AP CHEMISTRY SUMMER PACKET 2018 -2019

Introduction:

I am glad you have decided to take Advanced Placement Chemistry! This course is designed to give you a more complete experience of chemistry that will prepare you for both the AP Chem exam in the spring of next year and for introductory chemistry in college.

The only way to complete all the topics in this course is to move at a very rapid pace. I hope to finish the lecture portion of the course shortly after the end of the third marking period so we can begin reviewing for the exam. Therefore, it is critical for all students to complete the Summer Assignment to be ready to go in the fall.

Course Overview:

The course is taught through a series of lectures and laboratories with homework problems and practice exams.. Chapter exams, laboratories and homework assignments comprise the bulk of the grading criteria. Homework should be accomplished within one or two days after assignment. Problem sets are due on the day of the exam on current material. Laboratories are generally due 2 school days after completion of the laboratory. **No late labs are accepted**.

Why take AP Chemistry?

You have probably decided to take this course for several reasons. Here are some of the reasons why this course is beneficial:

- The most obvious answer is that students who successfully pass the AP Chem Exam next May (a score of 3 or better is considered passing) are eligible to receive college credit at most colleges and universities in the United States. This can represent a considerable savings in time and money.
- Some students, regardless of whether or not they passed the AP Chem Exam, elect to take freshman chemistry in college anyway. For most students freshman college chemistry is an extremely difficult course. Students who have taken AP Chem do immensely better than if they had not taken the course. If you planning on majoring in any science or medical field you will take college chemistry and this course will prepare you extremely well.
- AP Chem credit looks really good on your transcript. While you should not take a course mainly because the grade is "weighted", you should take challenging courses that show you pushed yourself in difficult courses.
- AP Chem will teach you to think at higher levels. In AP Chem, you will be encouraged and taught how to analyze deeply, synthesize concepts and evaluate approaches to problems, often in novel situations, sometimes even deriving your own techniques from application. This is exactly the type of thinking you will be expected to use in college.
- You will find it can be easier to learn chemistry in this high school AP setting than in college because of the small class sizes and individual time and help that I can give you. Freshman college chemistry is usually taught in large lecture halls where individual assistance is difficult to find.

Tips for achieving success in AP Chemistry:

- Study AP Chem every day. This means that if there are no formal assignments, you should be using this time to review your class notes, read the text, give yourself a practice quiz, etc. You must budget this time carefully. If you have a job or are involved in sports, your study time must take priority.
- Choose a study partner that you can also use as a lab partner. **This class is very difficult if done alone.** Pairs are better than larger groups. Get together at regularly scheduled times for study and homework. Avoid "splitting up" the work.
- Purchase a study guide and use it for each chapter studied. There are a variety of guides. I will provide "5 Steps to a 5"
- Avoid getting behind in this course.
- Attend study sessions once they are offered in March. These are generally one evening a week.

The Commitment:

If you taking this course, you have already enjoyed success in your academic career. Taking a course such as AP Chem will be very different than courses you have taken in the past. It will involve a level of work and commitment that you may not have experienced before. Below is list of realities that you must face:

- Straight-A students often get their first B in AP Chem and other students receive their first C. An A in this course will take tremendous effort.
- Missing class for sports, vacations, activities, etc, will result in falling behind and extreme difficulty in getting caught up. You may have been able to manage missing more than a few days in the past. In this course multiple missed days will be very hard to make up.
- This course always follows the same pace, has the same workload, and the same difficulty level. There is a very specific amount of material that must be covered for the AP Test and there is no time to re-teach or slow down if some students are falling behind. We absolutely must be ready for the AP Test in May. You must accept the fact that you will have significant work outside of class.
- You must complete the summer assignment that follows. We will have a test on this material on the **second day of class**. In order for us to save some valuable time later in the course, everyone needs to be ready to go. Carefully read the information on the summer packet on the pages that follow.

We are going to have an exciting, challenging and fun year. I look forward working with you all next year. I hope you have a great summer. If you do have any questions please feel free to email me this summer. I cannot promise to check it everyday, but I will get back to you as soon as I can.

Remember your summer assignment and second-day test, and I'll see you in the fall!

