ACCELERATED CHEMISTRY SEMESTER 1 PROBLEM SHEET

100. Determine the number of significant figures in the following numbers:
   a. 100 _____
   b. 0.000123 _____
   c. 1.00300 _____
   d. 1.2300 _____
   e. 1.20×10^{16} _____
   f. .00010100 _____

   Write the following numbers in correct scientific notation
   a. 1560000000000000 _____
   b. .0000000000234 _____

   Write the following numbers in regular notation
   a. $7.25 \text{ X } 10^{23}$ _____
   b. $3.04 \ 10^{-9}$ _____

   Solve the following problems using correct significant figure rules.
   a. 7.23 + 0.0111 = _____
   b. 3cm + 1.45cm = _____
   c. 32.111 – 6.8 = _____
   d. 5.00 x 0.0032 = _____
   e. 2100 x 0.05433 = _____
   f. $1.34 \times 10^{21} \times 2.5 \times 10^{8}$ _____
   g. $3.500 \times 10^{4} \times 2.0000 \times 10^{12}$ _____

   Be able to read and interpret graphs.

101. Convert the following numbers using dimensional analysis
   a. 2500 cm to km

   b. 67.8 ml to L

   c. 31 days to seconds.

   Identify the following type of unit. (modified, derived, base, SI)
   a. Km

   b. cubic cm

   c. L

102. Determine whether the following properties is physical or chemical
   a. Melting point
   b. Flammability
   c. Conductivity
   d. Density
   e. Reactivity with acids

   List the five indicators of a chemical change

a. _____ b. _____ c. _____
d. _____ e. _____

Detemine whether the following is a physical or chemical change

a. Milk spoiling
b. Leaf changing color
c. Sharpening of a pencil
d. Melting of Ice
e. Combusiton of propane

103. Determine whether or not the following in an element, mixture, or compound

a. Salt water
b. Sugar
c. Aluminum
d. Lead
e. Total Cereal
f. Sodium Acetate

104. List the scientist credited with the discovery and the experiment performed

a. Nucleus _____

b. Electron _____

c. Atom _____

d. Energy Levels _____

105. Calculate the average atomic mass for Nitrogen if it has two naturally occurring isotopes. Nitrogen – 14 which has a mass of 13.998 amu and a percent of 98.71 percent and Nitrogen 15 which has a mass of 14.998 amu and a percent of 1.29 percent.

Give the number of Protons, neutrons, and electrons in the following isotopes

a. Silver – 110 _____

b. Sulfur – 33 _____

Give the atomic #, mass number, and average atomic mass for the following isotopes.

a. Boron – 11 atomic # _____ mass # _____ avg. atomic mass _____

b. Chlorine – 35 atomic # _____ mass # _____ avg. atomic mass _____

106. Give the electron or noble gas configuration for the following elements.

a. Cu _____

b. Ca _____

c. Li _____

Circle the more reactive particle given its electron configuration.

a. 1s2 2s2 2p5 or 1s2 2s2 2p4

b. [Ar] – 4s1 or [Ar] – 4s2

d. [Ne] – 3s2 3p6 or [Ne] - 3s2

Determine how the following elements achieve a stable octet given its electron configuration.

a. 1s2 2s2 2p6 3s2 3p3 _____

b. [Kr] – 5s1 _____

c. [Ar] – 4s2 3d10 4p4 _____

107. Describe the wave mechanical view of the atom

_____
_____
_____

Identify the four quantum numbers

a. n _____ l _____ m_i _____ m_s _____

Give the four quantum #'s for the following elements

a. Oxygen _____

b. Kr _____

c. Scandium _____

108. Answer the following questions about the major groups on the periodic table
   a. Name of the group that is generally chemically unreactive _____
   b. The group that contains highly reactive metals _____
   c. The group that has 7 valance electrons _____
   d. The group that has electrons located in the 'd' sublevel _____

