

AP[®] Chemistry Summer Assignment June 2013

Future AP[®] Chemistry Student,

Welcome to AP[®] Chemistry. I am eagerly anticipating a great year of Chemistry. In order to ensure the best start for everyone next fall, I have prepared a summer assignment that reviews basic chemistry concepts. There is a multitude of tremendous chemistry resources available via the Internet. With the ready access to hundreds of websites either in your home or at the local library, I am confident that you will have sufficient resources to prepare adequately for the fall semester. There are few old chemistry textbooks which can be picked up for your reference.

There are two books to check out from the library. The text book is “General Chemistry” by Ebbing and the study guide is “5 steps to a 5: AP[®] Chemistry” by John Moore and Richard Langley. If you wish to write in the study guide, you might want to purchase it.

For those students who have already taken a high school chemistry course, much of the material in the summer packet will be familiar to you. For those students who will be taking AP[®] Chemistry as your first high school chemistry course, the problems will help you build a foundation in chemistry and insure all students are on a relatively even plane. It will be important for everyone to come to class the first day prepared. It is expected that all students know the following topics:

1. **Naming: Ionic, Covalent, Gases, Metals, Acids and Bases**
2. **Scientific Fundamentals: (chapter 1)**
3. **Atoms, Molecules, and Ions, including trends of the periodic table: (chapter 2)**
4. **Stoichiometry: (chapter 3)**
5. **Simple equation reactions, including solubility rules.**

This is a fast paced course, and while I review, extensive remediation is not an option as we work towards our goal of being 100% prepared for the AP[®] Exam in early May.

You may contact me by email: (reedar@puyallup.k12.wa.us) this summer. I will do my best to answer your questions ASAP.

I hope you are looking forward to an exciting year of chemistry. You are all certainly fine students, and with plenty of motivation and hard work you should find AP[®] Chemistry a successful and rewarding experience.

Finally, I recommend that you spread out the summer assignment. Please do not try to complete it all in the final week of the summer. Chemistry takes time to process and grasp at a level necessary for success in AP[®] Chemistry. Remember, AP[®] Chemistry is an equivalent course to Introductory Chemistry in college. Taking a college level course **in high school is difficult, requires dedication**, and is a **great investment** in your education so prepare yourself and arrive ready to learn.

Important information, the **course grade** will mainly depend on your **performance in tests and labs**. Do not expect any grade curves. You will be given opportunities which you must strive to perform well and achieve the desired grade.

Have a great summer and enjoy the chemistry.

Mrs. Reed

If you're not part of the solution, you're part of the precipitate!

Utilize Internet Resources to complete the following problems. The URLs below represent a fraction of the available chemistry addresses available. Please feel free to expand the list and find other web sites that help prepare you for the coming year. We recommend that you complete as many online quizzes as possible, take detailed notes, and practice the items indicated in the packet.

Completed work must be handed in the first day of school. Below are links to help you.

<http://highschoolhub.org/hub/chemistry.cfm>

<http://www.chemistrycoach.com/home.htm>

<http://www.collegeboard.com/ap/students/chemistry/index.html>

www.chemmybear.com

www.collegeboard.com

I. Chemical Formulas

1. Write formulas for the following substances:

- Barium sulfate _____
- Ammonium chloride _____
- Chlorine monoxide _____
- Silicone tetrachloride _____
- Magnesium fluoride _____
- Sodium oxide _____
- Sodium peroxide _____
- Copper (I) iodide _____
- Zinc sulfide _____
- Potassium carbonate _____
- Hydrobromic acid _____
- Perchloric acid _____
- Lead (II) acetate _____
- Sodium permanganate _____
- Lithium oxalate _____
- Potassium cyanide _____
- Iron (III) hydroxide _____
- Silicone dioxide _____
- Nitrogen trifluoride _____
- Chromium (III) oxide _____
- Calcium chlorate _____
- Sodium thiocyanate _____
- Cobalt (III) nitrate _____
- Nitrous acid _____
- Ammonium phosphate _____
- Potassium chromate _____

