AP Chemistry Summer Assignment

For help or for clarification on this material, email Mr. Chen at bchen@stfrancishs.org. You'll need to get a copy of the textbook, Chemistry, AP edition by Raymond Chang and Kenneth Goldsby, in order to complete the homework. (The ISBN is 9780076656103).

Summary of Summer Assignment:

1. Complete this packet. You should memorize required information and complete reading, notes, and homework problems.
2. ***Read & sign and have your parents read & sign the Safety Handout". This is due the first day of class!***
3. Take the Safety Quiz on PowerSchool. You must earn 100% to participate in labs. You may retake it as many times as needed to pass. This MUST be done BEFORE the first day of class. I will make it available the last week before school begins. If you will not have access to the internet that last week, notify me ahead of time so I can make it available earlier.

You will be responsible for knowing everything assigned below. You will be taking a summer test sometime within the first 2-3 days of school on this material. It will be worth 100 points. (The same point value as most other tests).

The information in these tables should be memorized:

SI (Le Systeme International d'Unites) system of measurement

A. 7 base units – memorize these for now:

length	*meter*	*m*
mass	*kilogram*	*kg*
time	*second*	*s*
thermodynamic temp	*kelvin*	*K*
amount of substance	*mole*	*mol*

B. Important prefixes – prefixes can be added to base units to obtain units of convenient sizes for larger/ smaller sizes - memorize these:

prefix	***symbol***	***meaning***	***Multiplier***	***Multiplier***	***Using meters as an ex. unit, determine the appropriate relationships…***
		Greater than 1			
mega	*M*	*million*	*1 000 000*	*1×10^{6}*	*1Mm = 10^{6} m (I did this one for you)*
kilo	*k*	*thousand*	*1 000*	*1×10^{3}*	*____ km = ____ m*
		Less than 1			
centi	*c*	*hundredth*	*0.01*	*1×10^{-2}*	*____ cm = ____ m*
milli	*m*	*thousandth*	*0.001*	*1×10^{-3}*	*____ mm = ____ m*
micro	*μ*	*millionth*	*0.000 001*	*1×10^{-6}*	*____μm = _____ m*
nano	*n*	*billionth*	*0.000 000 001*	*1×10^{-9}*	*10^{9} nm = 1 m (I did this one for you)*

Solubility Rules:

1. Ionic compounds containing Group 1 elements and ammonium ion are soluble.
2. Ionic compounds containing acetates and nitrates are soluble.
3. Ionic compounds containing halogens (other than F) are soluble **except** those of silver, mercury(I), and lead.
4. Ionic compounds containing sulfates are soluble **except** those of calcium, strontium, barium, silver, mercury(I), and lead.
5. Hydroxides are soluble **only** with alkali metals and heavier alkaline earth metals (calcium and strontium partially soluble).
6. Assume other ionic compounds are insoluble.

Common Ions:

Monatomic Cations	Name
H^+	Hydrogen
Ag^+	Silver
Zn^{2+}	Zinc
Fe^{3+}	Iron(III)
Fe^{2+}	Iron(II)
Cu^{2+}	Copper(II)
Cu^+	Copper(I)
Co^{3+}	Cobalt(III)
Co^{2+}	Cobalt(II)
Sn^{4+}	Tin(IV)
Sn^{2+}	Tin(II)
Pb^{4+}	Lead(IV)
Pb^{2+}	Lead(II)
Ni^{2+}	Nickel

Polyatomic Anions	Name
OH^-	Hydroxide
NO_3^-	Nitrate
PO_4^{3-}	Phosphate
CO_3^{2-}	Carbonate
HCO_3^-	Hydrogen carbonate or bicarbonate
SO_4^{2-}	Sulfate
ClO_3^-	Chlorate
$CH_3CO_2^-$	Acetate
MnO_4^-	Permanganate
$Cr_2O_7^{2-}$	Dichromate
CrO_4^{2-}	Chromate
O_2^{2-}	Peroxide
$C_2O_4^{2-}$	Oxalate
CN^-	Cyanide
SCN^-	Thiocyanate

Polyatomic Cation	Name
NH_4^+	Ammonium

** all ion names must be spelled correctly on tests b/c small difference can change into new ion!!

Strong Acids

HCl	HBr	HI	
H_2SO_4	HNO_3	$HClO_4$	$HClO_3$

*The first proton in sulfuric acid is ionized completely; the second proton is only partially ionized. Sulfuric acid is the only polyprotic acid that exhibits this property. All other polyprotic acids are weak (and are written in molecular forms in NIE).

Strong Bases

- Soluble hydroxides (alkali hydroxides and Ba^{2+})
- Slightly soluble hydroxides (Ca^{2+} and Sr^{2+})

All other common acids/ bases are weak.

