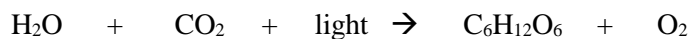
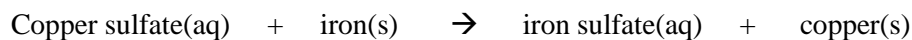
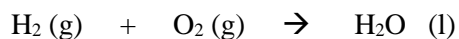


Name: _____

Period: _____

General Chemistry
First Semester Final Exam Study Guide
60 multiple choice questions

1. Define product.
2. Define reactant.
3. Label the products and reactants in the following chemical reactions:



4. Define element and give three examples.
5. Define compound and give three examples of compounds.
6. Explain the law of conservation of mass and give a scenario that supports this law.
7. Complete the chart.

Subatomic Particle	Charge	Size	Location in Atom

Name: _____

Period: _____

8. Which subatomic particle makes up most of an atom's mass?
9. Most of an atom's volume is really what?
10. Define isotope and give an example.
11. Why is the atomic mass of a given element usually **NOT** listed on the periodic table as a whole number?
12. What particle does the atomic number listed on the periodic table represent, and where does this particle reside?
13. Write the equation that relates the mass # to the number of protons and neutrons in the nucleus of an atom.
14. Complete the chart.

Name	Symbol	Protons	Neutrons	Electrons	Atomic Mass	Atomic Number
Potassium						
	Pb					82
Arsenic				33		
		47	63			
					260	101

15. Which elements from problem 36 were isotopes?
16. List the four electron orbitals AND the total number of electrons each orbital can hold.
17. Write the unabbreviated electron configuration for the following atoms:
 - a. Helium
 - b. Oxygen
 - c. Aluminum
 - d. Neon

Name: _____

Period: _____

18. Write the abbreviated (noble gas) electron configuration for the following atoms:

a. Silver

b. Copper

c. Tungsten

d. Titanium

19. Define ground state.

20. Define excited state.

21. How do atoms jump from ground state to excited state and back? (Remember our Flame Test Lab!)

22. Which atomic particle changes energy states?

23. Who is considered the “father” of the modern periodic table?

24. Define period.

25. Define group.

26. Define electron affinity.

27. Define electronegativity.

28. Define atomic radius.

29. Define ionization energy.

Name: _____

Period: _____

30. Label the following on the attached periodic table (page 13):

- | | |
|-------------------------------|----------------------------------|
| 1) Highest electron affinity | 11) Lanthinide |
| 2) Highest electronegativity | 12) Metals |
| 3) Largest atomic radius. | 13) Nonmetals |
| 4) Highest ionization energy. | 14) Metalloids |
| 5) Highest reactivity. | 15) Solids |
| 6) Alkali metal | 16) Liquids |
| 7) Alkaline earth metals | 17) Gases |
| 8) Halogens | 18) Valence electrons for groups |
| 9) Noble gases | 1, 2, 13-18 |
| 10) Actinide | |

31. Label the subscripts in the following chemical formula.



32. What information does a subscript reveal and how would changing a subscript in a chemical formula change the chemical it represents?

33. Define molar mass.

34. Calculate the molar mass of the following:

a) Au

b) H₂O

c) Mg(MnO₄)₂

d) CH₃CH₂COOH

e) Fe₂(SO₄)₃

35. Define molecular formula.

Name: _____

Period: _____

36. Define empirical formula.
37. What is the empirical formula for C_6H_{12} ?
38. What is the empirical formula for Hg_2C_{12} ?
39. What is the percent composition of the following compounds:
- a) potassium cyanide, KCN

 - b) butane, C_4H_{10}

 - c) sulfuric acid, H_2SO_4
40. Find the empirical formula of a compound that is 63.52 % iron and 36.48 % sulfur.
41. Find the empirical formula of a compound that contains 32.38 % sodium, 22.65% sulfur, and 44.99% oxygen.
42. Calculate the empirical formula of a compound containing 1.0 g K, 0.70 g Cr, and 0.82 g of O.
43. If you have a mole of pennies, how many do you have?

Name: _____

Period: _____

44. Convert 3.5 moles of nickel into grams.

45. What is the mass of 5 moles of $C_6H_{12}O_6$, glucose?

46. How many grams are in 3 moles of HCl, hydrochloric acid?

47. Convert 100 grams of $CaCO_3$ (chalk) into moles?

48. How many moles are in 1 gram sample of gold?

49. How is an ion different than an atom?

50. Define cation and give an example.

51. Define anion and give an example.

52. Define ionic bond.

53. Name the following ionic compounds.

a) $Al(SO_4)_2$

b) PbF_4

c) KBr_2

d) $Ca(OH)_2$

e) $Mg(NO_2)_2$

Name: _____

Period: _____

54. Write the formula for the following ionic compounds.

- a) Magnesium chlorate
- b) Potassium cyanide
- c) Tin (IV) chloride
- d) Zinc nitrate
- e) Calcium chlorite

55. Define covalent bond.

56. Name the following covalent (in other words molecular) compounds.

- a) As_3P_5
- b) IF_7
- c) NO_2
- d) SrH_2
- e) SiCl_4

57. Write the formula for the following covalent (in other words molecular) compounds.

- a) dinitrogen pentoxide
- b) carbon monoxide
- c) trisulfur difluoride
- d) triarsenic pentanitride
- e) dihydrogen monoxide

Name: _____

Period: _____

58. Compare and contrast ionic and covalent bonds (include the properties).

59. Define polar covalent bond.

60. Define nonpolar covalent bond.

61. How many electrons are shared in a covalent bond?

62. Define octet rule. Which family on the period table has a complete octet and thus does not react to form compounds?

63. Define valence electron.

64. How many valence electrons do the following atoms have:

a) Magnesium

b) Bromine

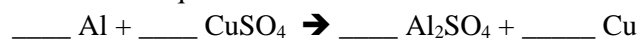
c) Calcium

d) Phosphorous

65. The electron configuration of oxygen is $1s^2 2s^2 2p^4$. How many more electrons does oxygen need to satisfy the octet rule?