2. Name each of the following compounds (Give acid names where appropriate)

- CuSO_4 _____
- PCl_3 _____
- Li_3N _____
- BaSO_3 _____
- N_2F_4 _____
- KClO_4 _____
- NaH _____
- $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ _____

- i. HNO_2 _____
- j. Sr_3P_2 _____
- k. $\text{Mg}(\text{OH})_2$ _____
- l. Al_2S_3 _____
- m. AgBr _____
- n. P_4O_{10} _____
- o. $\text{HC}_2\text{H}_3\text{O}_2$ _____
- p. CaI_2 _____
- q. MnO_2 _____
- r. Li_2O _____
- s. FeI_3 _____
- t. Cu_3PO_4 _____
- u. PCl_3 _____
- v. NaCN _____
- w. Cs_3N _____
- x. $\text{Zn}(\text{NO}_3)_2$ _____
- y. N_2O _____
- z. HF _____

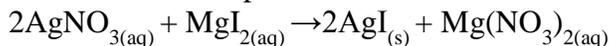
II. Chemical Equations

For each equation below, identify the type (synthesis, decomposition, single replacement, double replacement, or combustion), predict the products, and then write the balanced reaction. Remember to use the solubility rules for double replacement reactions and the activity series for single replacement reactions. Hint: when writing these reactions, ignore all of the information about heat, or bubbling, or mixing. These are just excess words used to make complete sentences. Simply pull out the chemical formulas.

For example:

Solutions of silver nitrate and magnesium iodide are combined.

This is a double replacement reaction.



1. Ammonium sulfate reacts with barium nitrate.
2. Zinc metal is added to a solution of copper (II) chloride.
3. Propane gas (C_3H_8) is burned in excess oxygen.
4. Solid calcium chlorate is heated strongly.
5. Magnesium and nitrogen gas are heated together.
6. Chlorine gas is bubbled through a solution of sodium bromide.
7. Solutions of lead nitrate and calcium iodide are combined.
8. Sulfuric acid is combined with sodium hydroxide.
9. Isopropyl alcohol ($\text{C}_3\text{H}_7\text{OH}$) is burned in oxygen.
10. Iron metal shavings are added to hydrochloric acid.
11. Solid sodium carbonate is heated in a crucible.
12. Sodium metal is added to distilled water.

III. Stoichiometry

- Find the mass percent of nitrogen in each of the following compounds:
 - NO
 - NO₂
 - N₂O₄
 - N₂O
- Benzene contains only carbon and hydrogen and has a molar mass of 78.1 g/mol. Analysis shows the compound to be 7.74% H by mass. Find the empirical and molecular formulas of benzene.
- Calcium carbonate decomposes upon heating, producing calcium oxide and carbon dioxide gas.
 - Write a balanced chemical equation for this reaction.
 - How many grams of calcium oxide will be produced after 12.25 g of calcium carbonate is completely decomposed?
 - What volume of carbon dioxide gas is produced from this amount of calcium carbonate, at STP?
- Hydrogen gas and bromine gas react to form hydrogen bromide gas.
 - Write a balanced chemical equation for this reaction.
 - 3.2 g of hydrogen gas and 9.5 g of bromine gas react. Which is the limiting reagent?
 - How many grams of hydrogen bromide gas can be produced using the amounts in (b)?
 - How many grams of the excess reactant is left unreacted?
 - What volume of HBr, measured at STP, is produced in (b)?
- When ammonia gas, oxygen gas and methane gas (CH₄) are combined, the products are hydrogen cyanide gas and water.
 - Write a balanced chemical equation for this reaction.
 - Calculate the mass of each product produced when 225 g of oxygen gas is reacted with an excess of the other two reactants.
 - If the actual yield of the experiment in (b) is 105 g of HCN, calculate the percent yield.
- When solutions of potassium iodide and lead (II) nitrate are combined, the products are potassium nitrate and lead (II) iodide.
 - Write a balanced equation for this reaction, including (aq) and (s).
 - Calculate the mass of precipitate produced when 50.0mL of 0.45M potassium iodide solution and 75mL of 0.55M lead (II) nitrate solution are mixed.
 - Calculate the volume of 0.50M potassium iodide required to react completely with 50.0mL of 0.50M lead (II) nitrate.

