Date: June 2007

Dear: Potential AP Chemistry Student

I sincerely hope that you are having a wonderful summer break, relaxing, recharging and expanding you intellectual spirit in preparation for your next year at Cornelia Connelly School and your Advance Placement Chemistry Class. The class size for AP Chemistry has always been comparatively small. This affords a great opportunity for individual involvement and achievement. In addition we hope to have some fun.

As you probably know, there is a summer assignment for AP Chemistry. You will need your text to do the assignment. If you do not have a copy it can be purchased through the online bookstore.

I have attached to this letter a copy of the summer assignment which includes reading the **first four chapters** of *Chemistry*, Sixth Edition, by. Zumdahl and Zumdahl and answering selected questions. In addition there is a list of common anions and cations included in the packet. **These must be committed to memory**.

The AP Chemistry course at Connelly has over the past 20 years experienced great success as measured by the achievements of its graduates. I'm sure that working together, we will continue that tradition of accomplishment.

So, welcome to the world of Chemistry, and one of the most challenging courses at Connelly.

I hope to be on campus beginning after August 15, if you have any questions. You may reach me on the Internet at jdejovine@AOL.com.

Have a super summer.

Sincerely,

James M. DeJovine

Commit to Memory Ions

Symbol	Name
Cations	
Na^{+}	Sodium
K^{+}	Potassium
Li^{+}	Lithium
NH_4^{+4}	Ammonium
Ca^{+2}	Calcium
Sr^{+2}	Strontium
Ba^{+2}	Barium
Cd^{+2}	Cadmium
Mn^{+2}	Manganese
Mg^{+2}	Magnesium
Ag^{+}	Silver
Pb^{+2}	Lead (II)
Hg_2^{+2}	Mercury(I) or Mecurous
Cu^{+1}	Copper(I) or Cuperous
Cu^{+2}	Copper(II) or Cuperic
Cr^{+3}	Chromium(III) or Chromic
Fe^{+2}	Iron (II) or Ferrous
Fe^{+3}	Iron (III) or Ferric
Al^{+3}	Aluminum

Anions	
Cl^{-}	Chloride
Br^{-}	Bromide
F^{-}	Fluoride
I^{-}	Iodide
OH^{-}	Hydroxide
CN^{-}	Cyanide
SCN^{-}	Thiocyanide
NO_3^{-}	Nitrate
NO_2^{-}	Nitrite
HCO_3^{-}	Bicarbonate
$C_2H_3O_2^{-}$	Acetate (Ethanoate)
ClO^{-}	Hypochlorite
ClO_2^{-}	Chlorite
ClO_3^{-}	Chlorate
ClO_4^{-}	Perchlorate
SO_4^{-2}	Sulfate
SO_3^{-2}	Sulfite
S^{-2}	Sulfide
MnO_4^{-}	Permanganate
$Cr_2O_7^{-2}$	Dichromate
CrO_4^{-2}	Chromate
$S_2O_4^{-2}$	Thiosulfate
O^{-2}	Oxide
O_2^{-2}	Peroxide
CO_3^{-2}	Carbonate
$C_2O_4^{-2}$	Oxalate
SeO_4^{-2}	Selenate
PO_4^{-3}	Phosphate

AP (Advance Placement) Chemistry
Study Guide (2007-2008)

Chapter 1 (Chemical Foundations)

Chapter 1 Overview: The first three Chapters of our text should present a review for AP(Advance Placement)Chemistry students. The first Chapter deals with the Scientific Method, Units of Measurement, Uncertainty and Conventions for Significant Numbers, Dimensional Analysis, Temperature, Density, and the Classification of Matter. Special attention should be paid to Uncertainty and the Conventions of Significant Numbers.

Expected Achievements and Concepts to be Mastered:

(1) Know how to construct a flow diagram for the **Scientific Method**. Be able to describe the difference between a theory, hypothesis and a law in your own words. Be able to discuss the possible causes of failure of the Scientific Method to achieve a Law.

(2) Be familiar with the fundamental **SI Units for Mass, Length, Time, Temperature, Electric Current and the Mole.**

(3) Be able to differentiate between **accuracy and precision**.

(4) Know how to apply the rules of **significant numbers and rounding off** to calculations based on experimental measurements.

(5) Be able to make **conversions between SI and other systems (i.e. English).** Recognize the importance of carrying unit designations (units) through calculations.

(6) Be familiar with the three most commonly used **temperature scales**.

(7) Be able to define **density, specific gravity**. Be able to state why **density is an important physical characteristic.**

(8) Be able to differentiate between **physical and chemical changes**.

(9) Know the **characteristic states of matter**.

(10) Be able to recreate **Figure 1.13** from the Text.

(11) Be able to define and use the **Key Terms** found on page 31 in your text.

Homework and Class Assignments: *(*Note: The following conventions will be followed in the preparation of Homework and Class Assignments.)

(a) In the upper right corner of the first page of your assignment put your **Name, Due Date, Chapter and Assignment and Problem Numbers.**

(b) For "**Prose**" work use brief but complete sentences.

(c) For "**Problems**" ***show setup and all work***, **box your answer**.

(d) Coding of Assignments: When problems are assigned, those **underlined will be turned in and discussed in class**. Others are recommended. All assignments will help you master the concepts presented in the Chapter. Remember---Practice makes perfect.

For Chapter 1, the following Questions and Exercises from the Text are assigned:
5, 8, 20, 25, 33, 34, 44, 45, 51, 52, 53, 65, 69, 74, 77, 82

Related Laboratory Experiments: None. Demonstration: Galileo Thermometer.

