

# AP CHEMISTRY SUMMER ASSIGNMENT

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For: Students enrolled in 2018-2019 AP Chemistry Course

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Google Classroom Code: 239n0q

*This assignment is a review of things you should have mastered in Chemistry I or Pre-AP Chemistry. This assignment will be collected for a grade with the first half of it due July 20<sup>th</sup>, 2018 and the second half due August 17<sup>th</sup>, 2018. We will spend the first couple weeks of school to review prior content. If you have any questions please do not hesitate to contact me at the email address [Vanessa.Urteaga@gpisd.org](mailto:Vanessa.Urteaga@gpisd.org).*

Welcome to **AP Chemistry!** I am very excited to have you enrolled in my class and cannot wait to get started! AP chemistry is a difficult course, but with some motivation and determination we will succeed! I am assigning a summer assignment because I need you ready for the start of the school year by reviewing the things you should have learned in Chemistry I or Pre-AP Chemistry. Remember this course is designed to match a first year college chemistry class...(YAY!!) I am extremely excited and I am sure we will have a fantastic year in AP Chemistry. (The summer assignment can also be found on the South Grand Prairie High School webpage, select Departments and Chemistry.)

## SUMMER ASSIGNMENT

This summer assignment consists of worksheets and rules to memorize. There are three (3) worksheets total.

- **Worksheet #1 and #2 are due July 20<sup>th</sup>, 2018 via Google Classroom (take pic & upload).**
- **Worksheet #3 is due August 17<sup>th</sup>, 2018 via Google Classroom (take a pic and upload).**

AP Chemistry is not all about memorization; however, having the following items memorized is essential for success in learning the concepts covered in the course. Make flashcards, have your friends and family quiz you, take the lists with you on vacation, or do whatever it takes to get this information firmly planted in your head.

Three areas to memorize: (they are attached for your convenience)

- 1) Rules for determining oxidation numbers
- 2) Solubility rules
- 3) Polyatomic ions

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## Rules for Determining Oxidation Number

Oxidation Number: A number assigned to an atom in a molecular compound or molecular ion that indicates the general distribution of electrons among the bonded atoms.

1. The oxidation number of any uncombined element is zero.
2. The oxidation number of a monatomic ion equals the charge on the ion.
3. The more electronegative element in a binary compound is assigned the number equal to the charge it would have if it were an ion.
4. The oxidation number of Fluorine in a compound is always -1.
5. Oxygen has an oxidation number of -2 unless it is combined with Fluorine, then it is +2, or it is in a peroxide, then it is -1.
6. The oxidation state of Hydrogen in most of its compounds is +1 unless it combined with a metal, in which case it is -1.
7. In compounds, the elements of groups 1 and 2 as well as Aluminum have oxidation numbers of +1, +2, and +3 respectively.
8. The sum of the oxidation numbers of all atoms in a neutral compound is zero.
9. The sum of the oxidation numbers of all atoms in a polyatomic ion equals the charge of the ion.

## Solubility Rules

1. Most nitrates ( $\text{NO}_3^-$ ) salts are soluble.
2. Most salts containing the alkali metal ions ( $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cs}^+$ ,  $\text{Rb}^+$ ) and the ammonium ion ( $\text{NH}_4^+$ ) are soluble.
3. Most chloride, bromide, and iodide salts are soluble. Notable exceptions are salts containing the ions  $\text{Ag}^+$ ,  $\text{Pb}^{+2}$ , and  $\text{Hg}_2^{+2}$ .
4. Most sulfates are soluble. Notable exceptions are  $\text{BaSO}_4$ ,  $\text{PbSO}_4$ ,  $\text{Hg}_2\text{SO}_4$ , and  $\text{CaSO}_4$ .
5. Most hydroxide salts are only slightly soluble. The important soluble hydroxides are  $\text{NaOH}$  and  $\text{KOH}$ . The compounds  $\text{Ba}(\text{OH})_2$ ,  $\text{Sr}(\text{OH})_2$ , and  $\text{Ca}(\text{OH})_2$ .
6. Most sulfides ( $\text{S}^{-2}$ ), carbonate ( $\text{CO}_3^{-2}$ ), chromate ( $\text{CrO}_4^{-2}$ ), and phosphate ( $\text{PO}_4^{-3}$ ) salts are only slightly soluble.

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### Polyatomic Ions

Name	Symbol	Charge
Ammonium	NH <sub>4</sub>	+1
Acetate	C <sub>2</sub> H <sub>3</sub> O <sub>2</sub>	-1
Bromate	BrO <sub>3</sub>	-1
Chlorate	ClO <sub>3</sub>	-1
Chlorite	ClO <sub>2</sub>	-1
Cyanide	CN	-1
Dihydrogen phosphate	H <sub>2</sub> PO <sub>4</sub>	-1
Hypochlorite	ClO	-1
Hydrogen carbonate (bicarbonate)	HCO <sub>3</sub>	-1
Hydrogen sulfate (bisulfate)	HSO <sub>4</sub>	-1
Hydrogen sulfite (bisulfite)	HSO <sub>3</sub>	-1
Hydroxide	OH	-1
Iodate	IO <sub>3</sub>	-1
Nitrate	NO <sub>3</sub>	-1
Nitrite	NO <sub>2</sub>	-1
Perchlorate	ClO <sub>4</sub>	-1
Permanganate	MnO <sub>4</sub>	-1
Thiocyanate	SCN	-1
Carbonate	CO <sub>3</sub>	-2
Chromate	CrO <sub>4</sub>	-2
Dichromate	Cr <sub>2</sub> O <sub>7</sub>	-2
Oxalate	C <sub>2</sub> O <sub>4</sub>	-2
Selenate	SeO <sub>4</sub>	-2
Silicate	SiO <sub>3</sub>	-2
Sulfate	SO <sub>4</sub>	-2
Sulfite	SO <sub>3</sub>	-2
Phosphate	PO <sub>4</sub>	-3
Phosphite	PO <sub>3</sub>	-3

