May 2019

To: All NWHS Students Enrolled in Advanced Placement Chemistry for the 2019-2020 school year.

Welcome to Advanced Placement Chemistry. You have elected to take a very challenging and rewarding course. There are several things you need to know **before** the start of the 2019-2020 school year.

1. I will teach this course at a rigorous pace to prepare ALL my students to score a **3** or higher on the exam. Although currently students are not required to take the AP Chemistry Exam, I will teach the course like every student will take the test. I will also HIGHLY encourage your student to enroll for the test on **May 7th**.

1. I intend to “flip” my classroom for a few of the lecture notes, especially for review of Chemistry 1 topics.

Videos will be posted in advance and accessible by a device with internet access (phone, computer, tablet). I will have devices available in my room in the event that you do not have one to use.

1. **Before August 15th**, you must complete the **AP Chemistry Summer Review Assignment** and the **Math Independent Study Packet**. If you need assistance, please visit your local library or use resources available on the internet. My website has a link to the Zumdahl 9th ed. Textbook. **Textbooks will be available till the last day of school in May for check out.** We will discuss and grade the assignments the first week of school.Summer items will be assessed on the first unit test.
2. **Staying on top of your reading and homework is KEY!!!** May 7th will be here before you know it!!!

1. When you signed up for AP Chemistry, you made a ***commitment***. Part of that commitment involves being prepared to learn chemistry at a deeper level and at a faster pace from the very beginning of school. The summer review ensures that all students are prepared to start on day one and that we will be able to cover the required material and perform the required laboratory activities.

1. Start the review assignments ASAP before the start of school. If you start too late, you will feel swamped the weekend before school starts. The idea is just to ‘knock off the rust’ prior to the start of school.

1. **DON’T PANIC!** I will conduct this course at a pace that will allow my potential ‘4’ and ‘5’ students to reach their potential. **I am available almost EVERY DAY for tutorials to help you!!!**

AP Chemistry is not just a difficult course. It is also **FUN**! As bright people, you should enjoy a challenge. If you are interested in the medical field, chemistry, engineering, or just want to learn more about chemistry, you have come to the right place. I look forward to seeing you this fall. If you have any questions, please email me at rachel.benzoni@ops.org. Keep checking my website at for updates and the specific assignment.

Remind Text # **81010** code **@ctchem2019** and I’ll start texting right away!!! I recommend the app version.

See you soon!

Miss Benzoni

**NWHS AP Chemistry Summer Assignment**

Part I – Chapters 1-3 in the textbook as a resource. READ THIS! <http://www.nxtbook.com/nxtbooks/ngsp/chemistry_ninthedition/>

If it were me, I’d take BRIEF notes over each section and try all of the practice exercises within each section. Any time we have a “reading quiz”, you are ALWAYS allowed to use your handwritten notes. If you have print access, you may want to print 2 pages on 1 and highlight and underline. It is the understanding that 80% of what you will be reading should have been taught in your introductory chemistry class and this serves as a refresher (especially for those of you who are seniors). Then complete assigned problems for each chapter.

If you get stuck (and you will), you can always skip that question and move on to another question. I will try to answer emails in a timely manner and will be available at the school in classroom during the dates and times listed above. We will hit the ground running when you arrive on August 15th, but it will be fun and a lot of hard work!

**Chapter 1: Read all of Chapter 1 then complete these exercises:**

**DIMENSIONAL ANALYSIS = TRAIN TRACKS!** 😊

1. What is better for measuring? A graduated cylinder or a buret? Why?
2. What is a volumetric flask? What is it used for?
3. What is the difference between precise and accurate?
4. What is the difference between a compound and a homogeneous mixture?
5. How many sig figs are in: a) 2000 b) 1.059 c) 450.00 d) 0.0034900 e) 300. f) 300 g) 8.0 x 108
6. Round these digits to three sig figs: a) 0.00341159 b) 17.9915 c) 2352642 d) 6.31119 e) 17000 f) 10.0999
7. Turn these numbers into scientific notation: a) 325837 b) 80000 c) 0.00003002 d) 0.00000000009 e) 12
8. Turn these numbers into standard notation: a) 4.64 x 104 b) 9.4800 x 10-5 c) 6.02 x 1023 d) 1 x 10-5
9. Using the rules for addition and subtraction, write the answers to these problems in proper sig figs:
	1. 212.2 + 53.4 + 423.09 = b) 7.244 – 4.9340 =

