Enthalpy Practice

As always show all work and box your final answer for the following problems.

(Remember kilo is the prefix meaning one thousand. <u>Ex</u>. - 5 kilojoules is equal to 5 000 joules) 1.) How much heat is needed to raise the temperature of 0.257 kg of ethanol ($c_{ethanol} = 2400 \frac{J}{kg}$ °C) by 49.1°C?

- 2.) How much heat is needed to raise the temperature of 0.125 kg of lead ($c_{lead} = 130 \frac{J}{kg}$ °C) from 17.5°C to 41.1°C?
- 3.) How many kilojoules of heat are required to heat 1.37 kg of water from 21.3° C to 89.5° C?
- 4.) What mass of iron ($c_{iron} = 450 \frac{J}{kg}$ °C) would need 305 kJ or energy to raise the temperature by 87. °C? (be careful!!!)
- 5.) What is the final temperature of a bar of nickel ($c_{nickel} = 0.54 \frac{J}{g}$ °C) if 3228 J of energy is added to a 384 g sample with an initial temperature of 24.4°C?

6.) What is the specific heat of an unknown metal sample if 10.3 kJ of energy are required to raise the temperature of 0.2543 kg sample of the metal by 38°C?

Part 2

Practice: Thermal Energy Calculations

Answer the following questions. Make sure to show all work for the math problems to receive credit. You may need a separate sheet of paper.

- 1. Explain the relationship between temperature, energy, and motion of particles in an object.
- 2. Referencing the reasoning you used from #1, explain the difference between objects that feel hot and those that feel "cold".
- 3. You've been waiting for the bus and your hands become cold. When you get onto the bus and sit down, you put your hands under your legs to warm up. After a while your hands feel warmer but your legs feel colder. Explain this with regards to what you know about thermal energy transfer.
- 4. How much energy must be absorbed by water with a mass of 0.5 kg in order to raise the temperature from 30°C to 65°C? Note: Water has a specific heat of 4,190 J/kg °C.
- 5. How much heat is needed to warm .052 kg of gold from 30°C to 120°C? Note: Gold has a specific heat of 136 J/kg °C.
- 6. A 9.5 kg outdoor copper sculpture heats up during the day from 24°C to 78°C. How much energy was absorbed? Note: Copper has a specific heat of 390 J/kg °C.
- 7. Challenge: If it takes 820 Joules of heat to warm a sample of zinc from 0°C to 50°C, what would be the mass of the zinc? Note: Zinc has a specific heat of 380 J/kg °C.

5. What mass of iron (c_{iron}= 0.11 cal/g°C) would need 1450 cal of energy in order to raise its temperature by 19.7°C? ($c_{iron} = 450 \frac{J}{kg}$ °C)

6. What is the final temperature of a samples of nickel (c_{nickel}= 0.54 J/g°C) if 328 J of energy is added to a 16.7g sample at an <u>initial</u> temperature of 24.4°C?

7. What is the specific heat of an unknown metal if 1.67 kcal of energy are required to raise the temperature of 79.2 g sample of the metal by 63.3°C?