

AP Chemistry Summer Assignment

Welcome to AP Chemistry! You will quickly notice that things will be different than they were in Honors Chemistry. For one, you must memorize a lot of the information that was given to you on the Chemistry Reference Tables. This assignment will help us with some of the memorization, math skills, and basic topics that you will need so that we can hit the ground running in August.

As you progress through this assignment use the following sources for help:

You can access a playlist of Honors Chemistry videos covering topics in the summer assignment. (<http://tinyurl.com/I8qv5f4>).

Email me for help (rosa.guerrero@browardschools.com) I will check periodically, but not daily!

Important Dates

- Worksheets 1 & 2 are due the second day of class & there will be a quiz on the elements on the second day also, and
- Quiz on the polyatomic ions on the Third day of class.

What will you hand in?

- Worksheets 1 & 2 (if you need additional space for worksheet 1, you can turn in your own notebook paper, but it must be neat and labeled correctly)

Task 1: Complete Worksheets 1 & 2 (attached)

Task 2: Memorize the names of the elements and their corresponding symbols

- You need to know elements 1-56, plus Pt, Au, Hg, Pb, Rn, Fr, Ra, U, Pu • Many of these elements you will already know
- Making flashcards is helpful!
- It's important to know these elements because the periodic table you are provided has only the symbols and not the names of the elements.

Task 3: Memorize the ionic charges of the basic ions

- **Think** about the valance electrons!
- **Think** about the common elements/ions in that group

- Group 1 ions = +1 ○ Zn = +2
- Group 2 ions = +2
- Ag = +1
- Group 15 (5A) ions (N and P) = -3
- Cu = +1 or +2 ○ Group 16 (6A) ions (O and S) = -2
- Fe = +2 or +3
- Group 17 (7A)/ halogens = -1
- Pb = +2 or +4 ○ Sn = +2 or +4

Task 4: Memorize the names, symbols, and charges of Polyatomic ions below:

- Oxyanions - polyatomics containing oxygen, names end in *-ate* or *-ite*
- *-ate* is used for the most common form
- *-ite* is used for the form with the same charge, but one less oxygen ○ Example:
 - ✦ NO_3^- = nitrate
 - ✦ NO_2^- = nitrite
- Prefixes are also used ○ *Per-* indicates one more oxygen than the *-ate* form (think “perfect = overachieving”, ie = more)
 - *Hypo-* indicates one fewer oxygen than the *-ite* form ○
 - Example:
 - ✦ ClO_4^- = perchlorate (b/c it has one more O than the *-ate* form)
 - ✦ ClO_3^- = chlorate (b/c it is the most common)
 - ✦ ClO_2^- = chlorite (b/c it has one less oxygen than *-ate* form)
 - ✦ ClO^- = hypochlorite (b/c it has one less oxygen than the *-ite* form) ○ F, Cl, Br, I all behave the same
 - ✦ Therefore, if chlorate is ClO_3^- , the bromate ion is... ✦ BrO_3^- !!!!
 - ✦ Simply substitute one halogen for the other
 - ✦ If you learn the chlorate series, you also automatically know the bromate, iodate, and fluorate series
- Hydrogen can be added to -2 or -3 ions to make a “new ion” i.e. H_2PO_4^- is dihydrogen phosphate (note the - charge went up 1 for each H^+ added)

$+1$ ammonium, NH_4^+		
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<u>-1</u> acetate, $C_2H_3O_2^-$, or CH_3COO^- bromate, BrO_3^- chlorate, ClO_3^- chlorite, ClO_2^- cyanide, CN^- hydrogen carbonate, HCO_3^- (or bicarbonate) hydroxide, OH^- hypochlorite, ClO^- iodate, IO_3^- nitrate, NO_3^- nitrite, NO_2^- permanganate, MnO_4^- perchlorate, ClO_4^- thiocyanate, SCN^-	<u>-2</u> carbonate, CO_3^{2-} chromate, CrO_4^{2-} dichromate, $Cr_2O_7^{2-}$ oxalate, $C_2O_4^{2-}$ peroxide, O_2^{2-} sulfate, SO_4^{2-} sulfite, SO_3^{2-}	<u>-3</u> phosphate, PO_4^{3-} phosphite, PO_3^{3-} arsenate, AsO_4^{3-}
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Be able to name polyatomic ions using the rules above such as these below:

HPO_4^{2-} _____

HSO_3^{-1} _____

FO_3^{-1} _____

HCO_3^{-1} _____

Be able to write formulas for polyatomic ions using the rules above such as these below:

Bromite _____

periodate _____

Dihydrogen phosphite _____

hydrogen chromate _____

Name: _____

Date: _____

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Worksheet #1 - Math Skills Significant

Figures (Sig Figs)

1. How many sig figs are in the following numbers?

a) 0.0450 _____

b) 790 _____

c) 32.10 _____

2. Solve the following problems. Round your answer to the correct number of sig figs (and use the correct unit on your answer).

a) $825 \text{ cm} \times 32 \text{ cm} \times 0.248 \text{ cm}$ _____

b) $15.68 \text{ g} / 2.885 \text{ mL}$ _____

Density (round your answers to correct number of sig figs and show all work with units)

3. A cube of ruthenium metal 1.5 cm on a side has a mass of 42.0 g. What is the density in g/cm^3 ? Will ruthenium metal float on water?