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## Naming and Writing Chemical Formulas Worksheet #1

Write formulas for the following substances:

- a. Barium sulfate \_\_\_\_\_
- b. Ammonium chloride \_\_\_\_\_
- c. Chlorine monoxide \_\_\_\_\_
- d. Silicon tetrachloride \_\_\_\_\_
- e. Magnesium fluoride \_\_\_\_\_
- f. Sodium oxide \_\_\_\_\_
- g. Sodium peroxide \_\_\_\_\_
- h. Copper (I) iodide \_\_\_\_\_
- i. Zinc sulfide \_\_\_\_\_
- j. Potassium carbonate \_\_\_\_\_
- k. Hydrobromic acid \_\_\_\_\_
- l. Perchloric acid \_\_\_\_\_
- m. Lead (II) acetate \_\_\_\_\_
- n. Sodium permanganate \_\_\_\_\_
- o. Lithium oxalate \_\_\_\_\_
- p. Potassium cyanide \_\_\_\_\_
- q. Iron (III) hydroxide \_\_\_\_\_
- r. Silicon dioxide \_\_\_\_\_
- s. Nitrogen trifluoride \_\_\_\_\_

Name each of the following compounds  
(Give acid names where appropriate)

- a.  $\text{CuSO}_4$  \_\_\_\_\_
- b.  $\text{PCl}_3$  \_\_\_\_\_
- c.  $\text{Li}_3\text{N}$  \_\_\_\_\_
- d.  $\text{BaSO}_3$  \_\_\_\_\_
- e.  $\text{N}_2\text{F}_4$  \_\_\_\_\_
- f.  $\text{KClO}_4$  \_\_\_\_\_
- g.  $\text{NaH}$  \_\_\_\_\_
- h.  $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$  \_\_\_\_\_
- i.  $\text{HNO}_2$  \_\_\_\_\_
- j.  $\text{Sr}_3\text{P}_2$  \_\_\_\_\_
- k.  $\text{Mg}(\text{OH})_2$  \_\_\_\_\_
- l.  $\text{Al}_2\text{S}_3$  \_\_\_\_\_
- m.  $\text{AgBr}$  \_\_\_\_\_
- n.  $\text{P}_4\text{O}_{10}$  \_\_\_\_\_
- o.  $\text{HC}_2\text{H}_3\text{O}_2$  \_\_\_\_\_
- p.  $\text{CaI}_2$  \_\_\_\_\_
- q.  $\text{MnO}_2$  \_\_\_\_\_
- r.  $\text{Li}_2\text{O}$  \_\_\_\_\_
- s.  $\text{FeI}_3$  \_\_\_\_\_

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t. Chromium (III) oxide \_\_\_\_\_

t.  $\text{Cu}_3\text{PO}_4$  \_\_\_\_\_

u. Calcium chlorate \_\_\_\_\_

u.  $\text{PCl}_3$  \_\_\_\_\_

v. Sodium thiocyanate \_\_\_\_\_

v.  $\text{NaCN}$  \_\_\_\_\_

w. Cobalt (III) nitrate \_\_\_\_\_

w.  $\text{Cs}_3\text{N}$  \_\_\_\_\_

### Writing Chemical Equations Worksheet #2

For each equation below, identify the type (synthesis, decomposition, single replacement, double replacement, or combustion), predict the products, and then write the balanced reaction. Remember to use the solubility rules for double replacement reactions and the activity series for single replacement reactions. Hint: when writing these reactions, ignore all of the information about heat, or bubbling, or mixing. These are just excess words used to make complete sentences. Simply pull out the chemical formulas.

For example: Solutions of silver nitrate and magnesium iodide are combined.

This is a double replacement reaction.  $2\text{AgNO}_3(\text{aq}) + \text{MgI}_2(\text{aq}) \rightarrow 2\text{AgI}(\text{s}) + \text{Mg}(\text{NO}_3)_2(\text{aq})$

1. Ammonium sulfate reacts with barium nitrate.
2. Zinc metal is added to a solution of copper (II) chloride.
3. Propane gas ( $\text{C}_3\text{H}_8$ ) is burned in excess oxygen.
4. Solid calcium chlorate is heated strongly.
5. Magnesium and nitrogen gas are heated together.

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## Stoichiometry Practice Problems Worksheet #3

1) Calcium carbonate decomposes upon heating, producing calcium oxide and carbon dioxide gas.

- a. Write a balanced chemical equation for this reaction.
  
  
  
  
  
  
  
  
  
  
- b. How many grams of calcium oxide will be produced after 12.25 g of calcium carbonate is completely decomposed?
  
  
  
  
  
  
  
  
  
  
- c. What volume of carbon dioxide gas is produced from this amount of calcium carbonate, at STP?

2) Hydrogen gas and bromine gas react to form hydrogen bromide gas.

- a. Write a balanced chemical equation for this reaction.
  
  
  
  
  
  
  
  
  
  
- b. 3.2 g of hydrogen gas and 9.5 g of bromine gas react. Which is the limiting reagent?
  
  
  
  
  
  
  
  
  
  
- c. How many grams of hydrogen bromide gas can be produced using the amounts in (b)?
  
  
  
  
  
  
  
  
  
  
- d. How many grams of the excess reactant is left unreacted?
  
  
  
  
  
  
  
  
  
  
- e. What volume of HBr, measured at STP, is produced in (b)?