Welcome to AP Chemistry! To keep chemistry concepts fresh and to prepare you for class, please complete the following prior to the 1st day of class. Come prepared to ask questions about anything you do not understand.

Part 1: Read (if necessary) and Complete the following practice.

Read chapters 1-3 & 6-7 of *Chemistry: The Central Science, 15th Edition* by Brown, LeMay, Bursten, Murphy, Woodward, and Stoltzfus © 2022.

<u>Be sure you know the following skills</u>: How to name all types of compounds (ionic, covalent, acids etc.), How to use stoichiometry & dimensional analysis (MUST show your work), How to find empirical & molecular formulas, How to write & balance chemical equations.

1) Identifying and Naming Compounds:

	Type of Compound	Name of compound
Ex) Na ₂ CO ₃	ionic	sodium carbonate
1) CaSO ₄		
2) K ₃ PO ₃		
3) CO ₂		
4) SO ₃		
5) HNO₃		
6) Cu ₂ S	ionic	copper (II) sulfide
7)		sodium nitrate
8)		<i>iron (III) chlor<u>ide</u></i>
9)		sodium nitrate
10)		hydrochloric acid

2) Stoichiometry and Dimensional Analysis (Chemical Conversions):

11) Given 100 grams of water (H₂O),

- a) how many moles of water are present?
- b) how many molecules of water are present?

12) If you have a sample of 23 grams of acetic acid $(HC_2H_3O_2)$, how many moles do you have?

- 13) Given 3 grams of propane C_3H_8 ,
 - a) How many moles of propane are there?
 - b) How many molecules of propane are there?
 - c) How many carbon atoms are there in this sample of propane? (Hint: There are 3 carbon atoms in one molecule of propane)
- 14) If you have 4 10²⁰ molecules of water, how many moles of water do you have?
- 15) What is the *percent composition by mass* of all elements in acetic acid?
- 16) a) What is the percent composition by mass of all elements in table salt, sodium chloride (NaCl)?b) A student has a sample of salt that has a percent composition of sodium (Na) of 45%. Which of the following impurities could be present in the salt? (think about what would cause the sodium to be at a percentage higher than what it is supposed to be)

A) NaF	B) KCl	C) KF	LiCl

17) A student was dissolving a sample of iron ore in sulfuric acid in order to determine the purity of the ore (see chemical reaction below). Assume this reaction went to completion and that iron is the limiting reactant:

$$Fe_{(s)} + H_2SO_{4(aq)} \rightarrow FeSO_{4(aq)} + H_{2(g)}$$

a) If 0.07 moles of hydrogen gas are produced in this reaction, how many moles of iron were present before the reaction?

b) How many grams of iron were present before the reaction?

c) Using your answer from part (b), if the student had a 5 gram sample of the ore, what was the purity of the sample? (What was the mass percent of iron in the ore)

18) Use the following chemical reaction to answer the following questions:

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

a) If you burn 15 grams of propane, how many grams of water vapor would you produce?b) If you produce 10 grams of water vapor in a separate reaction, how many grams of oxygen gas were used to fuel the reaction?

- 3) Empirical and Molecular Formulas (Remember the empirical formula is the lowest reduced formula)...
- remember to find the number of moles of each element, divide all elements by the lowest number of moles, then round where necessary to determine the empirical formula
- If given percents first...assume a 100 gram sample and convert percents to grams (we did these this past year)
 - 19) If you have 2.10 grams of hydrogen and 16.8 grams of oxygen, what is the empirical formula for the substance?
 - 20) If you have a sample with 5.10 grams of nitrogen and 11.6 grams of oxygen, what is the empirical formula for the substance?
 - 21) A substance contains 6.00 g of carbon, 1.00 g of hydrogen, and 8.00 g of oxygen. What is the empirical formula?
 - 22) A compound consists of 2.40 g of magnesium and 3.20 g of oxygen. What is the empirical formula?
 - 23) A compound contains 25.9% nitrogen and 74.1% oxygen. Find the empirical formula.
- 4) Writing and Balancing Chemical Equations.
 - Do NOT forget about the diatomic elements (Br•I•N•Cl•H•O•F)...sound it out...brinkle hof...
 - 24) Aqueous sodium carbonate is mixed with aqueous calcium chloride to form aqueous sodium chloride and an insoluble compound.
 - 25) Hydrogen gas reacts with oxygen gas to produce water.
 - 26) Methane gas (CH₄) burns in oxygen to produce carbon dioxide and water vapor.
 - 27) Iron(III) oxide reacts with aluminum to form iron and aluminum oxide.
 - 28) Ammonia gas (NH_3) reacts with oxygen gas to form nitrogen monoxide and water vapor.

