Chem B Ch 10 Test Review - Please answer on a separate sheet of paper

1. How is the concept of energy defined?
2. Explain a situation where potential energy decreases as the kinetic energy increases and vice versa.
3. What does temperature measure?
4. Define the terms *system* and *surroundings*. Draw a picture if needed.
5. What do the terms *exothermic* and *endothermic* mean?
6. What sign should be used for endothermic processes? For exothermic processes?
7. What sign should be used for systems that become more disordered? For systems that become less disordered?
8. If you know the specific heat of a substance, what does that really tell you?
9. There is no heat in an insulated system at a constant temperature of 400 C, why is this?
10. Explain what is happening in the picture on page 345 in your book, Fig 10.4.
11. Look at the pictures on pages 368 and 369 and relate them to the terms *energy spread* and *matter spread*.
12. What is the 1st Law of Thermodynamics?
13. What is the 2nd Law of Thermodynamics?
14. If your body is the system and the classroom (at 70F) is the surroundings, then describe how you can relate this to the terms exothermic, endothermic, and equilibrium?
15. What are the units for heat?
16. What are the units for specific heat?
17. What are the units for temperature?
18. Explain why burning a match is a chemical process and why it is considered exothermic.
19. Explain why water freezing is a physical process. Explain whether freezing is an exothermic or endothermic process and why.
20. Explain why water boiling is a physical process. Explain whether boiling is an exothermic or endothermic process and why.
21. What do you get when you add all of the heat and the work for a system?
22. What does the term enthalpy mean?
23. What does the term entropy mean?
24. Consider the following phases: solid, liquid and gas.
    a. Which phase of matter has the most entropy, why?
    b. Which phase of matter has the most enthalpy, why?
25. If you add 1kJ of energy to water and it goes from 15 to 42 C, then what is its mass?
26. If a 34.5 g chunk of iron loses 234 J of energy and it starts at 1.5 C, then what is its final temperature?
27. If you add 1kJ of energy to aluminum and it goes from -10 to 47, then what is its mass?
28. Consider the combustion of propane

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l) \qquad \Delta H = -2221 \text{ kJ}$$

    a. Is the combustion of propane endothermic or exothermic?
    b. Is energy as heat released into the surroundings or absorbed by the system?
    c. How much energy as heat is released when 2 mol of propane are burned in excess oxygen?
    d. How much energy as heat is released when 100.0 g of propane is burned in excess oxygen?
    e. How much energy as heat is released when 100.0 g of carbon dioxide is produced?

29. Calculate ΔE for each of the following cases:
    a. A system releases 23 J of heat while 12 J of work is done on it.
    b. 14 J of work is done on a system, and 5.0 calories of heat are released.
    c. A system absorbs 87 J of heat and performs 32 J of work on the surroundings.
    d. q = 34 J, w= -22J
    e. q=-28J, w= -23J
    f. q = -15J, w= 12J

30. Convert the following

459J = _____ cal   55.31 kJ = _____ J   43.5 cal = _____ J   456 J = _____ kJ

31. The specific heat capacity of iron is 0.444 J/gC. How many Joules of energy are needed to warm 22.50 g of iron from -100.00 °C to 19.00 °C

32. If a sample of mercury absorbs 22.5 Joules of energy and increases in temperature from 18.6°C to 23.2°C, then what is its mass (specific heat capacity of mercury = 0.14 J/g °C)?
                                                i.

33. The specific heat capacity of gold is 0.13 J/g °C. How many Joules of energy are needed to warm 2.700 g of gold from 25.0°C to 122.5°C?

34. When 1 mole of propane (C_3H_8) is burned at a constant pressure, 2221 kJ of energy is released as heat. Calculate ΔH for a process in which 123.2 g of propane is burned at constant pressure.

35. How much heat is evolved if 55.00 g of oxygen gas is consumed in excess methane (CH_4)? The reaction
      is: $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ ΔH = -891.1 kJ

36. How much heat is evolved if 55.00 g of methanol is burned in excess oxygen gas?
    a. _____$CH_3OH(l)$ + _____$O_2(g) \rightarrow$ _____$CO_2(g)$ + _____$H_2O(g)$ ΔH = -1453 kJ

Challenge Question
A 52.0-g sample of iron at 95.0°C is dropped into 15.0 g of water at 32.0°C. What is the final temperature of the mixture (specific heat capacity of iron = 0.444 J/g °C; specific heat capacity of water = 4.184 J/g °C)?