Welcome to AP CHEMISTRY

Some Tips for Success (generated mostly by students):

1) Sign up for the class Remind by texting **@stonchem** to the number **81010**
2) Join the AP Chem Google Classroom with code **myzfynd**. The notes video for summer work are posted here.
3) Save my correct email address (kaitlin.johnson@stoningtonschools.org) and contact me for help if you are having trouble or have a question.
4) Actually do the Summer Work; it really gives you an idea of what you need to work on (don't start these assignments the day before they are due because they are lengthy).
5) AP Chem moves VERY quickly, and does not slow down until the first week of May. It is the equivalent of two semesters of university chemistry, which usually meets for 7 hrs/wk. We will have an average of 3 hrs/wk to get through material. It is crucial that you do not let yourself fall behind. STUDY and see Mrs. Johnson if you need extra help!
6) Complete the summer work thoroughly, and use the Skills Checklist below to make sure you are prepared. By the first day of school you should be able to complete these skills in your sleep. **Be ready for a quiz encompassing these skills** in the first week of school.
7) Although textbook readings are not required, the text provides a great resource when stuck and explains difficult concepts very well.

Skills Checklist for Starting AP Chemistry:

- ❑ Memorize the seven diatomic elements (BrINClHOF)
- ❑ Recognize chemical compounds (ionic) and molecules (covalent), and polyatomic ions w/ charges, such as those in the Chart 2.5 on pg. 65 of textbook (Ch. 2)- memorization NOT necessary at this point.
- ❑ Use sig figs in measurements and calculations (Ch. 1)
- ❑ Complete simple calculations in scientific notation WITHOUT calculator (Ch. 1)
- ❑ Quickly complete metric conversions (focus on milli, kilo and nano. You won't see deka, deci, hecto, or any of the other weird ones)
- ❑ Use dimensional analysis to convert between moles, mass, particles and gas volume (Ch. 3)
- ❑ Solve stoichiometry problems, including limiting reactant problems (Ch. 3)
- ❑ Calculate theoretical yield and percent yield (Ch. 3)
- ❑ Calculate mass percent, empirical formulas, and molecular formulas (Ch. 3)
- ❑ Complete molarity, mass, moles, and volume calculations (Ch. 4)
- ❑ Draw Lewis dot diagrams for molecules such as NH_3, NH_4^+, C_2H_2, C_2H_6, CH_3OH
- ❑ Be able to write out complete electron configurations easily and accurately.

AP Chemistry Summer Assignment, 2020

Familiarize yourself with chapters 1-4 of your Zumdahl textbook, then complete the following end-of-chapter problems. Please make sure work is neatly shown for all problems, and final answer is circled. When you are ready to submit them, please *scan/take a clear picture of each page and upload in Google Classroom*. Remember that the optional questions are not required and will not be graded; however, they are recommended and will be helpful in preparation for the first day of class.

Part 1 : Due August 1st, 2020

- ***Chapter 1:*** Problems 34, 79 (Optional but recommended: end-of-chapter AP multiple choice review questions 3,4,5)
- ***Chapter 2:*** Problems 28, 36, 115 (Optional but recommended: 60, 87, 103, end-of-chapter AP multiple choice review questions 5, 8, 15, 16)
- ***Watch Empirical and Molecular Formula Notes Video*** (https://www.youtube.com/watch?v=v0Cc4LeUDHE). Will need this info to complete Ch. 3 Problems. Fill in attached notes.
- ***Chapter 3:*** Problems 31, 76, 86, 88 (Optional but recommended: 4, 38, 87, 89)

Part 2: Due First Day of Class (can submit via email early if you want additional feedback from Mrs. Johnson)

- ***Chapter 3:*** Problems: 124, 126, 148 (Optional but recommended: 96, 117, 146, 159, End-of-chapter AP multiple choice review questions 9, 17)
- ***Chapter 4:*** Problems: 24, 27, 30, 31, 40 (Optional but recommended: 29, 33, 42)
- **AP Exam-style free-response questions 1-3 (see below)**

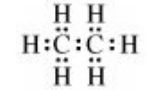
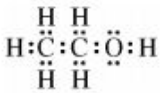
AP Exam-style free-response questions 1-3

1. Draw a complete Lewis electron-dot diagram for a molecule of S_2Cl_2. Make sure you draw all electron pairs.

2. The chart above to the right lists several molecules and their associated Lewis electron-dot diagrams.

   a) In the space provided, draw the missing Lewis dot diagram.

   b) Of the four molecules shown, which contains the shortest carbon-carbon bond? Explain.