Homework from the textbook:
A lot of the material in AP Chemistry is review; however, now you need to ***understand*** *the material. You can't just memorize it. In order to leave time to develop that deep understanding, I need to count on you to have thoroughly reviewed and re-learned the material I am assigning on this handout. We will continue to use this material throughout the year so please don't put this off until the end and hurry through it. Take the time to study it and put it in your long-term memory.*

You will need to read chapters 1 – 4. Please read all material unless I specifically tell you to skip a section. Even though there are not many concepts to memorize in the first chapter, it is an excellent lead in to why we will approach things the way we do, etc. As you read through the chapters, take notes on the material you do not know well. (There are no book notes in AP Chemistry). There are many terms in these chapters that you should be **very** comfortable with and that you should be able to use in explanations and discussions. You should know a lot of these already. I will list them for each chapter. You should study the material well enough that you understand it and can do the homework problems.

I've assigned some "review of concepts" sections; I won't collect these but they often ask the questions in a slightly different way and force you to develop your critical thinking skills; in AP chemistry it is necessary to thoroughly understand the material and I think these will help you develop that deeper understanding.

Chapter 1
Terms to know & be able to use: macroscopic vs microscopic, qualitative vs quantitative, matter, substances, mixtures, homogeneous, heterogeneous, element, compound, solid, liquid, gas, melting point, boiling point, physical property, chemical property, extensive property, intensive property, density, mass vs weight, accuracy, precision
Be able to: perform mathematical operations without a calculator, count sig figs, do a math problem and report your answer with correct sig figs, dimensional analysis
Make sure you do the "Review of concepts" sections on the following pages in chapter 1: 10, 11, 18
Problems: 12, 16, 30, 32 (without calculator), 34, 36, 38, 42, 44, 54, 56, 77

Chapter 2
Terms to know & be able to use: law of definite proportions, atom, subatomic particles, radiation, atomic number, mass number, isotopes, periods, groups/families, metal, nonmetal, metalloid, alkali metals, alkaline earth metals, halogens, noble gases, monatomic, molecule, polyatomic, ion, cation, anion, ionic compound, monatomic vs polyatomic ion, chemical formula, molecular formula, empirical formula, acid, oxyacid, base, hydrate
Be able to: list the 7 elements that exist as diatomic molecules, go back and forth between ionic compound names and formulas, go from name of binary molecular compound to formula (I will not require you to determine the name if given the formula), go back and forth between acid names and formulas, describe why NH_3 is a base, recognize a substance is a hydrate if shown its formula, be able to call an isotope by name (uranium two thirty-five, uranium-235)
Special note: You can just skim section 2.2 – only need to know defn of atom and nucleus and charge and relative mass of e-, p, n
Skip 2.8 completely
Make sure you do the "Review of concepts" sections on the following pages in chapter 2: 50, 56
Problems: 14, 16 (just first 3 examples), 18, 26, 32, 36, 44, 46, 50, 58 (except for "i"), 60 (except for "e" and "j"), 63, 64a&b, 66, 68, 72, 76, 80, 82, 112, 114

Chapter 3
Terms to know & be able to use: atomic mass, atomic mass unit, mole, Avogadro's number, average atomic mass, molar mass, molecular mass, mass spectrometer, chemical reaction, chemical equation, reactants, products, (g), (l), (s), (aq), stoichiometry, limiting reagent, excess reagent, theoretical yield, actual yield, percent yield

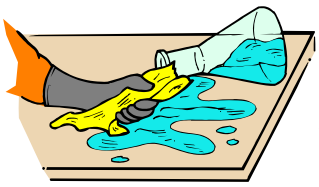
Be able to: perform stoichiometry calculations, percent composition calculations, empirical formula calculations (do not need to be able to calculate emp formula from amounts of CO_2 and H_2O produced when the substance is burned as demonstrated on pg 88-89), determination of molecular formulas, percent yield calculations
Make sure you do the "Review of concepts" sections on the following pages in chapter 3: 77, 81, 88, 99, 102
Problems: 5, 14, 16, 20, 26, 28 (carbon only), 30, 40, 46, 50 (a only), 52, 54, 63, 64, 66, 70, 78, 81, 82, 84, 86, 94, 97, 98, 104, 118, 123, 128

Chapter 4:
Terms to know & be able to use: solution, solute, solvent, electrolyte, nonelectrolyte, dissociation, hydration, ionization, reversible reaction, chemical equilibrium, precipitation reaction, metathesis reaction/double displacement reaction (same as double replacement), solubility, soluble, insoluble, molecular equation, ionic equation, spectator ions, net ionic equation, hydronium ion, monoprotic acids, diprotic acid, neutralization reaction, salt, redox reaction, half-reaction, oxidation reaction, reduction reaction, oxidation number/oxidation state, combination reaction, decomposition reaction, combustion reaction, displacement reaction, concentration (of a solution), molarity (M), dilution, titration, standard solution, equivalence point, indicator,
Know properties of acids and bases on pg 127 (ignore parts about litmus)
Memorize rules 1-6 for assigning oxidation numbers on pg 136
Make sure you do the "Review of concepts" sections on the following pages in chapter 4: 125, 129, 144
Problems: 7, 8, 10, 12, 17, 18, 20, 22, 32, 46, 48, 50, 52, 54, 56 (except for "d"), 62, 74, 76, 82, 84, 90, 92, 96, 98, 108, 110, 126, 142

