Heat Transfer
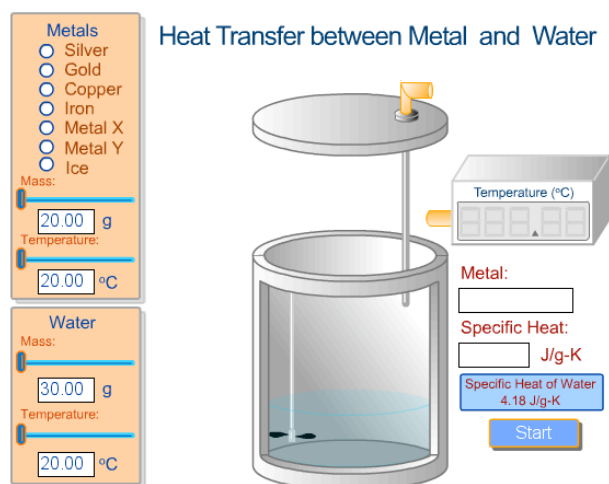
Name_____   Lab Section_____

Problem Statement: How is heat transferred between substances?

I. Data Collection:

A. Go to http://introchem.chem.okstate.edu/DCICLA/heat_metal_ice.html and
    open the Heat Transfer Simulation. Your screen should look like the figure.

The apparatus represents a container that can be filled with different amounts of water at
different temperatures. Different amounts of various substances at different temperatures
can be added to the water. Slide bars control these amounts. A temperature gauge
monitors the temperature of the contents of the container. The specific heat content (C_s)
of the water and the added substances are displayed in boxes.

B. Use the button to pick Ag. Adjust its Temperature to 220.00℃ and its mass to 20.0g. Adjust the water temperature to 20.00℃ and its mass to 30.00g. Record the beginning conditions in the table below.

	Ag	Water
Mass		
Initial Temp		
Final Temp		
Change in Temp		
Heat Content		

C. Click on the Start button. What do you observe happening? Record the final conditions of Ag and the water in the table above.

II. Data Analysis and Interpretation

A. Which substance, Ag or water loses heat when they are combined? Which substance, Ag or water gains heat when they are combined? Which process is endothermic and which is exothermic?

B. Calculate the heat (q) transferred to or from Ag. Use the equation $q = mC_s\Delta t$ (q is heat in Joules, m is mass, C_s is the heat content, and Δt is the change in temperature).

C. Calculate the heat (q) transferred to or from water.

D. Compare the heats associated with the Ag and water. Make a generalization concerning these heats.

E. How would your results been different if you had used different amounts of Ag and water starting at different temperatures? Try this out and report your results.

III. Data Collection:

Repeat the experiment for Au, Cu, and Fe. Record the data in the following table

	Au	Water	Cu	Water	Fe	Water
m						
t_i						
t_f						
Δt						
C_s						
q						

IV. Data Analysis and Interpretation:

A. Calculate the heats lost or gained by each metal. Show your work for one of the calculations below.

B. Compare the results for all four metals. How are these metals different from each other.

C. Which of these metals would make the best cookware? Explain your answer.

V. Conclusions:

A. Calculate values for the heat contents for the two unknown metals.

	Metal X	Water		Metal Y	Water
m					
t_i					
t_f					
Δt					
C_s					
q					

B. Calculate the molar heat contents for the four metals. (Calculate C_s in units of J/mol °C.) How do these values for the four metals compare?

C. Use what you discovered in the previous question to identify the two unknown metals. Show how you arrived at your answers below.