66. How do you balance a chemical reaction?

67. Balance the equation below:



Name: _____

Period: _____

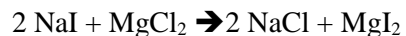
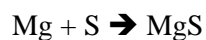
68. In a chemical formula, what do the subscripts tell you?

69. Balance the equations below:



70. What does a balanced chemical equation tell you?

71. Identify the type of reaction (synthesis, double displacement, etc) below:



72. Define the following:

a) Synthesis-

b) Single displacement-

c) Decomposition-

d) Double displacement-

73. What type of reaction is it, if your products are $\text{CO}_2 + \text{H}_2\text{O}$?

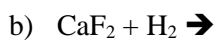
74. Define activity series.

75. Predict the products of the following reactions using the activity series in your textbook:



Name: _____

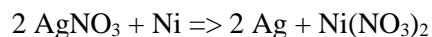
Period: _____



76. In the following reaction, $2 \text{NaI} + \text{MgCl}_2 \rightarrow 2 \text{NaCl} + \text{MgI}_2$, what is the mole ratio of MgCl_2 to NaCl ?

77. Write the calculation for a grams-grams conversion (mass-mass).

78. If you have 22.9 g of Ni and 112 g of AgNO_3 , which reactant is limiting? Which is excess?



79. Using the reaction in number 78, what mass of $\text{Ni}(\text{NO}_3)_2$ would be produced?

80. Write the calculation for moles-gram conversion (mole-mass).

81. What happens to a reaction when the limiting reactant is used up?

82. Write the calculation for a grams-mole conversion (mass-mole).

83. Write the calculation for a mole-mole conversion.

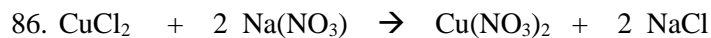
84. If you have 5.94 g of Cu and 23.23 g of HNO_3 , which reactant is limiting? Which is excess?



Name: _____

Period: _____

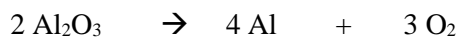
85. Using the reaction in number 84, what mass of NO_2 would be produced?



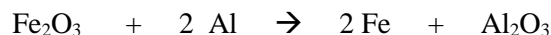
If 15 grams of copper (II) chloride react with 20 grams of sodium nitrate, how many grams of sodium chloride can be formed?

87. Using the balanced equation in #86, how many moles of CuCl_2 are reacted to form 3 moles of NaCl ?

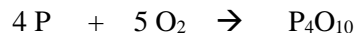
88. How many moles of aluminum will be produced from 30,000.0 g of Al_2O_3 in the following reaction?



89. How many moles of Fe_2O_3 will react with 99 grams of Al ?



90. What mass of P will be needed to produce 3.25 moles of P_4O_{10} ?



91. What mass of O_2 is produced when 1.840 moles of H_2O_2 decomposes?



Name: _____

Period: _____

92. Write the formula for calculating percentage yield.

93. For the reaction: $2 \text{Fe}(\text{PO}_4) + 3 \text{Na}_2(\text{SO}_4) \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 2 \text{Na}_3(\text{PO}_4)$, if I perform the reaction with 25 grams of iron (III) phosphate, how many grams of iron (III) sulfate can I make?

94. Using the reaction in #93, if 18.5 grams of iron (III) sulfate are actually produced, what is my percent yield?

Name: _____

Period: _____

The Periodic Table of the Elements

1 H Hydrogen 1.00794																	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
11 Na Sodium 22.989770	12 Mg Magnesium 24.3050											13 Al Aluminum 26.981538	14 Si Silicon 28.0855	15 P Phosphorus 30.973761	16 S Sulfur 32.066	17 Cl Chlorine 35.4527	18 Ar Argon 39.948
19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955910	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938049	26 Fe Iron 55.845	27 Co Cobalt 58.933200	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.39	31 Ga Gallium 69.723	32 Ge Germanium 72.61	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.80
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.29
55 Cs Cesium 132.90545	56 Ba Barium 137.327	57 La Lanthanum 138.9055	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.078	79 Au Gold 196.96655	80 Hg Mercury 200.39	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98038	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (263)	107 Bh Bohrium (262)	108 Hs Hassium (265)	109 Mt Meitnerium (266)	110 (269)	111 (272)	112 (277)	113 	114 				

58 Ce Cesium 140.116	59 Pr Praseodymium 140.90765	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92534	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93032	68 Er Erbium 167.26	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.967
90 Th Thorium 232.0381	91 Pa Protactinium 231.03588	92 U Uranium 238.0289	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)

1995 IUPAC names and Approved Names from <http://www.chem.qmul.ac.uk/iupac/ABW/>
 names for 107-111 from Ck29, March 13, 1995, p. 35
 112 from <http://www.chem.qmul.ac.uk/iupac/ABW/>