AP Chemistry Summer Assignment

2017-2018

Hello,

This assignment is to refresh your memory about some basic concepts you need to know prior to starting your AP chemistry class.

This year is going to be very rigorous and fast. You need to be up to the challenge with enthusiasm and excitement.

Students who enroll in any AP course ought to be mature organized and modest. They also have to be energetic inquisitive and free of other responsibilities.

For every hour spent in class students must have at least two extra hours to review the material, do the homework and research the concepts farther more in depth.

My name is Hara Johnson and I will be available to help with any questions you might have.

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Feel free to send me your questions any time.

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
  - 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 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_4^- = 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. $H_2PO_4^{-1}$ is dihydrogen phosphate (note the – charge went up 1 for each H^+ added)

+1 ammonium, NH_4^+		
-1 acetate, $C_2H_3O_2^-$, 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^-	**-2** 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}	**-3** 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^{-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 cm x 32 cm x 0.248 cm   _____

    b) <u>15.68 g</u>
       2.885 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 g/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) ___ KNO_3 → ___ KNO_2 + ___ O_2 Type: _____

    b) ___ $AgNO_3$ + ___ K_2SO_4 → ___ Ag_2SO_4 + ___ KNO_3 Type: _____

    c) ___ CH_3NH_2 + ___ O_2 → ___ CO_2 + ___H_2O + ___ N_2 Type: _____

    d) ___ N_2O_5 + ___ H_2O → ___HNO_3 Type: _____

    e) ___ Na + ___ $Zn(NO_3)_2$ → ___ Zn + ___ $NaNO_3$ 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

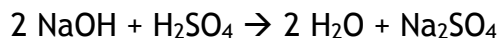10. Calculate the number of moles of the following: (SHOW WORK)

a) 42.8 g of KNO_3

b) 155.7 L of CO_2 at STP

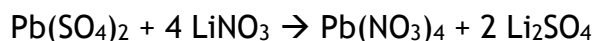c) 9.25 x 10^{26} molecules of $CaCl_2$

Stoichiometry

11. Using the following equation:

$$2\ NaOH + H_2SO_4 \rightarrow 2\ H_2O + Na_2SO_4$$

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:

$$Pb(SO_4)_2 + 4\ LiNO_3 \rightarrow Pb(NO_3)_4 + 2\ Li_2SO_4$$

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: $Fe_2O_3 + 3\ H_2 \rightarrow 2\ Fe + 3\ H_2O$

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

Limiting Reactant & Percent Yield

1. 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: $2 Na + Cl_2 \rightarrow 2 NaCl$

2. Determine the mass of lithium hydroxide produced when 50.0g of lithium are reacted with 45.0g of water according to the equation: $2 Li + 2 H_2O \rightarrow 2 LiOH + H_2$

3. Determine the percent yield of water produced when 68.3 g of hydrogen reacts with 85.4g of oxygen and 86.4g of water are collected. $2 H_2 + O_2 \rightarrow 2 H_2O$

Worksheet #2: Practice Naming Compounds

1. Provide names for the following ionic compounds:

   a. AlF_3 _____

   b. $Fe(OH)_2$ _____

   c. $Cu(NO_3)_2$ _____

   d. $Ba(ClO_4)_2$ _____

   e. Li_3PO_4 _____

   f. Hg_2S _____

   g. $Cr_2(CO_3)_3$ _____

   h. $(NH_4)_2SO_4$ _____

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. $Ni(ClO_2)_3$ _____

   e. Dinitrogen pentoxide _____

   f. Aluminum oxide _____

   g. Fe_2S_3 _____

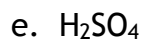5. Name the following acids

    a. $H_2C_2O_4$ _____

    b. $HBrO_3$ _____

    c. HBr _____

    d. HNO_2 _____

    e. H_2SO_4 _____

    f. $HClO$ _____
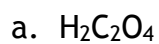
6. Write formulas for the following acids.

    a. hydrochloric acid   _____

    b. sulfuric acid   _____

    c. nitric acid   _____

    d. phosphoric acid   _____

    e. carbonic acid   _____

    f. acetic acid   _____