Compound	Formula	Lewis Electron-Dot Diagram
Ethanethiol	CH_3CH_2SH	
Ethane	CH_3CH_3	
Ethanol	CH_3CH_2OH	
Ethyne	C_2H_2	

3. a.) Write the complete electron configurations for K^-

   b.) Draw the Aufbau Diagrams for the elements Oxygen and Nitrogen

Fill in the notes below (from Sections 3.6-3.7 in textbook) as you watch the notes video, https://www.youtube.com/watch?v=v0Cc4LeUDHE (video also posted in Google Classroom).

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PERCENT COMPOSITION OF COMPOUNDS (aka Percent _____)

any sample of a pure compound always consists of the same elements combined in the same proportions by mass.

Exercise 1 Calculating Mass Percent I

Carvone is a substance that occurs in two forms having different arrangements of the atoms but the same molecular formula ($C_{10}H_{14}O$) and mass. One type of carvone gives caraway seeds their characteristic smell, and the other type is responsible for the smell of spearmint oil. Compute the mass percent of each element in carvone.

*Interpretation: A sample of pure carvone of any mass will always be _____% Carbon, _____% Hydrogen and _____ % Oxygen

Exercise 2

USE MENTAL MATH (no calculator) TO ANSWER: Out of the compounds in the table, which contains the greatest mass percent of oxygen?

Compound	Molar Mass (grams)
Na_2O	62.0
MgO	40.3
K_2O	94.2
CaO	56.1

Section 3.7: EMPIRICAL & MOLECULAR FORMULAS, COMBUSTION ANALYSIS

**Textbook gives lots of memorize-y steps for calculating these things. Don't try to memorize the steps. Just think mathematically and try to make sense of the information given.*

Empirical Formula: formula with the _____ ratio of atoms (ex: C_H_ instead of C_6H_{12})

- Can determine empirical formula given _____ of a compound
-

Exercise 3 Determining Empirical Formulas

Determine the empirical formula for a compound that gives the following analysis (in mass percents):

71.65% Cl 24.27% C 4.07% H

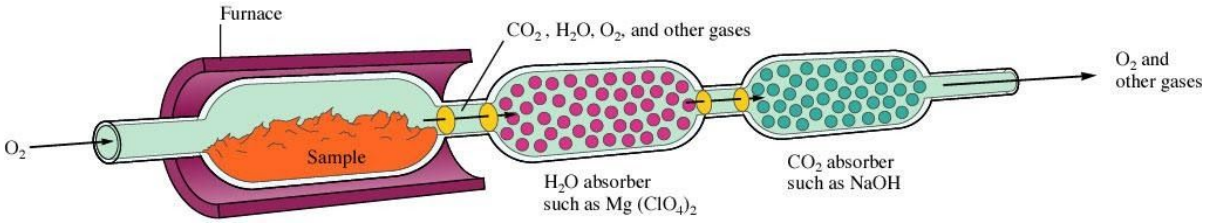
Molecular Formula: _____ formula

- Given mass percents and _____, can calculate molecular formula

Exercise 4 Determining a Molecular Formula

Caffeine, a stimulant found in coffee, tea, and chocolate, contains 49.48% carbon, 5.15% hydrogen, 28.87% nitrogen, and 16.49% oxygen by mass and has a molar mass of
194.2 g/mol. Determine the molecular formula of caffeine.

Combustion Analysis



When faced with a carbon-based compound of "unknown" formula, how do we determine its formula?

___C_H_O_N_ + ____ O_2 → _____ + _____ + _____

- Combust it with oxygen to produce CO_2, H_2O, and other gases like N_2.
- Collect and weigh the gases.
- All the carbon in CO_2 must have come from _____
- All the hydrogen in H_2O must have come from _____

Exercise 5

A compound is composed of carbon, hydrogen and nitrogen. When 0.1156 g of this compound is reacted with oxygen [burned, combusted], 0.1638 g or carbon dioxide and 0.1676 g of water are collected. The nitrogen gas produced was not collected. What is the empirical formula of the compound?