- 5) Reviewing Atomic Structure: valence electrons, electron dot diagrams, electron configurations, ions
 - 29) For the following elements, tell me how many valence electrons each has:
 - a) Na
 - b) Ca
 - c) O
 - d) lodine
 - 30) For the following elements, tell me what charge these elements take when becoming ions:
 - a) Na
 - b) Ca
 - c) Aluminum
 - d) Zinc (transition metal...but always takes a specific charge)
 - 31) Use electron dot diagrams to identify how many unpaired electrons each element has.
 - a) Na
 - b) O
 - c) N
 - d) Fluorine
 - 32) Write the electron configuration for the <u>elements and ions</u>, the first two have been done for you:
 a) Na: 1s²2s²2p⁶3s¹

b) S^{-2} : $1s^22s^22p^63s^23p^6$ (This does not end in $3p^4$ because the negative charge of the sulfur ion reminds us that two electrons were <u>added</u> to the original element.)

- c) K:
- d) Fe:
- e) Cl:
- f) Ba⁺²
- g) Cl⁻¹
- 33) Using your electron configurations from 32, identify the highest occupied sublevel. The first two are done for you.
 - a) Na: 3s sublevel b) S⁻²: 3p sublevel c) d) e) f)
 - g)

6) Review over your periodic trends. There are several questions on the summer assignment that apply knowledge of these. Again you may not know how to interpret all of the questions exactly right now, but you need to be trying your best on these pre-assessment assignments.

Part 2: Access AP Classroom and complete the AP MCQ Summer Assignment

Set up your AP Classroom (*code available <u>July 1st</u>*) and complete the "AP Chemistry Summer Assignment 2025". Class code will be emailed to you and posted on onCampus.

*Note: the above questions in part 1 are to help you <u>BEFORE</u> you look at the assignment on AP Classroom. There is a good chance you will not know how to answer many of the questions on this AP Classroom assignment but you will know how to do several of them. We will be going over all of these the first couple weeks of the school year.

Part 3:

<u>Memorize</u> common cations, anions, and the following list of common polyatomic ions. (*This only has a couple ions added to what you already know from Honors Chemistry.*)

*We will be having a quiz over these the first full week of school.

Cations (1 ⁺)	chlorate (ClO ₃ ¹⁻)
ammonium (NH4 ¹⁺)	chlorite (ClO ₂ ¹⁻)
hydronium (H₃O¹⁺)	hypochlorite (ClO ¹⁻)
Anions (1 ⁻)	Anions (2 ⁻)
acetate ($C_2H_3O_2^{1-}$)	carbonate (CO ₃ ²⁻)
bromate (BrO ₃ ¹⁻)	chromate (CrO ₄ ²⁻)
cyanide (CN ¹⁻)	dichromate (Cr ₂ O ₇ ²⁻)
hydrogen carbonate or bicarbonate (HCO ₃ 1-)	oxalate ($C_2O_4^{2-}$)
hydroxide (OH ¹⁻)	sulfate (SO ₄ ²⁻)
iodate (IO ₃ ¹⁻)	sulfite (SO ₃ ²⁻)
nitrate (NO ₃ ¹⁻)	Anions (3 ⁻)
nitrite (NO ₂ ¹⁻)	phosphate (PO ₄ ³⁻)
perchlorate (ClO4 ¹⁻)	phosphite (PO ₃ ³⁻)

All of this material is a review from Honors Chemistry. We will <u>quickly</u> cover this material within the first two weeks of school, so please work on this during the summer. This assignment will count as your first daily grade. *The information and skills will be on the Unit 1 Test*.