

**AP Chemistry**  
**Summer Assignment**  
**Mr. Verenna**  
**C141**

**RATIONALE:** AP Chemistry is designed to further the knowledge basis that you have developed last year (or, two years ago) in Honors Chemistry I. The idea is to extend your knowledge in order to be successful in both a freshman undergraduate General Chemistry class, as well as on the AP Chemistry Exam, administered in May of each year. Prior to entering the classroom, this course requires an excellent working understanding of the topics presented in Honors Chemistry I that will be applied extensively throughout the course. To best prepare you for the rigors of this course, you will be required to complete a worksheet which summarizes many of the important topics of Honors Chemistry I, which will then be followed by a quiz.

**BOOK/WEB:**

The assignment is on the Parkland High School website. The web address is (<http://psdweb.parklandsd.org/phsweb>). Click on “Links” and then on “AP/Honors Summer Assignments.” Find AP Chemistry in the list and click on it. Your notes from Honors Chemistry I may be used as a resource.

**ASSIGNMENT:**

- Complete the assigned worksheet on the next pages.
- These problems will be checked for completion **on the first day of school.**
- A quiz on this material will be given by the end of the second week of school. This quiz will be worth thirty points.
- This assignment should take you approximately 3 – 4 hours to complete.

## AP Chemistry Worksheet Honors Chemistry I Redux

- I. For each of the following compounds, assign oxidation numbers to each element in the compound:
- |                            |                             |
|----------------------------|-----------------------------|
| a. $\text{Al}_2\text{O}_3$ | f. $\text{HSbF}_6$          |
| b. $\text{P}_4$            | g. $\text{CsO}_2$           |
| c. $\text{NaMnO}_4$        | h. $\text{CH}_3\text{F}$    |
| d. $\text{ClO}^{1-}$       | g. $\text{CHCl}_3$          |
| e. $\text{HAsO}_4^{2-}$    | i. $\text{CH}_3\text{COOH}$ |
- II. Balance each of the following using the Ion Electron Method
- Manganese (IV) oxide reacts with hydrochloric acid to form manganese (II) chloride and chlorine gas.
  - Chloric acid reacts to form perchloric acid, chlorine dioxide gas, and water.
  - $\text{MnO}_2(\text{s}) + \text{PbO}_2(\text{s}) + \text{HNO}_3(\text{aq}) \rightarrow \text{HMnO}_4(\text{aq}) + \text{Pb}(\text{NO}_3)_2(\text{aq}) + \text{H}_2\text{O}(\text{l})$
  - $\text{C}_2\text{H}_5\text{OH}(\text{aq}) + \text{HCl}(\text{aq}) + \text{H}_2\text{Cr}_2\text{O}_7(\text{aq}) \rightarrow \text{CH}_3\text{CO}_2\text{H}(\text{aq}) + \text{CrCl}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- III. Solve the following problems relating to gases:
- A sample of a gas occupies a volume of  $1248 \text{ ft}^3$  at  $0.988 \text{ atm}$  and  $28.0^\circ\text{C}$ . What is the volume of the gas at STP?
  - The Hindenburg was a hydrogen-filled dirigible that exploded in 1937. If the Hindenburg held  $2.0 \times 10^5 \text{ m}^3$  of hydrogen gas at  $23^\circ\text{C}$  and  $1 \text{ atm}$ , what mass of hydrogen was present?
  - What is the density of nitrogen dioxide gas at  $0.970 \text{ atm}$  and  $35^\circ\text{C}$ ?
  - If  $2.50 \text{ g}$  of an unidentified gas occupies  $0.875 \text{ L}$  at  $685 \text{ torr}$  and  $35^\circ\text{C}$ , what is the molecular mass of the gas?
  - Hydrogen gas is produced when zinc reacts with sulfuric acid in a single displacement reaction. If  $159 \text{ mL}$  of wet hydrogen is collected over water at  $24^\circ\text{C}$  and  $738 \text{ torr}$ , how many grams of zinc have been consumed? The vapor pressure of water at this temperature is  $22.38 \text{ torr}$ .
  - What is the rms speed of nitrogen trifluoride molecules at  $25^\circ\text{C}$ ?

- IV. Describe the molecular geometry, the bond angles, the polarity, and the hybrid type for each of the following molecules or polyatomic ions. Be sure to draw a Lewis Structure and resonance structures, if applicable.
- |  |   |
|--|---|
| a. methane, CH <sub>4</sub>                          | d. boron trifluoride, BF <sub>3</sub>           |
| b. perchlorate anion, ClO <sub>4</sub> <sup>1-</sup> | e. nitrate anion, NO <sub>3</sub> <sup>1-</sup> |
| c. sulfuric acid, H <sub>2</sub> SO <sub>4</sub>     | f. sulfur hexafluoride, SF <sub>6</sub>         |
- V. Define each of the following:
- Van der Waals forces
  - Dipole-dipole interactions
  - Hydrogen bonds
- VI. Determine whether the following substances would dissolve in the substance listed. Explain why or why not.
- Table salt in water
  - Bromine (Br<sub>2</sub>(l)) in water
  - Methanol (CH<sub>3</sub>OH) in water
  - Arrange the following items in terms of decreasing polarity: CH<sub>4</sub>, CH<sub>3</sub>Cl, CH<sub>2</sub>Cl<sub>2</sub>, CHCl<sub>3</sub>