

AP Chemistry Summer Assignment (Semester-Long)

The following assignment will not be collected. These topics and others, however, will be tested 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.

$\text{Fe}(\text{NO}_3)_3$ _____

K_2SO_2 _____

NaOH _____

NaHCO_3 _____

Cu_2SO_4 _____

NH_4NO_2 _____

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

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

5. Name these binary acids.

HCl _____

HI _____

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

HClO₄ _____

HNO₂ _____

H₂SO₄ _____

H₂CrO₄ _____

HC₂H₃O₂ _____

H₂C₂O₄ _____

H₃PO₄ _____

H₂CO₃ _____

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

CO _____

HF _____

NH₄CN _____

SO₂ _____

HIO₃ _____

CuCr₂O₇ _____

NI₃ _____

K₂O _____

AlP _____

FeF₃ _____

OF₂ _____

PbSO₄ _____

LiMnO₄ _____

KC₂H₃O₂ _____

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 _____

$\text{Pb}(\text{NO}_3)_2$ _____ CuSO_4 _____

K_2S _____ Li_2O _____

BaSO_4 _____ $\text{Mn}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____

$(\text{NH}_4)_2\text{S}$ _____ $\text{Cr}(\text{OH})_3$ _____

AgI _____ AgClO_3 _____

$\text{Ni}(\text{NO}_3)_2$ _____ $\text{Sn}(\text{SO}_3)_4$ _____

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 _____

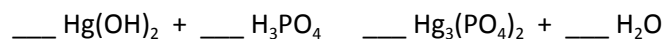
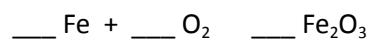
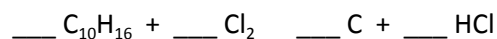
strontium bromide and potassium sulfate _____

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.



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. 6.022×10^{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 _____
- b. 0.000123 mol _____
- c. 0.00345 g _____
- d. 700,000,000 atoms _____

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

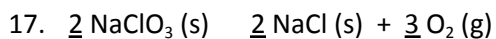
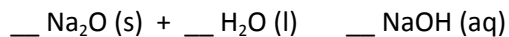
- a. $1.270 \text{ g} / 5.296 \text{ cm}^3 =$ _____
- b. $12.235 \text{ g} / 1.010 \text{ L} =$ _____
- c. $12 \text{ g} + 0.38 \text{ g} =$ _____
- d. $170 \text{ g} + 2.785 \text{ g} =$ _____
- e. $2.100 \text{ cm} \times 3.2102 \text{ cm} =$ _____
- f. $2.35 \text{ mL} - 0.4 \text{ mL} - 1.23 \text{ mL} =$ _____

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

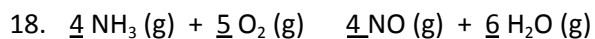
- a. 42.8 g of KNO_3
- b. 9.25×10^{26} formula units of CaCl_2
- c. 155.7 L of CO_2 at STP

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?

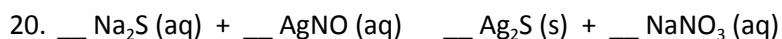


What mass of sodium chloride is formed along with 45.0 g of oxygen gas?



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

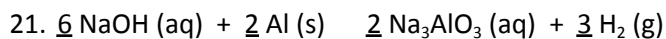
19. If the reaction in #18 is performed with 25.0 g of each reactant, which would be the limiting factor?



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?



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