

## 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**.



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



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



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



$\text{Ca}(\text{ClO}_3)_2$  \_\_\_\_\_

$\text{KNO}_2$  \_\_\_\_\_

$\text{NaHCO}_3$  \_\_\_\_\_

$\text{NH}_4\text{NO}_2$  \_\_\_\_\_

$\text{Cu}_2\text{Cr}_2\text{O}_7$  \_\_\_\_\_

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

$\text{HCl}$  \_\_\_\_\_

$\text{HI}$  \_\_\_\_\_

6. **Name** these acids with polyatomic ions. (I -ate something -icky and Sprite is delicious)

$\text{HClO}_3$  \_\_\_\_\_

$\text{H}_2\text{SO}_4$  \_\_\_\_\_

$\text{HC}_2\text{H}_3\text{O}_2$  \_\_\_\_\_

$\text{H}_3\text{PO}_4$  \_\_\_\_\_

$\text{HNO}_2$  \_\_\_\_\_

$\text{H}_2\text{CrO}_4$  \_\_\_\_\_

$\text{H}_2\text{C}_2\text{O}_4$  \_\_\_\_\_

$\text{H}_2\text{CO}_3$  \_\_\_\_\_

7. **Name** these compounds appropriately.

$\text{CO}$  \_\_\_\_\_

$\text{NH}_4\text{CN}$  \_\_\_\_\_

$\text{HIO}_3$  \_\_\_\_\_

$\text{NI}_3$  \_\_\_\_\_

$\text{AlP}$  \_\_\_\_\_

$\text{OF}_2$  \_\_\_\_\_

$\text{LiMnO}_4$  \_\_\_\_\_

$\text{HClO}$  \_\_\_\_\_

$\text{HF}$  \_\_\_\_\_

$\text{SO}_2$  \_\_\_\_\_

$\text{CuCr}_2\text{O}_7$  \_\_\_\_\_

$\text{K}_2\text{O}$  \_\_\_\_\_

$\text{FeF}_3$  \_\_\_\_\_

$\text{KC}_2\text{H}_3\text{O}_2$  \_\_\_\_\_

$\text{MnS}$  \_\_\_\_\_

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 _____           |

### 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

|                                |                                                     |                                  |
|--------------------------------|-----------------------------------------------------|----------------------------------|
| $\text{Na}_2\text{CO}_3$ _____ | $\text{CoCO}_3$ _____                               | $\text{Pb}(\text{NO}_3)_2$ _____ |
| $\text{K}_2\text{S}$ _____     | $\text{BaSO}_4$ _____                               | $(\text{NH}_4)_2\text{S}$ _____  |
| $\text{AgI}$ _____             | $\text{Ni}(\text{NO}_3)_2$ _____                    | $\text{KI}$ _____                |
| $\text{FeS}$ _____             | $\text{PbCl}_2$ _____                               | $\text{CuSO}_4$ _____            |
| $\text{Li}_2\text{O}$ _____    | $\text{Mn}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____ | $\text{Cr}(\text{OH})_3$ _____   |
| $\text{AgClO}_3$ _____         | $\text{Sn}(\text{SO}_3)_4$ _____                    | $\text{FeF}_2$ _____             |

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 \_\_\_\_\_

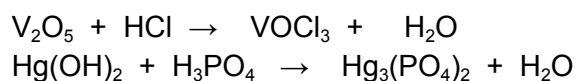
ammonium hydroxide and copper (II) acetate \_\_\_\_\_

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.

|                                                                                            |            |
|--------------------------------------------------------------------------------------------|------------|
| $\text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3$                                          | TYPE _____ |
| $\text{C}_{10}\text{H}_{16} + \text{Cl}_2 \rightarrow \text{C} + \text{HCl}$               | _____      |
| $\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$                                 | _____      |
| $\text{C}_7\text{H}_6\text{O}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ | _____      |
| $\text{KClO}_3 \rightarrow \text{KCl} + \text{O}_2$                                        | _____      |
| $\text{H}_3\text{AsO}_4 \rightarrow \text{As}_2\text{O}_5 + \text{H}_2\text{O}$            | _____      |



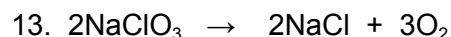

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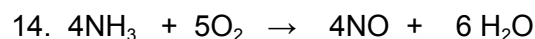
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### **Stoichiometry and Limiting Reactants**

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

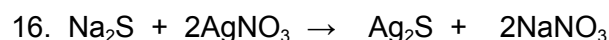


What **mass** of sodium chloride is formed along with 45.0g of oxygen gas?



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

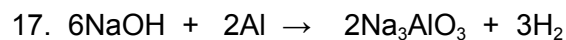
15. If the reaction in #14 is done with 25.0g of each reactant, which would be the limiting reactant?



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?



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

## ACID-BASE

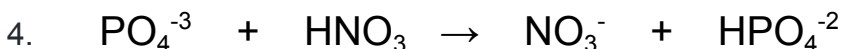
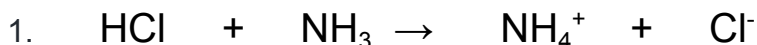
18. Write a balanced equation for the reaction between NaOH and HCl. Use this equation to answer problems 19-21

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.**



6. Write an equation that shows the reaction of ammonia,  $\text{NH}_3$  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  $2.1 \times 10^{-12}$  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  $2.70 \times 10^{-2}$  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.