Based on the listed properties identify the region of the periodic table
   a. Lustrous, good conductor, high melting point, ductile _____
   b. Dull, semiconductor, malleable _____

109. Going across a period identify the trend
   a. atomic radius _____
   b. Ionization energy _____
   c. Electronegativity _____
   d. Shielding effect _____

Going down a group identify the trend
   a. atomic radius _____
   b. Ionization energy _____

c. Electronegativity _____
d. Shielding effect _____

Pick the larger particle

a. Na or Na^+ b. F or F^- c. Ca or Br d. Cl or Br

Give the symbol and name of the ion formed from the following atoms

a. Mg _____
b. S _____
c. N _____
d. Cu^{2+} _____

110. Name the model for metallic bonding and why it can explain conductivity.

_____
_____
_____

List five properties of Ionic compounds

_____
_____

Given the elements list the type of bond

a. Mg and Br _____
b. C and Cl _____
c. O and Br _____
d. Cs and I _____

111. Write the formulas for the following ionic compounds

a. Calcium Chloride _____
b. Manganese (V) Bromide _____
c. Aluminum Sulfide _____
d. Titanium (III) Nitride _____
e. Lithium Sulfate _____

Give the names of the following compounds

a. MgO _____
b. $CuCl_2$ _____
c. $FePO_4$ _____
d. Na_2SO_4 _____
e. $Mg(HCO_3)_2$ _____

112. List four properties of covalent molecules

_____
_____

For the following molecules give the name, lewis structure, shape, 3-d model, name of shape, angle, and molecular polarity

a. SO_4^{2-}

b. NH_3

c. CO_2

d. CCl_4

Give the orbital hybridization for the following compounds

a. CO_2 _____ b. PH_3 _____ c. CCl_4 _____

Identify the type of bond (sigma or pi)

a. CO bond in carbon dioxide _____ PH bond in PH_3 _____

113. Given the electronegativity difference give the type of bond

a. 1.8 _____
b. 2.3 _____
c. 0.0 _____

Based on the location on the periodic table identify the type of bond.

a. S and O _____ Fe and S _____

114. Name the following molecules.

a. N_2O_5 _____
b. As_2S_7 _____
c. CO _____

Write the formulas for the following compounds

a. Nitrogen monoxide _____
b. Oxygen dichloride _____
c. Diphosphorus pentachloride _____

115. Identify the type of reaction listed below

a. $AX + BY \rightarrow AY + BX$ _____
b. $A + B \rightarrow AB$ _____
c. $CD \rightarrow C + D$ _____
d. $A + BX \rightarrow AX + B$ _____
e. $X + O_2 \rightarrow CO_2 + H_2O$ _____

Write the double replacement and net ionic equation for the following compounds:

a. Ammonium phosphate and chromium (III) bromide. Chromium (III) phosphate precititates.

_____
_____

b. Manganese (V) chloride and sodium carbonate

_____
_____

116. What is adjusted to balance and chemical reaction and why?

_____
_____

Write and balance the following chemical reactions

a. The gases nitrogen dioxide and oxygen react to produce dinitrogen pentoxide.

b. Heating sodium bicarbonate produces sodium carbonate (s) carbon dioxide and water

c. Sodium reacts with water

d. The combustion of propane C_3H_8

e. Sulfuric acid neutralizes magnesium hydroxide

117. Determine the percent composition of $Mg(NO_3)_2$

Find the empirical formula for a compound that contains 36.84 % Nitrogen and 63.16 % Oxygen.

Find the molecular formula for a compound that contains 40.68 % C 5.08% H and 54.24% Oxygen. Its molar mass is 118.1 g.

118. Make the following conversions:

a. 36.68 g of $CuSO_4$ to moles

b. 2.11 moles of $CuSO_4$ to molecules

c. 1.23×10^{24} atoms of Ne to Moles

d. 320 g of Sulfur to atoms

e. 78.1 moles of Sulfur to atoms

f. Calculate the mass of one atom of Nitrogen.