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   _____   _____
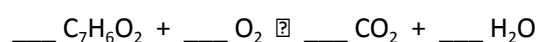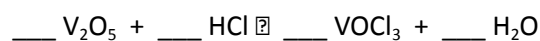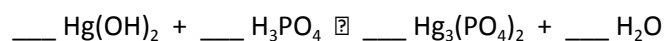
magnesium nitrate and sodium carbonate   _____   _____
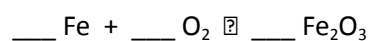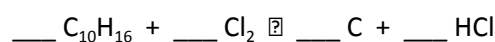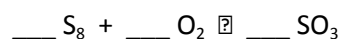
strontium bromide and potassium sulfate   _____   _____

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. $1.270 \text{ g} / 5.296 \text{ cm}^3 =$ _____   d. $170 \text{ g} + 2.785 \text{ g} =$ _____

    b. $12.235 \text{ g} / 1.010 \text{ L} =$ _____   e. $2.100 \text{ cm} \times 3.2102 \text{ cm} =$ _____

    c. $12 \text{ g} + 0.38 \text{ g} =$ _____   f. $2.35 \text{ mL} - 0.4 \text{ mL} - 1.23 \text{ mL} =$ _____

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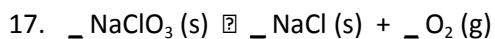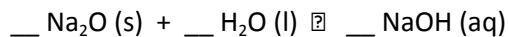
    What mass of sodium chloride is formed along with 45.0 g of oxygen gas?

18. _ NH$_3$ (g) + _ O$_2$ (g) ⮕ _NO (g) + _ H$_2$O (g)
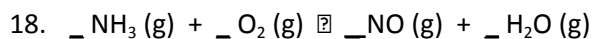
What mass of water vapor will be produced when 100.0 g of ammonia is reacted with excess oxygen?

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

20. __ Na$_2$S (aq) + __ AgNO (aq) ⮕ __ Ag$_2$S (s) + __ NaNO$_3$ (aq)
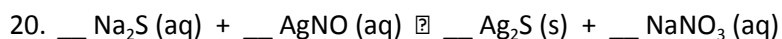
If the above reaction is carried out with 50.0 g of sodium sulfide and 35.0 g of silver nitrate, which is the limiting

factor?

What mass of the excess reactant remains?

What mass of silver sulfide would precipitate?

21. _ NaOH (aq) + _ Al (s) ⮕ _ Na$_3$AlO$_3$ (aq) + _ H$_2$ (g)
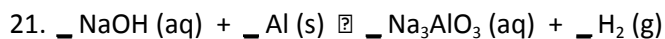
What volume of hydrogen gas (measured at STP) would result from reacting 75.0 g of sodium hydroxide with 50.0

g of aluminum?