 c) 50 – 5 = d) 2.01 x 102 + 5.014 x 103 =

1. Using the rules for multiplication and division, write the answers to these problems in proper sig figs:
	1. 0.14 x 8.002 = b) 2.00 x 106/ 3.00 x 10-5 =

 c) 1000/2.234 = d) 50 x 8492381 =



1. Using a combination of sig fig rules, write the answer to this problem in proper sig figs: =
2. Convert the following chemical quantities **using dimensional analysis**:
	1. 8.53 centimeters to meters b) 144450 meters to kilometers

 c) 903.3 nanometers to micrometers d) 58493 millimeters to kilometers

1. **Using dimensional analysis**, prove the answers to the following problems:
	1. If a single antibiotic capsule weighs 0.55 g and a pharmacist weighs out 13.2 g of capsules, how many capsules have been dispensed?
	2. You are driving 75 mi/hr and take your eyes off the road for “just a second.” What distance did you travel in feet? (1 mi = 5280 ft)
2. Convert the following temperatures to Kelvin: a) -25°C b) 0°C c) 25°C d) -273°C e) 801°C
3. A metal cube has edges that are 3.00 cm and a mass of 140.2 g. A second cube has edges that are 2.50 cm and 81.25 g. Are these metal cubes made of the same material? Prove it mathematically.
4. Bromine gas, Br2, has a density of 3.12 g/cm3. Calculate the mass of bromine if you have 125 mL in a flask.
5. Classify each of the following as: element (E), compound (C) or mixture (M):
	1. water b) iron c) pond water d) brass e) salt f) uranium
6. Classify each as physical (P) or chemical (C) change:
	1. log burning b) evaporation c) newspaper yellowing d) souring milk e) scrambling an egg
7. Magnesium filings and in the same beaker as some powdered sulfur. Is this a pure substance or a mixture? Suppose the beaker was then heated so that they react forming magnesium sulfide. Would this be a pure substance or a mixture? Justify your answer.
8. The density of aluminum is 2.70 g/cm3. Your experimental data determined the density to only be 2.62 g/cm3. Determine the percent error for your results.

**Chapter 2: Read all of Chapter 2, then complete these exercises:**

**Keep in mind that MOLECULAR = COVALENT BONDING.**

1. Explain these three laws: a) Law of Conservation of Mass b) Law of Definite Proportions and c) Law of Multiple Proportions.
2. John Dalton said atoms were indivisible. Why is that no longer true?
3. John Dalton also said that all atoms of the same element were identical? Why is this no longer true?
4. What were the major contributions of J.J. Thomson? What experiment did he use?
5. What were the major contributions of Ernest Rutherford? What experiment did he use?
6. What is the current model of atom?
7. What are the major differences between ionic and covalent bonding?
8. Identify the mystery elements below:
	* 1. I am a metal with three valence electrons living in period 4. Who am I?
		2. I am a gas that has one valence electron. Who am I?
		3. I am a nonreactive gas and the smallest element on the periodic table. Who am I?
		4. I form a -3 charge when I bond with other elements and I have two energy levels. Who am I?
9. A sample of H2SO4 contains 2.02 g of hydrogen, 32.07 g of sulfur and 64.00 g of oxygen. How many grams of sulfur and oxygen are present in a second sample of H2SO4 containing 7.27 g of hydrogen?
10. In a combustion reaction, 46.0 g of ethanol reacts with 96.0 g of oxygen to produce water and carbon dioxide. If 5

4.0 g of water is produced, what mass of carbon dioxide is also produced?

1. What are the names of the following periodic table groups: a) Group 1 b) Group 2 c) Group 3-12 d) Group 17
2. Write the atomic symbol ( $$) for each of the following isotopes:

 a) Z = 9, 10 neutrons b) an isotope of chlorine with a mass of 37 c) Z = 26, A = 57

 d) 43 protons, 63 neutrons e) lead with a mass of 205 f) lead with a mass of 207

1. How many protons, neutrons and electrons are in the following atoms?

 a) 239Pu b) 79𝑆𝑒2- c) 2859𝑁𝑖2+

1. Name the following compounds:

 a) NaI b) Li3N c) FeBr2 d) NiO e) P2O5 f) N2O

 g) HClO3 h) HBr i) Cu(NO3)2 j) MnPO4 k) HC2H3O2 l) KMnO4

1. Write the formulas for the following compounds:

 a) aluminum sulfide b) potassium nitride c) tin (II) nitride d) copper (I) chloride

 e) chromium (VI) oxide f) carbon monoxide g) diboron trioxide h) sulfuric acid

 i) hydrochloric acid j) hypochlorous acid k) magnesium nitrite l) calcium sulfate