4. The density of bismuth metal is $9.8 \text{ g}/\text{cm}^3$. What is the mass of a sample of bismuth that displaces 65.8 mL of water?

Conversions (round answers correctly and show work with units)

5. Make the following conversions:

a) 16.2 m to km

b) 5.44 nL to mL

c) 45.7 mL/s to kL/hr

Reactions

6. Balance the following and equations and tell what type of reaction it is (synthesis, decomposition, single replacement, double replacement, or combustion)

a) $\text{___ KNO}_3 \rightarrow \text{___ KNO}_2 + \text{___ O}_2$ Type: _____

b) $\text{___ AgNO}_3 + \text{___ K}_2\text{SO}_4 \rightarrow \text{___ Ag}_2\text{SO}_4 + \text{___ KNO}_3$ Type: _____

c) $\text{___ CH}_3\text{NH}_2 + \text{___ O}_2 \rightarrow \text{___ CO}_2 + \text{___ H}_2\text{O} + \text{___ N}_2$ Type: _____

d) $\text{___ N}_2\text{O}_5 + \text{___ H}_2\text{O} \rightarrow \text{___ HNO}_3$ Type: _____

e) $\text{___ Na} + \text{___ Zn(NO}_3)_2 \rightarrow \text{___ Zn} + \text{___ NaNO}_3$ Type: _____

7. What are diatomic molecules? List the 7.

Average Atomic Mass

8. Magnesium consists of 3 naturally occurring isotopes with the masses 23.98504, 24.98584, and 25.98259 amu. The relative abundances of these three isotopes are 78.70%, 10.13 %, and 11.17% respectively. Calculate the average atomic mass.

Percent Composition

9. Calculate the percent composition of $C_{12}H_{22}O_{11}$ (sugar). (Give Percent of each element.) Show all work.

Moles

10. Calculate the number of moles of the following: (SHOW WORK)

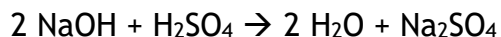
a) 42.8 g of KNO_3

b) 155.7 L of CO_2 at STP

c) 9.25×10^{26} molecules of $CaCl_2$

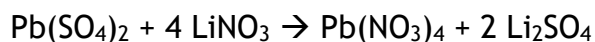
Stoichiometry

11. Using the following equation:



How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide and you have an excess of sulfuric acid?

12. Using the following equation:



How many grams of lithium nitrate will be needed to make 250 grams of lithium sulfate, assuming that you have an adequate amount of lead (IV) sulfate to do the reaction?

13. Using the following equation: $\text{Fe}_2\text{O}_3 + 3 \text{H}_2 \rightarrow 2 \text{Fe} + 3 \text{H}_2\text{O}$

Calculate how many grams of iron can be made from 16.5 grams of Fe_2O_3 .

Worksheet #2: Practice Naming Compounds

1. Provide names for the following ionic compounds:

- a. AlF_3 _____
- b. $\text{Fe}(\text{OH})_2$ _____
- c. $\text{Cu}(\text{NO}_3)_2$ _____
- d. $\text{Ba}(\text{ClO}_4)_2$ _____
- e. Li_3PO_4 _____
- f. Hg_2S _____
- g. $\text{Cr}_2(\text{CO}_3)_3$ _____
- h. $(\text{NH}_4)_2\text{SO}_4$ _____

2. Write the chemical formulas for the following compounds:

- a. Copper(I) oxide _____
- b. Potassium peroxide _____
- c. Iron(III) carbonate _____
- d. Zinc nitrate _____
- e. Sodium hypobromite _____
- f. Aluminum hydroxide _____

3. Give the name or chemical formula for each of the following molecular substances:

- a. SF_6 _____
- b. XeO_3 _____
- c. Dinitrogen tetroxide _____
- d. Hydrogen cyanide _____
- e. IF_5 _____
- f. Dihydrogen monoxide _____
- g. Tetraphosphorous hexasulfide _____

4. Give the name or chemical formula for the following compounds:

- a. Ammonium oxalate _____

b. Manganese(III) dichromate

c. $\text{Ti}(\text{OH})_4$

d. $\text{Ni}(\text{ClO}_2)_3$

e. Dinitrogen pentoxide

f. Aluminum oxide

g. Fe_2S_3

5. Name the following acids

a. $\text{H}_2\text{C}_2\text{O}_4$

b. HBrO_3

c. HBr

d. HNO_2

e. H_2SO_4

f. HClO

6. Write formulas for the following acids.

a. hydrochloric acid

b. sulfuric acid

c. nitric acid

d. phosphoric acid

e. carbonic acid

f. acetic acid
