AP CHEMISTRY SUMMER ASSIGNMENT

While you are enjoying your summer sun, you will begin your AP chemistry journey. This first assignment will give you a foundation which will be built upon as we study AP chemistry. You have 3 tasks over the summer:

I. **Please visit the College Board AP Chemistry site:**
https://apstudent.collegeboard.org/apcourse/ap-chemistry

Scroll through the site and become familiar with the format of the AP Exam. Find the practice example section.

II. Review Assignment

You will be receiving a code and instructions for the Flinn Prep review assignment. You should complete the assigned units. In addition, you will be e-mailed slides for chapters 1 and 2 of our AP Chemistry textbook and accompanying videos. These chapters include material covered in your tenth-grade chemistry class and/or the Flinn Prep review. The first test of the year (which will take place 2-3 weeks after classes have begun) will include chapters 1 and 2 but we will NOT be reviewing those chapters in class. Any other material covered in Flinn Prep will be reviewed in class, but it will be at a quick pace, so if you are not comfortable with that material, you will fall behind.

III. First Day Quiz Material

AP Chemistry is a difficult course. It is not all about memorization; however, having these items memorized is essential for success in learning the concepts covered in the course. Make take the lists with you on vacation, or do whatever it takes to get this information memorized. Do **not** wait until the night before school begins. You will have a quiz on this material on the first day of class.

The first day test will cover six areas of memorization:

1. Elements 1-38, 47, 50, 78-88 (names to symbols &symbols to names)
2. Determining Oxidation Numbers
3. Ions and Polyatomic Ions (including name, symbol and charge)
4. Nomenclature of Ionic Compounds and Molecular Compounds.
5. Rules for Naming Acids and common strong acids and bases
6. Memorization of one Solubility Rule listed at the end of this packet (If you need the other rules they will be given to you)

Rules for Determining Oxidation Number

Oxidation Number: *A number assigned to an atom in a molecular compound or molecular ion that indicates the general distribution of electrons among the bonded atoms.*

1. The oxidation number of any uncombined element is *O*.
2. The oxidation number of a monatomic ion equal the charge on the ion.
3. The more electronegative element in a binary compound is assigned the number equal to the charge it would have if it were an ion.
4. The oxidation number of fluorine in a compound is always –1
5. Oxygen has an oxidation number of –2 unless it is combined with F, when it is +2, or it is in a peroxide, when it is –1.
6. The oxidation state of hydrogen in most of its compounds is+1 unless it combined with a metal, in which case it is –1.
7. In compounds, the elements of groups 1 and 2 as well as aluminum have oxidation number of +1, +2, and +3, respectively
8. The sum of the oxidation numbers of all atoms in a neutral compound is *O*.
9. The sum of the oxidation number of all atoms in a polyatomic ion equals the charge of the ion.

Tables

COMMON ION CHART

POSITIVE IONS

+1	+2	+3	+4
H^+: hydrogen	Be^{+2}: beryllium	Fe^{+3}: iron (III)	Sn^{+4}: tin (IV)
Na^+: sodium	Mg^{+2}: magnesium	Au^{+3}: gold (III)	Pb^{+4}: lead (IV)
K^+: potassium	Ca^{+2}: calcium	Ga^{+3}: gallium	Mn^{+4}: manganese (IV)
Li^+: lithium	Sr^{+2}: strontium	In^{+3}: indium (III)	Ti^{+4}: titanium (IV)
Rb^+: rubidium	Ba^{+2}: barium	Tl^{+3}: thallium (III)	
Cs^+: cesium	Ra^{+2}: radium	Al^{+3}: aluminum	
Ag^+: silver	Fe^{+2}: iron (II)	Cr^{+3}: chromium (III)	**+6**
Au^+: gold (I)	Cu^{+2}: copper (II)	Ti^{+3}: titanium (III)	Cr^{+6}: Chromium (VI)
Cu^+: copper (I)	Zn^{+2}: zinc	Mn^{+3}: manganese (III)	
Tl^+: thallium (I)	Cd^{+2}: cadmium	Co^{+3}: cobalt (III)	
In^+: indium (I)	Hg_2^{+2}: mercury (I)		**+7**
	Hg^{+2}: mercury (II)	Bi^{3+} Bismuth (III) As^{3+} Arsenic (III)	Mn^{+7}: manganese (VII)
NH_4^+: ammonium	Pb^{+2}: lead (II)		
	Sn^{+2}: tin (II)		+5 Bi^{5+} Bismuth (V) $Arsenic^{5+}$ (V)
	Ni^{+2}: nickel		
H_3O^+ Hydronium	Co^{+2}: cobalt (II)		
	Mn^{+2}: manganese (II)		
	Ti^{+2}: titanium (II)		
	Cr^{+2}: chromium (II)		