**Chapter 3: Read all of Chapter 3, then complete these exercises:**

**Keep in mind that FORMULA WEIGHT = MOLAR MASS. \*\*\*\*\* THIS CHAPTER IS HUGE!!!! \*\*\*\*\***

1. Write a balanced chemical equation for the diagram shown here: 
2. Hydrogen gas and oxygen gas react to form water. Draw a molecule diagram representing the balanced reaction.
3. An element consists of the following percent abundances. What is the element?

|  |  |  |
| --- | --- | --- |
| **ISOTOPE**  | **PERCENT ABUNDANCE**  | **MASS (u)**  |
| **X-46**  | 8.00%  | 45.9523  |
| **X-47**  | 7.30%  | 46.9517  |
| **X-48**  | 73.80%  | 47.9479  |
| **X-49**  | 5.50%  | 48.9478  |
| **X-50**  | 5.40%  | 49.9448  |

1. The element rhenium (Re) has two natural isotopes, 185𝑅𝑒 and 187𝑅𝑒. The average of these isotopes is 186.207 u. Rhenium is 62.60% 187𝑅𝑒 with a mass of 186.956 u. Calculate the mass of 185𝑅𝑒.
2. An unknown element has two isotopes. The first isotope has a mass of 150.9196 u and the second isotope has a mass of 152.9209. The average atomic mass of the element is 15Type equation here.1.557 u. Calculate the **percent abundance of** **EACH** isotope.
3. Using dimensional analysis, calculate:
	1. the mass of 3,000 atoms of iron. b) number of liters in 5.5 moles of oxygen gas

c) grams in two moles of ammonium dichromate d) molecules in 34 grams of sulfuric acid e) atoms in 55 molecules of water

1. Calculate the molar mass of the following compounds: a) C2H3Cl3O2 b) (CH3)2N2O
2. Calculate the percent composition of EACH element in: a) C3H4O2 b) C12H22O11
3. What is the empirical formula for a compound that is 63.68% carbon, 12.38% nitrogen, 9.80% hydrogen and 14.14% oxygen? Be sure to show all of the steps!
4. A compound contains three elements: carbon, hydrogen and oxygen. What is the empirical formula for a substance that is 48.64% carbon and 8.16% hydrogen?
5. What is the molecular formula NPCl2 if it’s molecular formula has a mass of 347.64 g/mol?
6. Determine the molecular formula of a compound that has 26.7% P, 12.1% N and 61.2% Cl with a molar mass of 580 g/mol.
7. Write and balance the following equations. Watch for diatomic elements (BrINClHOF).
	1. iron (III) sulfide + hydrochloric acid 🡪 iron (III) chloride and hydrogen sulfide
	2. zinc + hydrochloric acid 🡪 zinc chloride + hydrogen
	3. calcium hydroxide + phosphoric acid 🡪 water + calcium phosphate
	4. silver nitrate + sulfuric acid 🡪 silver sulfate + nitric acid
	5. iron (II) carbonate + carbonic acid 🡪 iron (II) bicarbonate
8. Use dimensional analysis, stoichiometry and this balanced chemical equation to answer the following questions:

 **4 Al + 3 O2** 🡪 **2 Al2O3**

* 1. How many grams of aluminum oxide are produced from 12.5 grams of aluminum?
	2. How many liters of oxygen are necessary to produce 15.0 grams of aluminum oxide?
	3. How many moles of aluminum are necessary to react with 0.5 moles of oxygen?
	4. If you started with 10.0 grams of aluminum and 10.0 grams of oxygen, which would be the limiting reactant? How much excess reactant was used? How much excess reactant remains?
	5. If you produced 103.5 grams of aluminum oxide from 15.0 grams of aluminum with excess oxygen, what was your percent yield during your experiment?
	6. If our experiment was 96% efficient and we produced 13.96 grams of aluminum oxide, how much aluminum did we start with in grams?