

## Advanced Placement Chemistry 2018-2019 Summer Assignment

This assignment will count as **5% of your grade** for first semester and should be **turned in on 8/17/18**. Students *may* get help from other students on the assignment, but all students must turn in their own work which has been completed **on their own**.

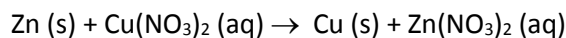
There are **two** parts to this assignment:

- Stoichiometry **problems** (to make sure you're ready to start in the fall)
- **Memorize** polyatomic ions and strong acids and bases (because you have to know them for AP and we'll need them memorized pretty early on in the year. You'll have a quiz the first week over the polyatomics listed and the acids and bases. You need to know the name, formula and charge for each.)

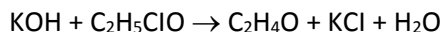
### Stoichiometry Problems

Complete all problems on separate paper and circle your answer with correct units. Include all balanced equations.

1. How many grams of oxygen are required to react completely with 48.6 g of butane (C<sub>2</sub>H<sub>6</sub>)?
2. How many moles of oxygen are necessary to react completely with four kg of propane (C<sub>3</sub>H<sub>8</sub>)?
3. If 100. g of zinc metal and 100. g of copper (II) nitrate react, how many grams of copper metal will be produced according to the following equation?



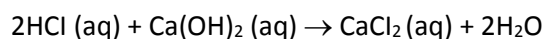
4. In an experiment, 10 moles of magnesium reacted with excess hydrochloric acid forming magnesium chloride. How many moles of magnesium chloride were formed?
5. Ammonium nitrate, an important fertilizer, produces nitrogen gas, oxygen gas and water when it decomposes. Determine the mass of water produced from the decomposition of 25.0 g of solid ammonium nitrate.
6. How many grams of water will be produced if 2.35 moles of oxygen reacts with benzene (C<sub>6</sub>H<sub>6</sub>)?
7. When octane (C<sub>8</sub>H<sub>18</sub>) is burned in oxygen, carbon dioxide and water are produced. If 320 g of octane is burned and the 37 grams of water are produced, what is the percent yield?
8. How many grams of ethylene oxide, C<sub>2</sub>H<sub>4</sub>O, will be produced from 500. g of potassium hydroxide reacting with 1000. g of ethylene chlorohydrin, C<sub>2</sub>H<sub>5</sub>ClO, as shown in the equation?



9. How many grams of barium chloride are required to react completely with 0.101 g of sodium sulfate?
10. How many moles of hydrogen are produced from the reaction of three grams of zinc with an excess of hydrochloric acid?

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11. A piece of copper with a mass of 5.00 g is placed in a solution of silver nitrate containing excess  $\text{AgNO}_3$ . The silver metal produced has a mass of 18.2 g. What is the percent yield for this reaction?
12. How many moles of ammonia will form from 5 moles of hydrogen? ( $3\text{H}_2 + \text{N}_2 \rightarrow 2\text{NH}_3$ )
13. Ammonia reacts with nitrogen monoxide to produce nitrogen gas and water vapor. If 0.240 moles of ammonia react, how many grams of nitrogen monoxide will be consumed?
14. 100. g of  $\text{Ca(OH)}_2$  are added to a beaker containing 50.0g of HCl dissolved in water. How much calcium chloride will be produced?



15. Determine the percent yield for the reaction between 15.0 g  $\text{N}_2$  and 15.0 g  $\text{H}_2$  if 10.5 g  $\text{NH}_3$  is produced.
16. Determine the percent yield for the reaction between 2.80 g of  $\text{Al(NO}_3)_3$  and excess NaOH if 0.966 g  $\text{Al(OH)}_3$  is recovered.

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Polyatomic Ions to be Memorized

Quiz the first week of school. Be prepared. (Look for patterns to help you memorize them)

<u>FORMULA</u>	<u>NAME</u>
$\text{PO}_4^{3-}$	phosphate
$\text{PO}_3^{3-}$	phosphite
$\text{HPO}_4^{2-}$	hydrogen phosphate
$\text{H}_2\text{PO}_4^-$	dihydrogen phosphate
$\text{SO}_4^{2-}$	sulfate
$\text{SO}_3^{2-}$	sulfite
$\text{S}_2\text{O}_3^{2-}$	thiosulfate
$\text{S}_2\text{O}_8^{2-}$	persulfate
$\text{HSO}_4^-$	bisulfate (or hydrogen sulfate)
$\text{HSO}_3^-$	bisulfite (or hydrogen sulfite)
$\text{CrO}_4^{2-}$	chromate
$\text{Cr}_2\text{O}_7^{2-}$	dichromate
$\text{MnO}_4^-$	permanganate
$\text{Hg}_2^{2+}$	mercury(I) or mercurous
$\text{NO}_3^-$	nitrate
$\text{NO}_2^-$	nitrite
$\text{N}_3^-$	azide
$\text{BO}_3^{3-}$	borate
$\text{ClO}_4^-$	perchlorate
$\text{ClO}_3^-$	chlorate
$\text{ClO}_2^-$	chlorite
$\text{ClO}^-$	hypochlorite
$\text{CN}^-$	cyanide
$\text{CNO}^-$	cyanate
$\text{CNS}^-$	thiocyanate
$\text{CO}_3^{2-}$	carbonate
$\text{HCO}_3^-$	bicarbonate (hydrogen carbonate)
$\text{C}_2\text{H}_3\text{O}_2^-$ ( $\text{CH}_3\text{COO}^-$ )	acetate
$\text{C}_2\text{O}_4^{2-}$	oxalate
$\text{NH}_4^+$	ammonium
$\text{H}_3\text{O}^+$	hydronium

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### Strong Acids

Name	Formula
Nitric Acid	HNO <sub>3</sub>
Sulfuric Acid	H <sub>2</sub> SO <sub>4</sub>
Perchloric Acid	HClO <sub>4</sub>
Chloric Acid	HClO <sub>3</sub>
Hydrochloric Acid	HCl
Hydrobromic Acid	HBr
Hydroiodic Acid	HI

### Strong Bases

(Hydroxides of Group IA elements + 2 more)

Name	Formula
Lithium Hydroxide	LiOH
Sodium Hydroxide	NaOH
Potassium Hydroxide	KOH
Rubidium Hydroxide	RbOH
Cesium Hydroxide	CsOH
Strontium Hydroxide	Sr(OH) <sub>2</sub>
Barium Hydroxide	Ba(OH) <sub>2</sub>

Below is a list of some other topics I expect you to have a good understanding of. We will either barely touch on these topics or work through them at a pace that a good base understanding is necessary. Please ask me for some problems or look up some tutorials online to get prepared for the fall if you need to.

- Manipulating algebraic equations to solve for a variable of interest
  - Such as:  $\frac{A}{B} = \frac{C}{D \times E}$  solve for D
- Nomenclature
- Balancing chemical equations
- Forming ionic compounds from a pair of ions
  - Such as magnesium chloride is MgCl<sub>2</sub>
- Periodic Trends
- Calculating concentrations and making solutions and dilutions
- Gas Laws and calculations

Please e-mail over the summer if you are having trouble or need clarification. To ensure that I can receive your e-mail, please use this address: [Jenny\\_Beck@gwinnett.k12.ga.us](mailto:Jenny_Beck@gwinnett.k12.ga.us)