AP Chemistry Summer Assignment (Semester-Long)

The following assignment will not be collected. These topics and others, however, will be tested in the first unit of the semester. You will have a markedly sharper recall of chemistry topics and a distinctly lower workload for Unit 1 if you complete this assignment before the first day of school. Questions about the assignment may be directed to cwayand@wcpss.net.

Nomenclature

1. Name these binary compounds of two nonmetals.

IF_7 ____________________ As_4O_{10} ____________________

N_2O_5 ____________________ SF_6 ____________________

XeF_2 ____________________ PCl_3 ____________________

N_2O ____________________ SCl_2 ____________________

2. Name these binary compounds with cations of a fixed charge.

$CsCl$ ____________________ $SrBr_2$ ____________________

MgO ____________________ Na_2S ____________________

BaI_2 ____________________ CaF_2 ____________________

K_3N ____________________ Al_2O_3 ____________________

3. Name these binary compounds with cations of variable charge.

$CuCl_2$ ____________________ Cu_2S ____________________

Fe_2O_3 ____________________ HgS ____________________

SnO ____________________ AuI_3 ____________________

$PbCl_4$ ____________________ CoP ____________________

4. Name these compounds with polyatomic ions. Follow rules for cations.

$Fe(NO_3)_3$ ____________________ K_2SO_2 ____________________

$NaOH$ ____________________ $NaHCO_3$ ____________________

Cu_2SO_4 ____________________ NH_4NO_2 ____________________

$Ca(ClO_3)_2$ ____________________ $Cu_2Cr_2O_7$ ____________________

5. Name these binary acids.

HCl ______________________ HI ______________________

6. Name these oxoacids (acids with polyatomic ions).

$HClO_4$ ______________________ HNO_2 ______________________

H_2SO_4 ______________________ H_2CrO_4 ______________________

$HC_2H_3O_2$ ______________________ $H_2C_2O_4$ ______________________

H_3PO_4 ______________________ H_2CO_3 ______________________

7. Name these compounds appropriately. Apply the correct naming convention.

CO ______________________ HF ______________________

NH_4CN ______________________ SO_2 ______________________

HIO_3 ______________________ $CuCr_2O_7$ ______________________

NI_3 ______________________ K_2O ______________________

AlP ______________________ FeF_3 ______________________

OF_2 ______________________ $PbSO_4$ ______________________

$LiMnO_4$ ______________________ $KC_2H_3O_2$ ______________________

HClO ______________________ MnS ______________________

8. Write the formulas for these compounds.

tin (IV) phosphide ______________________ potassium nitride ______________________

copper (II) cyanide ______________________ chromium (III) carbonate ______________________

magnesium hydroxide ______________________ gallium arsenide ______________________

sodium peroxide ______________________ cobalt (II) chromate ______________________

sulfurous acid ______________________ zinc fluoride ______________________

lithium silicate ______________________ dichromic acid ______________________

Solubility rules

9. Review solubility rules and identify the following compounds as soluble (aq) or insoluble (s) in water.

Na_2CO_3 ____________	FeS ____________
$CoCO_3$ ____________	$PbCl_2$ ____________
$Pb(NO_3)_2$ ____________	$CuSO_4$ ____________
K_2S ____________	Li_2O ____________
$BaSO_4$ ____________	$Mn(C_2H_3O_2)_2$ ____________
$(NH_4)_2S$ ____________	$Cr(OH)_3$ ____________
AgI ____________	$AgClO_3$ ____________
$Ni(NO_3)_2$ ____________	$Sn(SO_3)_4$ ____________

10. Predict whether each of these double replacement reactions will produce a precipitate or not based on the solubility of the products. If yes, identify the precipitate.