Science Laboratory Safety Rules

1. Protective goggles are required to prevent splashing and spattering in your eyes. You will not be permitted in the laboratory without them.
2. You must notify the instructor when wearing contact lenses in the laboratory.
3. Some sort of laboratory apron or coat is required to protect you and your clothing.
4. Prepare a safe laboratory environment by ensuring all bags and backpacks are off the floor and chairs are pushed in.
5. No running, shouting, shoving, or fooling around is permitted in the lab.
6. Your apparel should be appropriate for laboratory work. Long hanging necklaces, bulky jewelry, and excessive and bulky clothing should not be worn. Feet should be <u>fully</u> covered.
7. Long hair must be secured away from your face and lab materials, especially chemicals and burners.
8. You should know the location of and how and when to use the fire extinguisher, eye wash, fire blanket, exits, shower, and gas shut off.
9. NEVER taste chemicals. Touching of chemicals should be avoided unless told otherwise by your teacher.
10. <u>Never</u> return unused reagents (chemicals) to stock bottles.
11. Dispose of all waste materials in designated waste containers.
12. Be VERY cautious when testing for odors. Fan the odors to your nose.
13. Never aim the opening of a test tube or flask at yourself or anyone else.

14. Use fume hoods whenever irritating fumes are involved. Adequate ventilation is important for safety.
15. Never leave anything unattended while it is being heated or reacting rapidly. Do not leave Bunsen burners burning or hot plates heating while not in use. Do not leave gas jets on while not in use. Do not use burners when they are not needed.
16. A clean lab is a safe lab. Return materials to the proper place and keep your work area clean at all times.



17. Always concentrate on what you are doing and report any accident to the teacher <u>at once</u>.
18. NEVER WORK ALONE IN THE LABORATORY. You should only work in the laboratory while under the supervision of your teacher.
19. No food, drinks or chewing gum may be brought into the lab (unless authorized by the teacher).
20. You should know and understand the dangers and hazards of each experiment before you start the experiment. Read all instructions for a lab <u>before</u> you start work.

21. Follow all written and verbal instructions for each lab.

22. You should not mix chemicals together unless you have been instructed to do so by your teacher or the instructions of the experiment.

23. Hot items should be handled with gloves or tongs.

24. Flammable liquids should be used in small amounts.

25. When lighting a Bunsen burner, light the match first then turn on the gas.

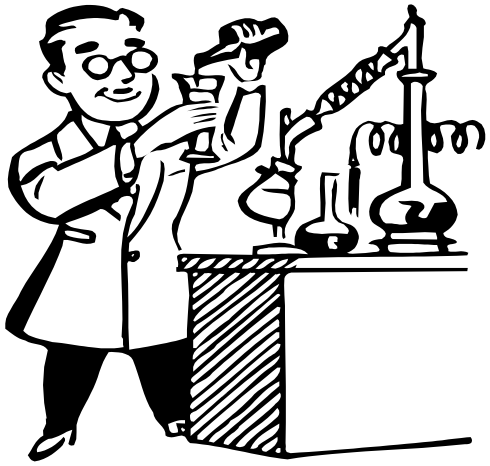
26. Avoid using cracked or broken glassware as it can chip further or break and cause injury.

27. Dispose of broken glassware in the proper container. Do not put broken glassware into the trash can.

28. Do not throw trash in the sinks.

29. When cleaning glassware, turn on the water first, then place the glassware under the faucet.

30. When obtaining reagents that have a similar appearance, properly label glassware to avoid confusion, cross-contamination or unwanted reactions.



A safe laboratory makes chemistry FUN!

Science Class Safety Agreement

All students will be required to pass with a score of at least 85%, a laboratory safety test before being allowed to participate in lab activities.

Students will be removed from the science activity area by the teacher if:

A. Their personal appearance or dress is such that they cause injury to themselves or to other students.

B. They are behaving in such a manner that they can cause injury to themselves or to other students.

C. They are not following the prescribed safety rules for the science activity area or the particular science activity being conducted.

D. They are going beyond the limits of the science activity into areas that may lead to an unsafe situation.

E. They have not completed the pre-experiment activities that will allow them to work safely in the laboratory situation.

---------- Cut here ----------

I, _____, have read this handout thoroughly. I understood what they
(Print student name)
meant or I had the teacher explain them to me.

I, _____, have read the above rules. I have discussed them with my
(Print parent/guardian name)
child and feel that my child understands what they mean and the consequences for removal from class. I would like to inform the school that my child has the following physical or medical situations that could affect their learning.

Student signature _____

Parent/Guardian signature _____