**AP CHEMISTRY SUMMER ASSIGNMENT**

1. Perform the following calculations
   1. The helium gas stored inside a large weather balloon weighs 13.558 grams. What is the volume of this balloon if the density of helium is 0.1786 g/L?
   2. 28.5 grams of iron shot is added to a graduated cylinder containing 45.5 mL of water. The water level rises to the 49.1 mL mark. From this information, calculate the density of iron.
2. Write the formula for the following compounds:
   1. ammonium sulfide
   2. sodium nitrate
   3. aluminum sulfate
   4. nitric acid
   5. Lead (II) phosphate
   6. diphosphorus pentoxide
   7. carbon tetrachloride
   8. silver phosphate
   9. Ammonium phosphate
   10. Sulfurous acid
   11. chloric acid
   12. Iron (III) Chloride
   13. Lithium Chromate
3. Write the names for the following compounds:
   1. FePO4
   2. KH
   3. Hg2SO4
   4. HCl
   5. CaSO4
   6. NaHCO3
   7. Ba(OH)2
   8. IF5
   9. SF4
   10. Co(NO3)2
   11. Cr(MnO4)3
   12. SO3
   13. PCl3
4. Name these binary acids

HCl \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HI \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Name these acids with polyatomic ions.

HClO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ H2SO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HC2H3O2\_\_\_\_\_\_\_\_\_\_\_\_

H3PO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ HNO2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ H2CrO4\_\_\_\_\_\_\_\_\_\_\_\_\_

H2C2O4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ H2CO3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write the electron configuration (long way), orbital notation for valence electrons only (boxes w/ arrows), and Noble Gas notation for the following.
   1. Sulfur
   2. Tin
   3. Rubidium
   4. Selenium
   5. Tungstun
2. Write the balanced equation and indicate the reaction type (single replacement, double replacement, decomposition or combination/synthesis, combustion) for each of the following:
   1. Sulfuric acid + Potassium Hydroxide 🡪
   2. Zinc metal + Hydrochloric acid🡪
   3. Chlorine gas + Magnesium iodide🡪
   4. Magnesium + Oxygen gas 🡪
   5. Sodium Chloride + Silver nitrate🡪
   6. Complete combustion of propane (C3H8)🡪

**Solubility rules**

1. Review solubility rules and identify each of the following compounds as soluble or insoluble in water.

Na2CO3\_\_\_\_\_\_\_\_\_\_\_ CoCO3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pb(NO3)2\_\_\_\_\_\_\_\_\_\_\_

K2S­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_ BaSO4\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (NH4)2S \_\_\_\_\_\_\_\_\_\_\_

AgI\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ni(NO3)2\_\_\_\_\_\_\_\_\_\_\_\_\_\_ KI­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

FeS\_\_\_\_\_\_\_\_\_\_\_\_\_\_ PbCl2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CuSO4\_\_\_\_\_\_\_\_\_\_\_\_\_

Li2O\_\_\_\_\_\_\_\_\_\_\_\_\_ Mn(C2H3O2)2\_\_\_\_\_\_\_\_\_\_\_ Cr(OH)3\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

AgClO3 \_\_\_\_\_\_\_\_\_\_ Sn(SO3)4 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ FeF2\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. List the number of protons, neutrons, and electrons in 136C? 23492 U? 19F1-? 85Rb1+?
2. Find the mass in grams of 3.10 x 1023 molecules of F2.
3. Calculate the moles in 10.0 grams of Copper (II) bromide.
4. NaCl + AgNO3 🡪 AgCl + NaNO3

a) If you have 78.0 grams of NaCl, how many grams of AgCl should be produced?

b) How much AgCl can be produced from 107 grams of AgNO3?

1. Calculate the percentage of nitrogen in each of the following compounds: NH4NO3, (NH4)2SO3.
2. What is the volume (in mL) of 18.0 M Sulfuric acid is needed to contain 2.45 grams of H2SO4.
3. What is the molarity of a solution made by dissolving 20.0 grams of H3PO4 in 50.0 mL of solution?
4. How many electrons are in the valence shell of:
   * 1. the halogen family?
     2. the Oxygen family?
     3. the alkali metals?
     4. the boron family?
     5. the inert gases?
     6. the alkaline earth metals?
     7. the carbon family?
     8. the nitrogen family?
5. Why do atomic radii decrease from left to right within a period?
6. What is meant by nuclear shielding?
7. Arrange the following in order of decreasing radius: Br, I, Se, Li.
8. Why does ionization energy increase from left to right across a period?

**Stoichiometry and Limiting Factor**

1. Given the equation below, what mass of water would be needed to react with 10.0g of sodium oxide?

Na2O + H2O 🡪 2NaOH

1. 2NaClO3 🡪 2NaCl + 3O2

What mass of sodium chloride is formed along with 45.0g of oxygen gas?

1. 4NH3 + 5O2 🡪 4NO + 6 H2O

What mass of water will be produced when 100.0g of ammonia is reacted with

excess oxygen?

1. If the reaction in #23 is done with 25.0g of each reactant, which would be the

limiting factor?

1. Na2S + 2AgNO3 🡪 Ag2S + 2NaNO3

If the above reaction is carried out with 50.0g of sodium sulfide and 35.0g of silver

nitrate, which is the limiting factor?

What mass of the excess reactant remains?

What mass of silver sulfide would precipitate?

1. 6NaOH + 2Al 🡪 2Na3AlO3 + 3H2

What volume of hydrogen gas (measured at STP) would result from reacting 75.0g of sodium

hydroxide with 50.0g of aluminum?

**Thermochemistry**

1. The value of ΔH for the reaction below is -126 kJ. How much energy will be released when 20.0 g of NaOH is formed in the reaction? 2 Na2O2 (s)  + 2 H2O(l) 🡪 4 NaOH (s) + O2 (g)
2. A gold ring (specific heat = 0.129 J/g.oC) that weighs 3.81 g is heated to 84 oC and placed in 50.0 g of water (Specifi heat 4.184 J/g.oC) at 22.1 oC. What is the final temperature?

**Bonding & Structure**

1. For each of the following molecules or ions, indicate the bond angle expected between the central atom and two adjacent hydrogen atoms. H2O, NH3, NH4+, CH4
2. Draw the structures of the following, state bond angle, some may be double bonds.

H2S, SiF4, C2H4, C3H8, HCN, C2H2, CO3-2

1. Which of the following has the strongest intermolecular attraction? Li2O, F2, SO2,
2. The difference in the strengths of the intermolecular forces among CH4 and NH3 are mainly due to..
3. Identify the strongest intermolecular force exhibited by each of the following samples of molecules. O2, CO, K2O, CH4, NH3,