

AP Chemistry Summer Assignment

Welcome to AP Chemistry! I am eagerly anticipating a great year of chemistry. In order to ensure the best start for everyone next fall, I have prepared a summer assignment that reviews basic chemistry concepts. You have to know all of the chemistry that you learned in your first year chemistry course in order to succeed in this course. I understand that you can't relearn and remember it all over a summer, so I will be re-teaching it during the year at a much faster pace. But, it is important that you know certain concepts before we start the course; these are the concepts you will be learning during your summer assignment. It will be important for everyone to come to class the first day prepared.

It is also important that you realize up front how your performance in this course will be measured. The course grade will mainly depend on your assessment scores, although some lab reports will also be assigned and evaluated. Be aggressive in pursuit of knowledge -- not just the grades. Prioritize your learning process, do not procrastinate until the last moment, get help in class, and participate in class.

I hope you are looking forward to an exciting year of chemistry. You are all certainly fine students, and with plenty of motivation and hard work you should find AP Chemistry a successful and rewarding experience.

Finally, I recommend that you spread out the summer assignment. Please do not try to complete it all during the final week of the summer. Chemistry takes time to process and grasp at a level necessary for success in AP Chemistry. Remember, AP Chemistry is an equivalent course to Introductory Chemistry in college. Taking a college level course in high school is difficult, requires dedication, and is a great investment in your education so prepare yourself and arrive ready to learn.

Have a great summer and enjoy the chemistry!

Mrs. Jennifer Palmer

Task 1: Read Chapters 1-3 in your textbook. Take notes while doing so.

Task 2: Complete Worksheets 1 & 2 (attached).

Task 3: 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
- You will already know many of these elements.
- 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 4: Memorize the ionic charges of the basic ions.

- Think about the valence electrons!
- Think about the common elements/ions in that group
 - Group 1 ions = +1
 - Group 2 ions = +2
 - Group 15 (5A) ions (N and P) = -3
 - Group 16 (6A) ions (O and S) = -2
 - Group 17 (7A)/ halogens = -1
 - Zn = +2
 - Ag = +1
 - Cu = +1 or +2
 - Fe = +2 or +3
 - Pb = +2 or +4
 - Sn = +2 or +4

Task 5: 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 hypertonic, hyperactive, 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 pattern
 - 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. HPO_4^{2-} is hydrogen phosphate, and
 - H_2PO_4^- is dihydrogen phosphate.
 - (note the - charge went up 1 for each H^+ added)

+1		
ammonium, NH_4^+		
-1	-2	-3
acetate, $\text{C}_2\text{H}_3\text{O}_2^-$, or CH_3COO^- bromate, BrO_3^- chlorate, ClO_3^- chlorite, ClO_2^- cyanide, CN^- hydrogen carbonate, HCO_3^- ▪ (also called bicarbonate) hydroxide, OH^- hypochlorite, ClO^- iodate, IO_3^- nitrate, NO_3^- nitrite, NO_2^- permanganate, MnO_4^- perchlorate, ClO_4^- thiocyanate, SCN^-	carbonate, CO_3^{2-} chromate, CrO_4^{2-} dichromate, $\text{Cr}_2\text{O}_7^{2-}$ oxalate, $\text{C}_2\text{O}_4^{2-}$ peroxide, O_2^{2-} sulfate, SO_4^{2-} sulfite, SO_3^{2-}	phosphate, PO_4^{3-} phosphite, PO_3^{3-} arsenate, AsO_4^{3-}

Be able to name polyatomic ions using the rules above such as these below:

HPO_4^{2-} _____ HSO_3^- _____

FO_3^- _____ HCO_3^- _____

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

bromite _____ periodate _____

dihydrogen phosphite _____ hydrogen chromate _____

Name: _____

Date: _____

AP Chemistry Summer Assignment 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:

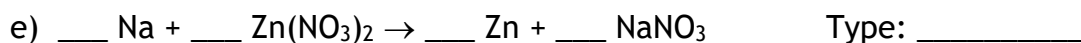
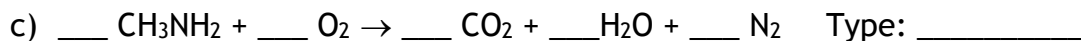
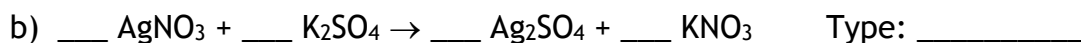
a) 16.2 m to km

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).



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 $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ (sugar). (Give percent of each element.) Show all work.

Moles

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

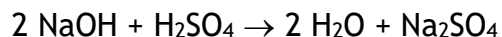
a) 42.8 g of KNO_3

b) 155.7 L of CO_2 at STP

c) 9.25×10^{26} molecules of CaCl_2

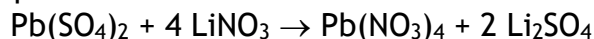
Stoichiometry

11. Using the following equation:



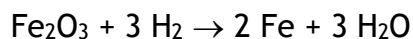
How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide and you have an excess of sulfuric acid?

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:



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

Limiting Reactant & Percent Yield

14. Determine the grams of sodium chloride produced when 10.0 g of sodium react with 10.0 g of chlorine gas according to the equation: $2 \text{Na} + \text{Cl}_2 \rightarrow 2 \text{NaCl}$.

15. Determine the mass of lithium hydroxide produced when 50.0 g of lithium are reacted with 45.0 g of water according to the equation: $2 \text{Li} + 2 \text{H}_2\text{O} \rightarrow 2 \text{LiOH} + \text{H}_2$

16. Determine the percent yield of water produced when 68.3 g of hydrogen reacts with 85.4 g of oxygen and 86.4 g of water are collected. $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$

AP Chemistry Summer Assignment
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. Ti(OH)_4 _____
- d. $\text{Ni(ClO}_2)_3$ _____
- 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 _____