Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Equations needed:**

 **q = mCΔT**

 **-q = q**

**Specific Heat Capacities of common substances:**

Water (*l*) = 4.184 $\frac{J}{g∙K}$

Iron (*s*) = 0.45 $\frac{J}{g∙K}$

Aluminum (*s*) = 0.89 $\frac{J}{g∙K}$

Mercury (*l*) = 0.14 $\frac{J}{g∙K}$

Carbon (*s*) = 0.71 $\frac{J}{g∙K}$

Silver (*s*) = 0.24 $\frac{J}{g∙K}$

Gold (*s*) = 0.13 $\frac{J}{g∙K}$

Brass (yellow solid alloy) = 0.402 $\frac{J}{g∙K}$

1. A sample of iron having a mass of 93.3g is heated to 65.58ºC is placed in 75.0g of water raising the temperature from 16.95ºC to 22.24ºC. Find the specific heat capacity for this iron sample. The answer you find has had some lab errors due to human mistakes. Find our percent error for your work using:



1. What is the resulting temperature when 35g of water at 75ºC is mixed with 15g of water at 15ºC?
2. A piece of metal weighing 59.047 g was heated to 100.0°C and then put it into 100.0 mL of water (initially at 23.7°C). The metal and water were allowed to come to an equilibrium temperature, determined to be 27.8°C. Assuming no heat lost to the environment, calculate the specific heat of the metal. (Hint: First calculate the heat absorbed by the water then use this value for “q” to determine the specific heat of the metal in a second calculation.) Compare your result to the above list of substances. What could the metal be?
3. In a coffee-cup calorimeter, 100.0 g of H2O and 100.0 mL of HCl are mixed. The HCl had an initial temperature of 44.6 °C and the water was originally at 24.6 °C. After the reaction, the temperature of both substances is 31.3 °C.
	1. Was the reaction exothermic or endothermic? Explain.
	2. Calculate how much heat the water lost or gained.

 **Answers:**

1. 0.41$\frac{J}{g∙K}$ and 8.89% error
2. 57ºC
3. qw= 1713.8 J and Cm=0.402 $\frac{J}{g∙K}$
4. For the water- endothermic. The temperature increased from 24.6 °C to 31.3 °C indicating energy was absorbed by the water. For the HCl- exothermic. The temperature decreased from 44.6 °C to 31.3 °C indicating energy was released by the HCl. Qw = 2.8 x 103J