silver nitrate and potassium chloride ______ ____________

magnesium nitrate and sodium carbonate ______ ____________

strontium bromide and potassium sulfate ______ ____________

cobalt (III) bromide and potassium sulfide ______ ____________

ammonium hydroxide and copper (II) acetate______ ____________

Balancing Equations

11. Balance the following equations with the lowest whole number coefficients.

____ S_8 + ____ O_2 → ____ SO_3

____ $C_{10}H_{16}$ + ____ Cl_2 → ____ C + ____ HCl

____ Fe + ____ O_2 → ____ Fe_2O_3

____ $Hg(OH)_2$ + ____ H_3PO_4 → ____ $Hg_3(PO_4)_2$ + ____ H_2O

____ H_3AsO_4 → ____ As_2O_5 + ____ H_2O

____ V_2O_5 + ____ HCl → ____ $VOCl_3$ + ____ H_2O

____ $C_7H_6O_2$ + ____ O_2 → ____ CO_2 + ____ H_2O

Writing Reactions

12. Write a **balanced equation with physical states** for the following:

a. Reaction of boron trifluoride gas with water to yield aqueous hydrofluoric acid and solid boric acid.

b. Reduction of iron (III) oxide by magnesium to form magnesium oxide and iron.

c. The decomposition of dinitrogen oxide gas into its elements.

d. Solid calcium carbide reacts with water to form calcium hydroxide and acetylene (C_2H_2) gas.

e. Solid calcium cyanamide ($CaCN_2$) reacts with water to form calcium carbonate and ammonia gas.

f. Ethane burns in air (oxygen).

g. Sodium reacts with iodine gas to form sodium iodide.

h. Carbon dioxide combines with water to form carbonic acid.

i. Magnesium and nitrogen gas combine to form magnesium nitride.

Quantitative Relationships in Chemistry

13. How many **significant figures** are in each of the following?

a.	1.9200 mm	_______	e.	0.000036 cm^3	_______
b.	0.0301001 kJ	_______	f.	10000 J	_______
c.	6.022 x 10^{23} atoms	_______	g.	110. mL	_______
d.	460.000 L	_______	h.	0.001345 g	_______

14. Record the following in correct **scientific notation**:

a. 4050,000,000 cal ____________________ c. 0.00345 g ____________________

b. 0.000123 mol ____________________ d. 700,000,000 atoms ____________________

15. Calculate the following to the **correct number** of significant figures. Maintain units where appropriate.

a. 1.270 g / 5.296 cm^3 = ____________________ d. 170 g + 2.785 g = ____________________

b. 12.235 g / 1.010 L = ____________________ e. 2.100 cm × 3.2102 cm = ____________________

c. 12 g + 0.38 g = ____________________ f. 2.35 mL – 0.4 mL – 1.23 mL = ____________________

16. Calculate the number of moles of the following: (SHOW YOUR WORK!)

a. 42.8 g of KNO_3

b. 9.25×10^{26} formula units of $CaCl_2$

c. 155.7 L of CO_2 at STP

Stoichiometry and Limiting Reactants

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

__ Na_2O (s) + __ H_2O (l) □ __ NaOH (aq)

17. _ $NaClO_3$ (s) □ _ NaCl (s) + _ O_2 (g)

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

18. _ NH_3 (g) + _ O_2 (g) → _NO (g) + _ H_2O (g)

What mass of water vapor will be produced when 100.0 g of ammonia is reacted with excess oxygen?

19. If the reaction in #18 is performed with 25.0 g of each reactant, which would be the limiting factor?

20. __ Na_2S (aq) + __ AgNO (aq) → __ Ag_2S (s) + __ $NaNO_3$ (aq)

If the above reaction is carried out with 50.0 g of sodium sulfide and 35.0 g of silver nitrate, which is the limiting factor?

What mass of the excess reactant remains?

What mass of silver sulfide would precipitate?

21. _ NaOH (aq) + _ Al (s) → _ Na_3AlO_3 (aq) + _ H_2 (g)

What volume of hydrogen gas (measured at STP) would result from reacting 75.0 g of sodium hydroxide with 50.0 g of aluminum?