Chapter 5 and 6 Problem Set

CHM 161-A

1.	Propose Lewis Structures for the following formulas. Use lines to indicate covalent bonds and show all lone pairs of electrons.					
	a) $C_2H_2O_2$	b) HONO	c) C ₂ Cl ₄	d) CH₃NO		
2.	Predict the geometry around the central element in the following:					
	a) CH ₄ b	b) OF ₂ c) NCl ₃	d) BH ₃	e) CO ₂		
3.	Name the follow	me the following binary molecular compounds:				
	a) PCl₅ k	b) BF ₃ c) Al ₂ Br ₆	d) P_3Se_4	e) Xel ₄		
4.	Fill in the bonds and lone pair of electrons in the following molecules. <i>In a), there are two correct answers</i> :					
	a) C ₃ H ₆ O b) CH		HNCl ₂	c) C ₃ H ₆ O		
	Н О		H N	н Н Н		

	14	II C C
нссп	С	НСО Н
н Сн	Cl Cl	Н
Н		

- 5. What is the
 - a) C-C-C bond angle in 4a)?
 - b) H-N-C bond angle in 4b)?
 - c) C-O-C bond angle in 4c)?

- 6. Balance the following reactions:
 - a) $Ca(NO_3)_2 + H_2SO_4 \longrightarrow CaSO_4 + HNO_3$ b) $NaHCO_3 + HBr \longrightarrow NaBr + CO_2 + H_2O$ c) $C_{12}H_{22}O_{11} + H_2O \longrightarrow C_2H_6O + CO_2$ d) $HCl + Al \longrightarrow AlCl_3 + H_2$
- 7. Using the balanced reactions from problem 6...

a) In reaction 6 a), how many moles of HNO_3 will form from the reaction of 10 mol of $Ca(NO_3)_2$ and 10 mol H_2SO_4 ?

b) In reaction 6 a), how many moles of HNO_3 will form from the reaction of 10 moles of $Ca(NO_3)_2$ and 5 mol H_2SO_4 ? What is left unreacted and how much?

c) In reaction 6 d), how many moles of AICl₃ will form from the reaction of *3 mol of HCl* and *1 mol AI*?

d) In reaction 6 d), how many moles of $AICI_3$ will form from the reaction of 3 mol of HCl and 3 mol of Al? What is left unreacted and how much?

8. Consider the chemical reaction shown below (edited from question 6.103).

 $Cu + HNO_3 \longrightarrow Cu(NO_3)_2 + NO_2 + H_2O$

- a) Balance the reaction.
- b) How many moles are there in 5.00g of Cu?
- c) Using your answer from parts a) and b), how many moles of HNO₃ are needed to react with the 5.00g of Cu?
- d) How many grams of HNO3 are needed to react with 5.00g of Cu?