Chapter 2 (Atoms, Molecules and Ions)

Chapter 2 Overview: Chapter 2 like Chapters 1 and 3 are almost entirely review for AP Chemistry students. Chapter 2 deals with the early history of Chemistry and some of the great contributors who took Chemistry from the age of alchemy and established the foundations of modern chemistry. The **Laws of Conservation of Mass, Definite Proportions, and Multiple Proportions** receive special emphasis. Dalton's original Atomic Theory and early experiments to characterize the atom are shown to lead directly to our modern view of basic atomic structure. The concept of ionic and covalent bonds is introduced in conjunction with solubility. The Periodic Table is introduced and the system for naming simple inorganic compounds is demonstrated.

Expected Achievements and Concepts to be Mastered:

(1) Be able to demonstrate examples of the **Law of Conservation of Mass, Law of Definite Proportions, and the Law of Multiple Proportions**.

(2) Be aware of the limitations of the **Law of Conservation of Mass**.

(3) Appreciate and be able to describe the **contributions of Dalton, Gay-Lassac, and Avogadro** to the early development of atomic theory.

(4) Describe the features of the most basic atomic particles and the meaning of **atomic mass and atomic number.**

(5) In your own words be able to describe an **ion** and differentiate between **covalent and ionic bonding.**

(6) Have a basic understanding of the **Periodic Table of Elements**. Recognize the "**periodicity**" within the Table. Know why families of elements have similar reactivities. You should be able to locate and place the individual alkali metals, alkaline earth metals, halogens, and noble gases as well as N, C, O, B, Be, Si, P, and S.

(7) Become **more than familiar** with the naming conventions for binary ionic compounds and simple polyatomic ions. See especially Section 2.8 of the Text.

(8) Know how to **name simple oxygen containing acids** and their related salts.

(9) Understand the **Arrhenius** definition of an **acid**.

(10) Be able to define and use the Key Terms found on pages 71 and 72 in the Text.

Homework and Class Assignments:

For Chapter 2, the following Questions and Exercises from the Text are assigned:
3, 4, 20, 22, 26, 29, 31, 33, 34, 36, 43, 58, 61, 62, 73, 74, 77, 79.

Related Laboratory Experiments: None. Periodic Table Crossword.

Chapter 3 (Stoichiometry)

Chapter 3 Overview: Chapter 3 represents the third review Chapter for AP Chemistry. It deals with the quantities of materials consumed and produced in chemical reactions and has its roots in the Law of Conservation of Mass. The area of study is referred to as Stoichiometry. To help us understand this area, the Text reviews atomic masses, the mole, molar masses and the percent elemental composition of compounds. The chemical equation is introduced and calculations used to balance equations are demonstrated. Calculations of theoretical yields are demonstrated under maximum and limited stoichiometric conditions.

Expected Achievements and Concepts to be Mastered:

(1) The concept of average atomic weight and the role of naturally occurring isotopes in the calculation of this number should be understood.

(2) An understanding of what a **mass spectrophotometer** accomplishes is very helpful to understanding how average molecular weights are obtained experimentally.

(3) Should be familiar with the **significance of Avogadro's number** and its connection to the mole.

(4) Be able to calculate the percent composition by mass of elements in a compound.

(5) Determine the **empirical formula** from mass percentages of elements in a compound.

(6) Determine the **molecular formula** of a compound from the **empirical formula** and the **approximate molecular weight**.

(7) Know what is meant by a **chemical reaction, reactants, products, and a chemical equation.**

(8) Explain what is meant by a "**balanced**" chemical equation.

(9) Calculate the **moles or mass of products** of a chemical reaction given the **mass of reactants.**

(10) Be familiar with the reactions involved in the **production of sulfuric acid**.

(11) Be able to calculate **theoretical yields**.

(12) Be able to define and use the Key Terms found on page 123 in your text.

Homework and Class Assignments:

For Chapter 3, the following Questions and Exercises from the Text are assigned:
4, 5, 7, 11, 12, 27, 28, 32, 36, 50, 58, 63, 64, 66, 70, 71, 78, 81, 82, 83, 99, 107, 112, 122.

Related Laboratory Experiments: Introduction to ball and stick models.

Chapter 4 (Types of Reactions and Solution Stoichiometry)

Chapter 4 Overview: This Chapter will contain many things that will be review for the AP Chemistry student. There are, however, several topics thar will be new or covered in greater depth than previous Chemistry course offerings. Chapter 4 begins with a discussion of **water**. The concept of solvents, electrolytes, and the characteristics of solutions are discussed. Chemical reactions are classified into general categories such as **neutralizations, oxidation-reductions, precipitation, double replacements** etc.

The **balancing of oxidation-reduction reactions** is given special attention.

Expected Achievements and Concepts to be Mastered:

(1) Know what is meant by a **strong electrolyte** and be able to discuss the relationship between molecular bonding and electrolytic strength.

(2) Be able to calculate the molarity of solutions and be able to apply molarity to calculate concentrations of reactants required to take reactions to completion. (**Acid/Base, and Oxidation-Reduction Reactions**)

(3) Know what is meant by **oxidation-reduction.**

(4) Be able to calculate the oxidation numbers of elements in compounds or ions.

(5) **Balance oxidation-reduction equations**, in acidic or basic solutions. You should be a master at this. Sample exercises 4.19 and 4.20 should be given special attention

(6) Be able to explain the difference between "concentration", "concentrated" and "acid strength" as these terms apply to sulfuric acid.

(7) Two experiments will be discussed which **confirm the value of Avogadro's number**.

(8) Be able to define and use the Key Terms found on page 179 in the Text.

Homework and Class Assignments:

For Chapter 4, the following Questions and Exercises from the Text are assigned:

3, 4, 14, 18, 19, 20, 25, 26, 29, 33, 34, 37, 48, 57, 63, 65, 76, 77, 82
Related Laboratory Experiments: None