Senior Final Exam Review 2013 Name: _____
Chemistry
4 points **DUE AT EXAM** Date: _____ Hour: _____

Provided during the exam: periodic table (no names), ion chart, activity series, solubility chart, molarity formula, conversion from mL to L, pH formula

mole
Avogadro's number
molar mass
conversion from moles to grams
conversion from moles to molecules
conversion from grams to particles
molarity
hydrate
molecular formula
empirical formula
percent composition
seven diatomic gases

1) What are the empirical formulas of

$C_6H_8O_6$ _____ CH_4 _____ $C_{40}H_{56}$ _____

2) How many oxygens are represented here: $6\ Ba_3(PO_4)_2$? _____

3) What is the molar mass of ammonium silicate? [112.174 g or 112.17 g]

4) What is the molar mass of Vitamin A ($C_{20}H_{30}O$)? [286.44 g]

5) What is a mole? _____

6) What is Avogadro's number? _____

7) (a) Which gases are diatomic? _____

(b) What does that mean? _____

8) What is a hydrate? _____

9) What happens to a hydrate when you heat it? _____

10) List the prefixes used to name hydrates:

1 = _____ 2 = _____ 3 = _____

4 = _____ 5 = _____ 6 = _____

7 = _____ 8 = _____ 9 = _____

10 = _____

11) Calculate the mass in grams of 2.23 moles of nitrogen gas. [62.5 g]

12) Determine the number of molecules in 0.34 moles of nitrogen gas. [2.0×10^{23} molecules]

13) How many atoms of sulfur are in 1.60×10^{-14} g of sulfur? [3.00×10^{8} atoms]

14) What is molarity? _____

15) Calculate the molarity of a 2.00 L solution that contains 5.56 mol of NaCl. [2.78 M or mol/L]

16) Calculate the molarity of a 200.0 mL solution that contains 19.2 g of KOH. [1.71 M or mol/L]

17) What is the percent composition of each element in $Ca_3(PO_4)_2$? [38.8% Ca, 20.0 % P, 41.3 % O]

18) What is the empirical formula of a compound that is 53.73 % Fe and 46.27 % S? [Fe_2S_3]

19) The molar mass of a compound is 92 g. Analysis of the compound shows that there are 0.608 grams of nitrogen and 1.388 grams of oxygen in the compound sample. What is the molecular formula of this compound? [N_2O_4]

product
reactant
states of matter symbols
precipitate
aqueous solution
coefficient
balancing equations
law of conservation of mass
double displacement
decomposition
single displacement
combustion
synthesis
activity series
prediction of single displacement products
solubility chart
prediction of double displacement products
limiting reactant
excess reactant
percent yield

20) What does the 4 in 4 $Ni(IO_3)_2$ mean? _____

21) Write and/or balance the following equations:

(a) SiF_4 + H_2O —> H_2SiF_6 + H_2SiO_3

(b) Fe + H_2O —> Fe_3O_4 + H_2

(c) niobium (III) iodide + iodine gas —> niobium (V) iodide

(d) C_7H_{14} + O_2 —> CO_2 + H_2O

(e) aluminum + copper (II) chloride —> aluminum chloride + copper

22) What are the five common types of reactions? How can you tell which is which?

_____

_____

_____

_____

_____

23) Where are the reactants written in a chemical equation? the products?

_____

24) Write and balance the following equations:

(a) iron (II) sulfide + hydrochloric acid -----> [double displacement]

(b) barium bromide + fluorine gas -----> [single displacement]

25) What do the different symbols mean in a reaction equation?

(g) = _____ (ℓ) = _____

↓ = _____ (s) = _____

(aq) = _____ (cr) = _____

↑ = _____ —> = _____

acid
base
neutral
properties of acids
properties of bases
pH scale

binary acid
oxyacid
naming acids
neutralization
salt

26) What are three characteristics of acids? _____

_____

_____

27) What are three characteristics of bases? _____

_____

_____

28) Acids produce _____ in water.

29) Bases produce _____ in water.

30) (a) What is pH? _____

(b) What pH range is considered acidic? _____ basic? _____ neutral? _____

31) Name the following acids:

(a) HF _____ (d) H_2CO_3 _____

(b) $H_2C_2O_4$ _____ (e) HNO_3 _____

(c) H_2SO_4 _____ (f) HI _____

mole ratio
stoichiometry
mole-mole stoichiometry
mole-gram stoichiometry
gram-gram (mass-mass) stoichiometry

32) Calculate the mass of hydrochloric acid needed to react with 5.0 g of Zn. [5.6 g]

$$Zn + HCl \longrightarrow ZnCl_2 + H_2$$

33) How many grams of chlorine gas must be reacted if 8.0 g of sodium chloride are needed? [4.9 g]

$$NaI + Cl_2 \longrightarrow NaCl + I_2$$

34) Molten iron and carbon monoxide are **produced** in a blast furnace by the reaction of iron (III) oxide and carbon. If 25.0 g of pure iron (III) oxide are used, how many grams of iron can be produced? [17.5 g]

system
surroundings
energy conversion
exothermic
endothermic
energy graphs/diagrams
heat vs. temperature
direction of heat flow
stoichiometry with energy
specific heat calculations
conduction, convection, and radiation

35) A piece of candy contains 53 kJ of energy. How many calories is that?

[13 000 cal or 1.3×10^4 cal]

36) Draw the two energy diagrams/graphs for endothermic and exothermic reactions.
(be ready to draw and explain them on the exam)

37) A 5.09 g metal sample is heated to 99.6 °C and dumped into 49.00 g of calorimeter water at an initial temperature 19.8 °C. The final (peak) temperature of the water is 21.1 °C. What is the specific heat of the metal? [0.67 J/g·°C]

38) (a) List two examples of exothermic labs or demonstrations: _____

_____

(b) List two examples of endothermic labs or demonstrations: _____

_____

39) How much energy is given off when 100.0 grams of hydrogen gas are reacted? [12000kJ]

$$2\ H_2 + O_2 \longrightarrow 2\ H_2O + 484\ kJ$$

(b) Is the reaction endothermic or exothermic? _____

40) How much energy is needed to disassociate 34.5 moles of ammonia? [1590 kJ]

$$2\ NH_3 + 92.2\ kJ \longrightarrow 3\ H_2 + N_2$$

(b) Is the reaction endothermic or exothermic? _____

electronegativity
intramolecular forces
ionic bond
covalent bond
polar covalent bond
intermolecular forces
dispersion
dipole-dipole forces
hydrogen bonding
redox
oxidation
reduction
half-reactions

41) What is electronegativity? _____

_____

42) What element has the (a) highest electronegativity? _____

(b) lowest electronegativity? _____

43) An ionic bond forms between _____ _____

44) A covalent bond forms between _____

45) (a) What are intermolecular forces? _____

(b) What is the strongest intermolecular force? _____

(c) What is the weakest intermolecular force? _____

46) Which three elements are involved in hydrogen bonding? _____

47) What is oxidation? _____

48) What is reduction? _____

49) Write and balance the half-reactions for this redox reaction:

$$Fe_2O_3 \text{ -----> } Fe + O_2$$

(a) What is oxidized? _____ (b) What is reduced? _____