

AP Chemistry Summer HW

Directions: Read and outline chapters 1 – 3, you may choose the format, and I will collect your outlines on the first day of school. Answer the following AP exam questions on binder paper, be sure to show ALL work. **Be prepared to explain your answers to the class on the first day of school.** If you have any questions please email me at taylorlork@mdusd.org, I check my email twice a week during summer.

1991 B – Will require an equation from chapter 4 $\Delta T_f = iK_f m$ as well as $PV = nRT$ ($R = 0.08206 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$)
The molecular formula of a hydrocarbon is to be determined by analyzing its combustion products and investigating its colligative properties.

- The hydrocarbon burns completely, producing 7.2 grams of water and 7.2 liters of CO_2 at standard conditions. What is the empirical formula of the hydrocarbon?
- Calculate the mass in grams of O_2 required for the complete combustion of the sample of the hydrocarbon described in (a).
- The hydrocarbon dissolves readily in CHCl_3 . The freezing point of a solution prepared by mixing 100. grams of CHCl_3 and 0.600 gram of the hydrocarbon is -64.0°C . The molal freezing-point depression constant of CHCl_3 is $4.68^\circ\text{C}/\text{molal}$ and its normal freezing point is -63.5°C . Calculate the molecular weight of the hydrocarbon.
- What is the molecular formula of the hydrocarbon?

1986 B

Three volatile compounds X, Y, and Z each contain element Q. The percent by weight of element Q in each compound was determined. Some of the data obtained are given below.

<u>Compound</u>	<u>Percent by weight of Element Q</u>	<u>Molecular Weight</u>
X	64.8%	?
Y	73.0%	104.
Z	59.3%	64.0

- The vapor density of compound X at 27°C and 750. mm Hg was determined to be 3.53 grams per litre. Calculate the molecular weight of compound X.
- Determine the mass of element Q contained in 1.00 mole of each of the three compounds.
- Calculate the most probable value of the atomic weight of element Q.
- Compound Z contains carbon, hydrogen, and element Q. When 1.00 gram of compound Z is oxidized and all of the carbon and hydrogen are converted to oxides, 1.37 grams of CO_2 and 0.281 gram of water are produced. Determine the most probable molecular formula of compound Z.

1982 B

Water is added to 4.267 grams of UF_6 . The only products are 3.730 grams of a solid containing only uranium, oxygen and fluorine and 0.970 gram of a gas. The gas is 95.0% fluorine, and the remainder is hydrogen.

- From these data, determine the empirical formula of the gas.
- What fraction of the fluorine of the original compound is in the solid and what fraction in the gas after the reaction?
- What is the formula of the solid product?
- Write a balanced equation for the reaction between UF_6 and H_2O . Assume that the empirical formula of the gas is the true formula.