Some useful information as we move forward

Positive Ions (Cations)

1+	2+	3+	4+
ammonium NH_4^+ cesium Cs^+ copper(I) Cu^+ gold(I) Au^+ hydrogen H^+ lithium Li^+ potassium K^+ rubidium Rb^+ silver Ag^+ sodium Na^+	barium Ba^{2+} beryllium Be^{2+} cadmium(II) Cd^{2+} calcium Ca^{2+} chromium(II) Cr^{2+} cobalt(II) Co^{2+} copper(II) Cu^{2+} iron(II) Fe^{2+} lead(II) Pb^{2+} magnesium Mg^{2+} manganese(II)Mn^{2+} mercury(I) Hg_2^{2+} mercury(II) Hg^{2+} nickel(II) Ni^{2+} strontium Sr^{2+} tin(II) Sn^{2+} zinc Zn^{2+}	aluminum Al^{3+} antimony(III) Sb^{3+} bismuth(III) Bi^{3+} chromium(III) Cr^{3+} cobalt(III) Co^{3+} gallium Ga^{3+} gold(III) Au^{3+} manganese(III) Mn^{3+} nickel(III) Ni^{3+} iron(III) Fe^{3+}	carbon C^{4+} lead(IV) Pb^{4+} silicon Si^{4+} tin(IV) Sn^{4+}
			5+
			antimony(V) Sb^{5+} bismuth(V) Bi^{5+}

Negative Ions (Anions)

-1	-2	-3	-4
acetate CH_3COO^- bromide Br^- chlorate ClO_3^- chloride Cl^- chlorite ClO_2^- cyanide CN^- dihydrogen phosphate $H_2PO_4^-$ fluoride F- hydride H- hydrogen carbonate HCO_3^- (bicarbonate) hydrogen sulfate HSO_4^- (bisulfate) hydrogen sulfide HS- (bisulfide) hydrogen sulfite HSO_3^- (bisulfite) hydroxide OH- hypochlorite OCl- iodate IO_3^- iodide I- nitrate NO_3^- perchlorate ClO_4^- permanganate MnO_4^- thiocyanate SCN-	carbonate CO_3^{2-} chromate CrO_4^{2-} dichromate $Cr_2O_7^{2-}$ hydrogen phosphate HPO_4^{2-} oxalate $C_2O_4^{2-}$ oxide O^{2-} peroxide O_2^{2-} selenide Se^{2-} silicate SiO_3^{2-} sulfate SO_4^{2-} sulfide S^{2-} sulfite SO_3^{2-} telluride Te^{2-} thiosulfate $S_2O_3^{2-}$	arsenide As^{3-} nitride N^{3-} phosphate PO_4^{3-} phosphide P^{3-} phosphite PO_3^{3-}	carbide C^{4-}

POLYATOMIC ELEMENTS, ACIDS and COMMON COMPOUNDS

Polyatomic Elements	Acids	Common Compounds
As_2 arsenic	CH_3COOH or $C_2H_4O_2$	$AlK(SO_4)_2 \cdot 12H_2O$ alum
At_2 astatine	acetic(vinegar) $HC_2H_3O_2$	CH_4 methane
Br_2 bromine	$C_{18}H_{34}O_2$ oleic	C_6H_6 benzene
Cl_2 chlorine	Cl_3CCOOH trichloroacetic	$C_{10}H_8$ naphthalene (moth balls)
F_2 fluorine	H_3BO_3 boric	$CHCl_3$ chloroform
H_2 hydrogen	HBr hydrobromic	CH_3OH methyl alcohol or methanol (wood alcohol)
I_2 iodine	HCOOH formic	C_2H_5OH ethyl alcohol or ethanol (drinking alcohol)
N_2 nitrogen	H_2CO_3 carbonic	CH_3COCH_3 acetone
O_2 oxygen	$H_2C_2O_4$ oxalic	$C_3H_5(OH)_3$ glycerin
P_4 phosphorus	HCl hydrochloric (muriatic)	$C_6H_8O_6$ L-ascorbic acid (vitamin C)
S_8 sulfur	HClO hypochlorous	$C_6H_{12}O_6$ monosaccharide (simple sugar)
Sb_4 antimony	$HClO_2$ chlorous	$C_{12}H_{22}O_{11}$ disaccharide (double sugar)
Se_8 selenium	$HClO_3$ chloric	$CaCO_3$ chalk, marble, limestone
	$HClO_4$ perchloric	CaO quicklime
	HF hydrofluoric	$Ca(OH)_2$ slaked lime (lime water)
	HI hydroiodic	$CaSO_4$ gypsum, plaster of paris
	HNO_2 nitrous	Fe_3O_4 or Fe_2O_3 rust
	HNO_3 nitric	HCHO formaldehyde
	H_2SO_3 sulfurous	H_2O water
	H_2SO_4 sufuric	Hg quicksilver
		K_2CO_3 potash
		MgO magnesia
		$MgSO_4$ epsom salts
		NH_3 ammonia
		N_2O laughing gas
		Na_2CO_3 soda ash
		NaCl table salt
		$NaHCO_3$ baking soda
		$NaNO_3$ saltpeter
		NaOCl bleach
		NaOH caustic soda or lye
		Na_2SO_4 Glauber's salt
		$Na_2S_2O_3$ hypo
		SiO_2 sand,quartz

THE SOLUBILITY RULES

1. The nitrates, nitrites, chlorates, and acetates of all metals are soluble in water. Silver acetate, silver nitrite, and potassium perchlorate are sparingly soluble.

