NAME: **HONORS CHEMISTRY**

SECTION: Heat Calculations

Use the formula Q = mcT

Percent error formula: $\% error = \frac{\left|accepted - experimental\right|}{accepted} × 100$

Pay attention to significant figures! Show all your work.

**Level 1**

Substance Specific Heat (J /g oC)

Water(ℓ) 4.18

Gold(s) .129

Copper(s) .385

Mercury(ℓ) .14

Silver 0.2165

1. A piece of *copper alloy* with a mass of 85.0 g is heated

from 30.oC to 45oC. In the process, it absorbs 500. J of

heat. A) What is the experimental specific heat of this copper alloy? B) If the accepted value for the specific heat of this alloy is 0.45 J/g oC, what is the percent error?

1. The temperature of a 74 g sample of material increases from 15oC to 45oC when it absorbs 2.0 kJ of heat. What is the specific heat of this material?
2. How much heat is needed to raise the temperature of 5.00 g of gold by 25.0oC?
3. What mass of liquid water at room temperature (25oC) can be raised to its boiling point with the addition of 24 kJ of heat energy?
4. How much heat will be given off by 55.0 g of water as it cools from 87.1oC to 25.1oC?
5. Calculate the temperature change for mercury if 160 g of the metal absorb 1500 J of heat energy.
6. Heat in the amount of 420 J is added to a 35 g sample of water at a temperature of 10. oC. What will be the final temperature of the water?

**Level 2**

Hint: Assume that all the heat lost by the warm object is absorbed by the cooler object. –Q = +Q

1. If a piece of gold with a mass of 45.5 g and a temperature of 80.5oC is dropped into 192 g of water at 15.0oC, what is the final temperature of the system?
2. A piece of unknown metal with a mass of 14.9 g is heated to 100.0oC and dropped into 75.0 g of water at 20.0oC. The final temperature of the system is 28.5oC. What is the experimental specific heat of the metal? If the accepted value for the specific heat of this metal is 2.42 J/g oC, what is the percent error?
3. A piece of unknown metal with a mass of 17.19 g is heated to 100.00oC and dropped into 25.00 g of water at 24.50oC. The final temperature of the system is 30.05oC. What is the specific heat of the metal?

Answers to selected problems

1. 0.39 J/g oC
2. 0.90 J/g oC
3. 16.0 J
4. 77g
5. 14.0 kJ
6. 67oC
7. 13oC
8. 15.5oC
9. 2.50 J/g oC