Summer Enrichment **Name:** _____
AP Chemistry 2020-2021

This is the first assignment of the 2024-2025 school year and it will be due on **Monday, 08/12/24**.

Welcome to AP Chemistry! There will be a lot of differences between AP Chemistry and Regular Chemistry such as the need to memorize various information that was given to you previously. The summer assignment is to help with some of the memorization, math skills, and basic topics that have been covered in chemistry.

AP Chemistry will require a decent amount of time and dedication to study on your own time, much like a college course. If you are ever stuck on any topic, your textbook and online videos will be your best friend in order to see more examples.

Here are **links to some resources**
Online Textbook will be posted in Canvas.

- **Chapter 1**: Matter, Measurement, and Problem Solving
- **Chapter 2**: Atoms, and Elements
- **Chapter 3**: Molecules and Compounds
- **Chapter 4**: Chemical Reactions and Chemical Quantities

- Review Videos:
  - Conversion between metric units: https://bit.ly/2dIhiCD
  - Converting Squared and Cubed Units: https://youtu.be/6fN5cZ5gdrQ
  - Density: https://youtu.be/74jU3B-2bAE and https://youtu.be/7tVebi3TSsg
  - Scientific notation: https://youtu.be/i6lfVUp5RW8
  - Moles and grams conversion: https://youtu.be/CMnkSb2YsXI
  - Grams, moles and particles/molecules conversion: https://youtu.be/tBbCX6dQZPo
  - Limiting Reactant: https://youtu.be/nZOVR8EMwRU and https://youtu.be/Mlu_v8rE1TY
  - Theoretical and Percent yield: https://www.youtube.com/watch?v=jtAj0s203CI
  - Percent Composition by Mass: https://www.youtube.com/watch?v=IywmGCfIUIA

Required Supplies for the School Year:

- AP Chemistry Textbook (Ebook)
- Scientific Calculator
- Binder
- Lined Paper
- Lab notebook (composition book – quad ruled)

Recommended Supplies for the School Year:

- Quad Ruled Paper
- Highlighter

Summer Enrichment Assignment: Online Textbook: AP Chemistry, A Molecular Approach TRO

Student ONLY Registration and Video

Student Code	Student Registration Video	Registration URL
SSSRCC-BRILL-MESNE-ORATE-BRUSH-WAXES	savvas.com/mastering-stu-registration	MLM.Pearson.com

1. Read and take notes on chapters 1-4. 300 words per 10 pages.
2. Chapter 1: Do Problems 35,37,39,41,43,51,55,57,59,61,63,69,71,73,77,79,81,85,87,89,91,93,95,103, 109,111,113,119,137,139.
   Chapter 2: 35,37,39,53,55,57,61,65,69,71,73,75,77,76,83,89,91,93,95,97,99,105,115,127,131.
   Chapter 3: 25,27,29,31,33,39,45,49,51,55,57,59,61,67,69,71,75,77,81,89,91,93,97,99,103
   Chapter 4: 21,25,31,37,41,49,51.

3. Complete the following worksheets (attached). Show all your work.
4. Memorize the names of the elements and the corresponding symbols.
    a. Know elements 1-56 and also Pt, Au, Hg, Rn, Fr, Ra, U, and Pu
    b. You will already know many of these
    c. The periodic table that will provided to you on the AP test and in class will only provide the symbols and **not the names of the elements**
    d. Making flashcards is helpful

5. Memorize the ionic charges of basic ions
    a. Think valence electrons
    b. Group 1 ions : +1
    c. Group 2 ion: +2
    d. Group 15 or (5A) ions (N and P): -3
    e. Group 16 or (6A) ions (O and S): -2
    f. Group 17 or (7A) ions (halogens): -1

6. Memorize the list of polyatomic ions (at the back of the provided AP Periodic Table, **Page 10**)

Math skills you should know by the time the school year starts:

Metric System:

- ❑ Know the meaning of metric prefixes: kilo-, hecto-, deca- (deka-), deci-, centi-, milli-
    - ❑ **K**ing **H**enry **D**ied By **D**rinking **C**hocolate **M**ilk
    - ❑ **K**ids **H**ate **D**oing Language Math and Grammar **D**uring **C**hristmas **M**orning
- ❑ Also know other metric prefixes such as nano, micro, mega, pico, etc.
- ❑ You can convert one measurement into another (e.g. 0.765 cg = _____ mg).
- ❑ You can convert squared/cubed units (e.g. knowing the 2.54 cm = i inch, 385.5 in^2 = ____ cm^2)

Dimensional Analysis (Train Tracks):

- ❑ When you convert from one unit to another, you can show your work using dimensional analysis.
- ❑ You know that you should always show enough work so that if your answer is incorrect, I can tell where you went wrong.

