- 1. How many atoms are in 4 moles of iron?
- 2. What is the percentage by mass of oxygen in water?
- 3. A compound is 57.5 % sodium, 40% oxygen and 2.5 % hydrogen. What is its empirical formula?

4. A compound with an empirical formula of CH_2 has a molecular weight of 42. What is its molecular formula?

5. At STP 48 liters of neon would contain the same number of molecules as how many grams of Argon? What volume would the argon occupy?

6. Sodium and chlorine react to form sodium chloride. If 4 moles of chlorine react, how many moles of sodium chloride will form?

7. How many liters of chlorine at STP would be needed to react with 92 grams of sodium?

8. How many milliliters of chlorine were required in question 7?

9. Write and balance the equation for the combustion of butane.

10. If 232.0 grams of butane are combined with 192 grams of oxygen and a reaction occurs, how many grams of water will form?

11. If the reaction in number 9 was performed and 2 liters of carbon dioxide were produced at STP, what was the percent yield?

12. Write and balance the equation for the reaction of aluminum with hydrochloric acid.

13. If you are given 108 grams of aluminum to react with 146 grams of HCl, what will be the limiting reactant?

- 14. Convert 350 kPa to mm Hg.
- 15. A sample of gas occupies 4 liters at 25 C and 200 kPa. What will its volume be at STP?
- 16. What is the volume of a 4 mole sample of He at 200 K and 102 kPa.
- 17. What is the mass of 2 liters of ammonia at 222 kPa and 125 C?
- 18. How does the volume of at gas relate to temperature? to Pressure?
- 19. How is temperature related to average kinetic energy?
- 20. What phase change does solid carbon dioxide (dry ice) undergo at 1 atm and 25 C?
- 21. Why do your ears "pop" when you go up a mountain?
- 22. Does a gas diffuse faster, or slower at a high temperature
- 23. What is Boyle's law?

24. What is the molecular weight of a gas that has a mass of .5 grams in a volume of 1 liter at STP?

25. If you dissolve salt in a beaker of water and the temperature goes up, was the solution process exothermic or endothermic?

26. How many joules of energy are released when 40 grams of water cool from 40 C to 20 C?

27. How many joules of energy are needed to melt 20 grams of water (ice) at its melting point. The heat of fusion of water is 80 cal/gram and 4.18 joules = 1 calorie.

28. 25 grams of a metal at 98 C are put into a container of 50.0 grams of water at 18 C. The temp. of the water rises to 25 C. What was the specific heat capacity of the metal? Cp water = 4.18 J/gC

29. The ΔH for the combustion of ethane is -3120 kJ. If 100.0 grams are burned, what quantity of heat is released?

30. Was the reaction endothermic or exothermic?

31. If 400.0 kJ of energy are put into 50 grams of water at 25 C, what will be the final temperature of the water?

32. How do you determine whether a bond is ionic, polar covalent or non polar covalent?

33. What type of bond involves equal sharing of electrons?

34. How do the electronegativities of the atoms in a non-polar bond compare to each other?

35. What is the formula of an ionic compound between magnesium and nitrogen?

36. How many double bonds are in the Lewis dot diagram of carbon dioxide?

37. What is the electron domain geometry of ammonia (NH_3) ?

38. How many double bonds are in the carbonate ion (CO_3^{-2})

39. If two molecules are similar in size, would a polar or a non-polar molecule evaporate faster?

40. Between non-polar molecules, do big molecules or small molecules stick together better?

41. What is an unsaturated hydrocarbon?

42. What four elements would you expect to find in an amine?

43. What functional group would you expect to find in propanol?

44. Differentiate between alkanes, alkenes and alkynes.

45. How many moles are in 4 liters of 4 M NaOH?

46. What is the molarity of a solution containing 120 grams of NaOH in 4 liters of solution?

47. What is the pH range of a base?

48. What is the pH of a solution with a hydronium ion concentration of .0001 M?

49. How do you identify a base by looking at a chemical formula?

50. If 25 ml of acid HA are required to neutralize 35 ml of .2 M NaOH, what was the molarity of the acid?

51. What do acids donate to bases?

52. What is an electrolyte?

53. What is equilibrium?

54. How do equilibrium systems differ from the chemical reactions that we studied for most of the year?

55. For the reaction A + B <-> C, What effect will an increase in B have on A and C?

56. When metals combine with oxygen, what does their charge go up, or down?

57. In the reaction between chlorine and sodium iodide, what reactant is oxidized?

58. What type particle can be accelerated in a magnetic field?

59. When salt is put into water, what effect does it have on the liquid range of the water?

60. What is the difference between nuclear fusion and nuclear fission?