unknown metal:

What observations did you collect?: (You may or may not need all of the cells below.)

Using your observations indicate the Evidence you have to support the Claim you will make below.

Claim: The specific heat of metal _____ is _____.