Scientific Notation:

- ❑ You can translate regular numbers into scientific notation and numbers written in scientific notation into normal notation

Making Measurements:

- ❑ You can use a ruler or other measuring device to make a measurement to the correct number of significant figures
- ❑ You always include a unit on a measurement

Significant Figures:

- ❑ You can determine the number of significant figures in a given measurement (i.e., you know whether a "0" in a measurement is significant or not.)
- ❑ You can determine the precision involving measurement when the measurement are written with the correct number of significant figures.

Summer Enrichment Assignment **Name: _____**

(to be turned in on the MONDAY of the second week of school)

Significant Figures:

1. How many significant figures (sig figs) are in the following numbers?
    a. 0.0450 _____
    b. 790 _____
    c. 32.10 _____

Prefixes:

2. What prefix do the following multiplication factors correspond to?
    a. 10^{-6} _____
    b. 10^{-3} _____
    c. 10^{3} _____
    d. 10^{6} _____

Conversions:

3. Make the following conversions (round answers correctly and show work with units):
    a. 16.2 m to km
    b. 5.44 nL to mL
    c. 45.7 ml/s to kL/hr
    d. 15 years to seconds (use 365.25 days per year)

e. How many cm^2 are in an area of 4.21 in^2?

f. 400 cm^3 to m^3

g. 25°C to K

Density:

4. A liquid has a density of 1.48 g/cm^3. What volume of liquid has a mass of 5.00 grams?

5. The density of aluminum is 2.70 g/cm^3. If a cube of aluminum weighs 13.5 grams, what is the length of the edge of the cube?

6. In an experiment, you measure the density of aluminum as 2.60 g/cm^3. The accepted value is 2.70 g/cm^3. What is the percent error in your measurement?

Scientific Notation:

7. The mass of a paperclip is about 0.525 grams. What is the mass of this paperclip in kg? (report your answer in scientific notation).

8. The number, three hundred fifty thousand, written in scientific notation is best written as:

Moles:

9. Calculate the number of moles of the following (show work):
    a. 42.9 g of KNO_3

b. 1557.7 L of CO_2 at STP

c. 9.25×10^{26} molecules of $CaCl_2$

Stoichiometry:

10. Using the following equation:

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

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

11. Using the following equation:

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

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?

12. Using the following equation:

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

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

Limiting Reactant and Percent Yield:

13. 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: $2Na + Cl_2 \rightarrow 2NaCl$

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

15. 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. $2H_2 + O_2 \rightarrow 2H_2O$

Percent Composition:

16. Calculate the percent composition of $C_{12}H_{22}O_{11}$ (sucrose). (Give percent of each element.)

Naming Compounds (see page 11 for help)

1. Provide the 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 of 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. Tetraphosphorus 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 _____

PERIODIC TABLE OF THE ELEMENTS

1 H 1.0079																	2 He 4.0026
3 Li 6.941	4 Be 9.012											5 B 10.811	6 C 12.011	7 N 14.007	8 O 16.00	9 F 19.00	10 Ne 20.179
11 Na 22.99	12 Mg 24.30											13 Al 26.98	14 Si 28.09	15 P 30.974	16 S 32.06	17 Cl 35.453	18 Ar 39.948
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.938	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.75	52 Te 127.60	53 I 126.91	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	*57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.85	75 Re 186.21	76 Os 190.2	77 Ir 192.2	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.02	†89 Ac 227.03	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Ds (271)	111 Rg (272)							

*Lanthanides	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.4	63 Eu 151.97	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
†Actinides	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)

Polyatomic Ions to Memorize:

1- Charge		2- Charge		3- Charge	
Ion	**Name**	**Ion**	**Name**	**Ion**	**Name**
$C_2H_3O_2^-$	Acetate	CO_3^{2-}	Carbonate	PO_4^{3-}	Phosphate
HCO_3^-	Bicarbonate	CrO_4^{2-}	Chromate		
BrO_3^-	Bromate	$Cr_2O_7^{2-}$	Dichromate		
BrO^-	Hypobromite	$C_2O_4^{2-}$	Oxalate		
ClO_3^-	Chlorate	HPO_4^{2-}	Monohydrogen Phosphate		
CN^-	Cyanide				
SCN^-	Thiocyanate	SO_4^{2-}	Sulfate		
OH^-	Hydroxide	$S_2O_3^{2-}$	Thiosulfate		
NO_3^-	Nitrate	O_2^{2-}	Peroxide		
IO_3^-	Iodate				
MnO_4^-	Permanganate				
$H_2PO_4^-$	Dihydrogen Phosphate				
HSO_4^-	Bisulfate				

NAMING COMPOUNDS FLOW CHART