Thermodynamics Review

1. What is energy?

2. What is temperature? How is it related to heat while still different?

3. When dealing with a chemistry situation explain the difference between the system and the surroundings.

4. Describe the difference between exothermic and endothermic.

5. What signs do we put on exothermic and endothermic reactions, in terms of enthalpy?

6. What units do we use to measure energy?

7. Explain what the specific heat of a material is. What specific heat would make the material a good conductor of heat? What would make the material an insulator?

8. Calculate the mass (in grams) of each of the following substances that could be warmed over the indicated temperature range by application of exactly 1000 J of energy:
    a. Water (c=4.184 J/g^{o}C) from 12 to 56 ^{o}C

    b. Iron (c=0.45 J/g^{o}C)from 8 to 111 ^{o}C

    c. Aluminum(c=0.89 J/g^{o}C) from -45 to 23 ^{o}C

9. What is enthalpy and what letter do we use to represent it.

10. Consider the following reaction $SF_4 + 2H_2O \rightarrow SO_2 + 4HF$ $\Delta H = -828kJ$
    a. Is this reaction endothermic or endothermic, how can you tell?

    b. Is the energy as heat released into the surroundings or absorbed by the system?

11. The specific heat capacity of aluminum is 0.89 J/gC. How many Joules of energy are needed to warm 3.50 g of aluminum from 2 °C to 32 °C

12. If a sample of carbon releases 123 Joules of energy and decreases in temperature from 123.6°C to 44.2°C, then what is its mass of the carbon? (specific heat capacity of carbon = 0.71 J/g °C)

13. How much heat is required to boil 19.3 g of water? (ΔH_v = 2260 J/g)

14. For the given information, balance the equation, then give the correct enthalpy of the given system:
    _____CH_4 + _____$O_2 \rightarrow$ _____CO_2 + _____H_2O

    $\Delta H_{(f)}$ CH_4= -75 kJ/mol
    $\Delta H_{(f)}$ H_2O= -286 kJ/mol
    $\Delta H_{(f)}$ CO_2= -394 kJ/mol

16. A 50 g metal is heated to 367 °C, and added to a calorimeter filled with 75 g of water at 22 °C. After some time, the system came to thermal equilibrium at 29 °C.

17. A 25 g metal is heated to 165 °C, and added to a calorimeter filled with 50 g of water at 28 °C. After some time, the system came to thermal equilibrium at 35 °C.