2. All sodium, potassium, and ammonium salts are soluble in water.

3. The chlorides, bromides, and iodides of all metals except lead, silver, and mercury (I) are soluble in water. Hg_2Br_2 is moderately soluble. $PbCl_2$, $PbBr_2$, and PbI_2 are soluble in hot water. The water-insoluble chlorides, bromides, and iodides are also insoluble in dilute acids.

4. The sulfates of all metals except lead, strontium, mercury (I), and barium are soluble in water. Silver sulfate and calcium sulfate are slightly soluble. The water-insoluble sulfates are also insoluble in dilute acids.

5. The carbonates, phosphates, borates, sulfites, chromates, and arsenates of all metals except sodium, potassium, and ammonium are insoluble in water, but soluble in dilute acids. $MgCrO_4$ is soluble in water; $MgSO_3$ is slightly soluble in water.

6. The sulfides of all metals except lithium, barium, calcium, magnesium, potassium, sodium, and ammonium are insoluble in water. BaS, CaS, and MgS are sparingly soluble.

7. The hydroxides of lithium, sodium, potassium, and ammonium are very soluble in water. The oxides and hydroxides of calcium, strontium, and barium are moderately soluble. The oxides and hydroxides of all other metals are insoluble.

Naming Compounds should be an easy task.

Table 5.4 Prefixes Used to Indicate Numbers in Chemical Names

Prefix	Number Indicated
mono-	1
di-	2
tri-	3
tetra-	4
penta-	5
hexa-	6
hepta-	7
octa-	8

Rules for Naming Type III Binary Compounds

1. The first element in the formula is named first, and the full element name is used.
2. The second element is named as though it were an anion.
3. Prefixes are used to denote the numbers of atoms present. These prefixes are give in Table 5.4.
4. The prefix *mono-* is never used for naming the first element. For example, CO is called carbon monoxide, *not* monocarbon monoxide.

NAMING ACIDS

1. If the anion does not contain oxygen, the acid is named with the prefix *hydro-* and the suffix *–ic* attached to the root name for the element. For example, when gaseous HCl (hydrogen chloride) is dissolved in water, it forms hydrochloric acid. Similarly, hydrogen cyanide (HCN) and dihydrogen sulfide (H_2S) dissolved in water are called hydrocyanic acid and hydrosulfuric acid, respectively.

2. When the anion contains oxygen, the acid name is formed from the root name of the central element of the anion or the anion name, with a suffix of *–ic* or *–ous*. When the anion name ends in *–ate*, the suffix *–ic* (or sometimes *–ric*) is used. For example, H_2SO_4 contains the sulfate anion (SO_4^{2-}) and is called sulfuric acid; H_3PO_4 contains the phosphate anion (PO_4^{3-}) and is called phosphoric acid; and $HC_2H_3O_2$ contains the acetate ion ($C_2H_3O_2^-$) and is called acetic acid. When the anion has an *–ite* ending, the suffix *–ous* is used. For example, H_2SO_3, which contains sulfite (SO_3^{2-}), is called sulfurous acid; and HNO_2, which contains nitrite (NO_2^-), is called nitrous acid.

From the Textbook please complete the following problem sets. You will turn them in the first day of class. Make sure they are neat and organized and easy for me to grade!!!

From Chapter 2: Atoms, Molecules, Ions

- End of Chapter Questions: (pages 71-72) 50, 64, 66, 68,

From Chapter 3: Stoichiometry

- End of Chapter Questions: (pages 117 – 122) 27, 29, 30, 31, 52, 62, 63, 64, 65, 69, 70, 74, 78, 79, 80, 82, 90, 91, 92, 95, 99, 102, 106

From Chapter 4: Types of Chemical Reactions

- End of Chapter Questions: (pages 171 – 174) 21, 28, 38, 42, 44, 47, 48, 49, 50, 53, 56, 58, 60, 63, 64

Read and take notes from Chapters 2-5. Keep these in a notebook for your reference as we quickly move through the first few days of school.