Table 6.8 Anions

Ionic Charge: 1−				Ionic Charge: 2−		Ionic Charge: 3−	
Halogens: Group 7A/17		***Oxyanions***		***Group 6A/16***		***Group 5A/15***	
F^-	Fluoride	ClO_4^-	Perchlorate	O^{2-}	Oxide	N^{3-}	Nitride
Cl^-	Chloride	ClO_3^-	Chlorate	S^{2-}	Sulfide	P^{3-}	Phosphide
Br^-	Bromide	ClO_2^-	Chlorite	***Oxyanions***		***Oxyanion***	
I^-	Iodide	ClO^-	Hypochlorite	CO_3^{2-}	Carbonate	PO_4^{3-}	Phosphate
Acid Anions		BrO_3^-	Bromate	SO_4^{2-}	Sulfate		
HCO_3^-	Hydrogen carbonate	BrO_2^-	Bromite	SO_3^{2-}	Sulfite		
HS^-	Hydrogen sulfide	BrO^-	Hypobromite	$C_2O_4^{2-}$	Oxalate		
HSO_4^-	Hydrogen sulfate	IO_4^-	Periodate	CrO_4^{2-}	Chromate		
HSO_3^-	Hydrogen sulfite	IO_3^-	Iodate	$Cr_2O_7^{2-}$	Dichromate		
$H_2PO_4^-$	Dihydrogen phosphate	NO_3^-	Nitrate	***Acid Anions***			
Other Anions		NO_2^-	Nitrite	HPO_4^{2-}	Hydrogen phosphate		
SCN^-	Thiocyanate	OH^-	Hydroxide	***Diatomic Elemental***			
CN^-	Cyanide	$C_2H_3O_2^-$	Acetate	O_2^{2-}	Peroxide		
H^-	Hydride	MnO_4^-	Permanganate				

Less Common but still know:
BrO^{4-} Bromate (VII) (Perbromate)
$HC_2O_4^-$ Hydrogen Oxalate
IO^- Hypoiodite
IO^{2-} Iodite
PO_3^{3-} Phosphite
$S_2O_3^{2-}$ Thiosulfate

Rules for Naming Ionic Compounds

1. Balance Charges (charges should equal zero)
2. Cation is always written first (in name and in formula)
3. Change the ending of the anion to -ide

-If necessary, use the stock system

- review the criss cross method

FOR NAMING MOLECULAR (COVALENT) COMPOUNDS--GREEK PREFIXES

mono-	hexa-
di-	hepta-
tri-	octa-
tetra-	nona-
penta-	deca-

ELEMENTS THAT EXIST AS DIATOMIC MOLECULES

BrINClHOF or HONClBrIF or H NO Halogens

Br_2 I_2 N_2 Cl_2 H_2 O_2 F_2

You should know how to go from a name to a formula and a formula to a name. Look in your book if you need extra help or go to

http://www.chemteam.info/Nomenclature/Nomenclature.html

Rules for Naming an Acid

1. When the name of the anion ends in –ide, the acid name begins with the prefix hydro-, the stem of the anion has the suffix –ic and it is followed by the word acid.
   -ide becomes hydro _____ic Acid
   Cl^- is the Chlor**ide** ion so HCl = **hydro**chlor**ic acid**

2. When the anion name ends in –ite, the acid name is the stem of the anion with the suffix –ous, followed by the word acid.
   -ite becomes _____ous Acid
   ClO_2^- is the Chlor**ite** ion so $HClO_2$. = Chlor**ous** acid.

3. When the anion name ends in –ate, the acid name is the stem of the anion with the suffix –ic, followed by the word acid.
   -ate becomes _____ic Acid
   ClO_3^- is the Chlor**ate** ion so $HClO_3$ = Chlor**ic** acid.

TABLE OF STRONG ACIDS

Completely Ionized in Water to Give One (*or more*) Protons per Acid Molecule

HI	$H^+(aq) + I^-(aq)$	
HBr	$H^+(aq) + Br^-(aq)$	
$HClO_4$	$H^+(aq) + ClO_4^-(aq)$	
HCl	$H^+(aq) + Cl^-(aq)$	
$HClO_3$	$H^+(aq) + ClO_3^-(aq)$	
H_2SO_4	$H^+(aq) + HSO_4^-(aq)$	*(HSO_4^- is a weak acid that contributes additional protons)*
HNO_3	$H^+(aq) + NO_3^-(aq)$	

TABLE OF STRONG BASES

Completely Ionized in Water to Give One (*or more*) Hydroxides per Base Molecule

NaOH	**$Na^+(aq) + OH^-(aq)$**	
KOH	**$K^+(aq) + OH^-(aq)$**	
LiOH	$Li^+(aq) + OH^-(aq)$	
RbOH	$Rb^+(aq) + OH^-(aq)$	
CsOH	$Cs^+(aq) + OH^-(aq)$	
$Ca(OH)_2$	$Ca^{2+}(aq) + 2OH^-(aq)$	*(but not very soluble)*
$Ba(OH)_2$	$Ba^{2+}(aq) + 2OH^-(aq)$	*(but not very soluble)*
$Sr(OH)_2$	$Sr^{2+}(aq) + 2OH^-(aq)$	*(but not very soluble)*

Memorize the following Solubility Rule:

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

ENJOY YOUR SUMMER! LOOKING FORWARD TO A CHALLENGING BUT GREAT YEAR OF AP CHEMISTRY!