Know the solubility rules:

- All compounds containing alkali metal cations and the ammonium ion are soluble.
- All compounds containing NO₃⁻, ClO₄⁻, ClO₃⁻, and C₂H₃O₂⁻ anions are soluble.
- All chlorides, bromides, and iodides are soluble except those containing Ag⁺, Pb²⁺, or Hg²⁺.
- All sulfates are soluble except those containing Hg²⁺, Pb²⁺, Sr²⁺, Ca²⁺, or Ba²⁺.
- All hydroxides are insoluble except compounds of the alkali metals, Ca²⁺, Sr²⁺, and Ba²⁺.
- All compounds containing PO₄³⁻, S²⁻, CO₃²⁻, and SO₃²⁻ ions are insoluble except those that also contain alkali metals or NH₄⁺.

Know the name, symbol and charge of each of the following elements

H	He	Li	Be	B	C	N	O	F	Ne	Na	Mg	Al	Si
P	S	Cl	Ar	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni
Cu	Zn	As	Se	Br	Kr	Sr	Y	Mo	Ag	Cd	Sn	Sb	Te
I	Xe	Ba	La	W	Pt	Au	Hg	Pb	Bi	Rn	Ra	U	Pu

AP Chemistry 1st year review

1. Below are lists of videos that are excellent review of some of the 1st year concepts in chemistry. They can be viewed at: www.kahnacademy.org

- Introduction to the Atom
 - Elements and Atoms
 - Introduction to the Atom
- Orbitals and Electrons
 - Orbitals
 - More on orbital and electron configuration
 - Electron configurations
 - Electron configurations 2
 - Valence electrons
- Periodic table, trends, and bonding
 - Groups of the periodic table
 - Valence electrons
 - Periodic table trends: Ionization energy
 - Other periodic table trends
 - Ionic, covalent and metallic bonds
- Chemical reactions (stoichiometry)
 - Molecular and Empirical Formulas
 - The mole and Avogadro's number
 - Formula and mass composition
 - Another mass composition problem
 - Balancing Chemical Equations
 - Stoichiometry
 - Stoichiometry: Limiting Reagent
 - Spectrophotometry Introduction
 - Spectrophotometry Example
- Ideal gas laws
 - Ideal Gas Laws
 - Gas law examples 1-4
- States of matter
 - States of matter
 - States of matter Follow up
 - Specific heat, heat of fusion and vaporization
 - Covalent networks, metallic and ionic crystals
 - Suspensions, colloids and solutions
 - Solubility
- Reaction rates
 - Introduction to kinetics
 - Reactions in equilibrium
 - Keq Intuition
 - Keq derivation intuition
 - Heterogeneous equilibrium
 - Le Chatelier's principle
 - Introduction to pH, pOH, and pKw
- Acids and bases
 - Acid Base Introduction
 - pH, pOH of Strong Acids and Bases
 - pH of a weak acid
 - pH of a weak base
 - Conjugate Acids and Bases

CHEMISTRY:
All the cool kids are
doing it! 😊

I get a BANG out of
chemistry!

Oxygen and Magnesium
together?
OMg!

2. Chemical Naming and Formula writing are not covered well in the Kahn academy, please visit:

www.chemteam.info/Nomenclature/Nomenclature.html to review this topic. These are not videos, but rather information text.

3. You will need to know chapters 1-4 in the book. We will spend the first week covering these chapters. Please ensure you check out a book before summer starts.

If you have any questions, please contact me at: reedar@puyallup.k12.wa.us

Mrs. Angie Reed

