AP Chemistry Summer Assignment – Gulf Shores High School

The following assignment is to be completed and brought on the first day of class. ***DO NOT SHARE ANSWERS.*** We will grade on FIRST DAY OF SCHOOL!!

Nomenclature

1. **Name** these binary compounds of two **nonmetals**.

IF_7 _____
N_2O_5 _____
XeF_2 _____
N_2O_4 _____
As_4O_{10} _____
SF_6 _____
PCl_3 _____
S_2Cl_2 _____

2. **Name** these binary compounds with a fixed charge metal.

$AlCl_3$ _____
MgO_____ _____
BaI_2_____
KI_____
$SrBr_2$ _____
Na_2S _____
CaF_2 _____
Al_2O_3_____

3. **Name** these binary compounds of cations with variable charge (***Roman Numerals***).

$CuCl_2$ _____
Fe_2O_3 _____
SnO_____
$PbCl_4$ _____
Cu_2S_____
HgS_____
AuI_3 _____
CoP_____

4. **Name** these compounds with polyatomic ions.

$Fe(NO_3)_3$ _____
$NaOH$ _____
Cu_2SO_4 _____

$Ca(ClO_3)_2$ _____
KNO_2 _____
$NaHCO_3$ _____
NH_4NO_2 _____
$Cu_2Cr_2O_7$ _____

5. **Name** these binary acids (Hydro -ic acids)

HCl _____
HI _____

6. **Name** these acids with polyatomic ions.(I -**ate** something **-ic**ky and Spr**ite** is delici**ous**)

$HClO_4$ _____
H_2SO_4 _____
$HC_2H_3O_2$ _____
H_3PO_4 _____
HNO_2 _____
H_2CrO_4 _____
$H_2C_2O_4$ _____
H_2CO_3 _____

7. **Name** these compounds appropriately.
CO _____
NH_4CN _____
HIO_3 _____
NI_3 _____
AlP _____
OF_2 _____
$LiMnO_4$ _____
HClO _____
HF _____
SO_2 _____
$CuCr_2O_7$ _____
K_2O_____
FeF_3 _____
$KC_2H_3O_2$ _____
MnS _____

8. **Write** the formulas.

Tin (IV) phosphide _____ copper (II) cyanide_____
Magnesium hydroxide_____ sodium peroxide_____
Sulfurous acid_____ lithium silicate _____
Potassium nitride _____ chromium (III) carbonate_____
Gallium arsenide_____ cobalt (II) chromate_____
Zinc fluoride_____ dichromic acid_____2_____

Solubility rules

9. Review solubility rules and identify each of the following compounds as soluble(aqueous) or insoluble(solid) in water.
Remember: NAG SAG with Castro Bear and PMS exceptions
If its a precipitate, put ppt
If its not, put aq for aqueous

Na_2CO_3 _____ $CoCO_3$ _____ $Pb(NO_3)_2$ _____
K_2S_____ $BaSO_4$ _____ $(NH_4)_2S$ _____
AgI_____ $Ni(NO_3)_2$ _____ KI_____
FeS_____ $PbCl_2$ _____ $CuSO_4$ _____
Li_2O_____ $Mn(C_2H_3O_2)_2$ _____ $Cr(OH)_3$ _____
$AgClO_3$ _____ $Sn(SO_3)_4$ _____ FeF_2 _____

10. Predict whether each of these double replacement reactions will give a precipitate or not based on the solubility of the products. If yes, **identify** the precipitate. If they precipitate, write the **net ionic equation** for each. If no precipitate forms, just put NO RXN.

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 _____
lithium chlorate and chromium (III) fluoride _____

Balancing Equations

11. Balance the following equations with the lowest whole number coefficients. Identify the type of equation as well: synthesis, decomposition, single replacement, double replacement or combustion.

	TYPE
$S_8 + O_2 \rightarrow SO_3$	_____
$C_{10}H_{16} + Cl_2 \rightarrow C + HCl$	_____
$Fe + O_2 \rightarrow Fe_2O_3$	_____
$C_7H_6O_2 + O_2 \rightarrow CO_2 + H_2O$	_____
$KClO_3 \rightarrow KCl + O_2$	_____
$H_3AsO_4 \rightarrow As_2O_5 + H_2O$	_____

$V_2O_5 + HCl \rightarrow VOCl_3 + H_2O$ _____

$Hg(OH)_2 + H_3PO_4 \rightarrow Hg_3(PO_4)_2 + H_2O$ _____

Stoichiometry and Limiting Reactants

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

$$Na_2O + H_2O \rightarrow 2NaOH$$

13. $2NaClO_3 \rightarrow 2NaCl + 3O_2$

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

14. $4NH_3 + 5O_2 \rightarrow 4NO + 6\,H_2O$

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

15. If the reaction in #14 is done with 25.0g of each reactant, which would be the limiting reactant?

16. $Na_2S + 2AgNO_3 \rightarrow Ag_2S + 2NaNO_3$

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

What mass of the excess reactant remains?

What mass of silver sulfide would precipitate?

17. $6NaOH + 2Al \rightarrow 2Na_3AlO_3 + 3H_2$

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

ACID-BASE

18.Write a balanced equation for the reaction between NaOH and HCl. Use this equation to answer problems 19-21

19. If it takes 26 mL of 1.5 M NaOH to neutralize 175 mL of an HCl solution, what is the concentration of the HCl?

20. If it takes 25 mL of 0.05 M HCl to neutralize 75 mL of NaOH solution, what is the concentration of the NaOH solution?

21. A 25.0 mL sample of HCl was titrated to the endpoint with 15.0 mL of 2.0 M NaOH. What is the molarity of HCl?

22. **Label the acid, the base, the conjugate acid, and the conjugate base in each of the equations.**

1. $HCl + NH_3 \rightarrow NH_4^+ + Cl^-$
2. $HCO_3^- + HCl \rightarrow H_2CO_3 + Cl^-$
3. $NH_4^+ + H_2O \rightarrow NH_3 + H_3O^+$
4. $PO_4^{-3} + HNO_3 \rightarrow NO_3^- + HPO_4^{-2}$
5. $HPO_4^{-2} + H_2O \rightarrow OH^- + H_2PO_4^-$
6. Write an equation that shows the reaction of ammonia, NH_3 with hydrobromic acid, HBr. Label the acid, the base, the conjugate acid, and the conjugate base.

Solve the following pH calculations. Write the formula, plug numbers into formula, & give answers with correct units and significant figures.

23. If the pH of a solution is 10.3, what is the [H+] concentration?

24. If the $[H^+]$ is 2.1×10^{-12} M $HClO_4$, what is the pH? Is the solution ACIDIC, BASIC, or NEUTRAL?

25. What is the pH of a 0.033 M KOH solution?

26. Determine the concentration of $[OH^-]$ ions in an aqueous solution where the pH = 5.22.

27. Calculate the pH of a solution that is 0.357 M HCl?

28. What is the hydroxide ion concentration in an aqueous solution with a hydrogen ion concentration of 2.70×10^{-2} M?

29. Explain how to calculate pH, pOH, $[H^+]$ and [OH-]. How is pH related to pOH?

30. Determine the concentration of [H+] ions in an aqueous solution where the pOH = 3.98.