

4. Use the VSEPR theory to complete the following table.

Compound	Lewis Diagram	Shape	Polar/Nonpolar	# of LP	# of BP
$\text{CCl}_3\text{Br}$		<del>Tetrahedral</del>	Polar	<del>4</del>	4
$\text{BF}_3$		<del>Trigonal planar</del>	N-p.	<del>3</del>	3
$\text{HOCl}$		<del>Bent</del>	Polar	2	2
$\text{PH}_3$		<del>Trigonal pyramidal</del>	Polar	1	3
$\text{I}_2$		<del>Linear</del>	N-p	N/A	N/A

NOTE: # of LP = number of lone pairs around the central atom  
# of BP = number of bonding pairs around the central atom

5. List three differences between ionic and covalent compounds. Give an example of each.

Ionic

Covalent

- Solids @ roomtemp
- dissolve to make conductive solns
- high melting + boiling pts
- Solid, liquid or gas
- dissolve yet do not make conductive solns
- lower melting + boiling pts

6. Show all work for the following questions. Be sure to include the correct number of significant digits, and circle final answers.

a) How many grams of  $\text{SnF}_2$  can be made by reacting  $7.98 \times 10^{22}$  molecules of HF with  $\text{Sn} + 2\text{HF} \rightarrow \text{SnF}_2 + \text{H}_2$

$$7.98 \times 10^{22} \text{ m.c. HF} \times \frac{1 \text{ mol HF}}{6.02 \times 10^{23} \text{ m.c.}} \times \frac{1 \text{ mol SnF}_2}{2 \text{ mol HF}} \times \frac{156.7 \text{ g SnF}_2}{1 \text{ mol SnF}_2} = 10.4 \text{ g SnF}_2$$

b) How many liters of nitrogen dioxide are produced when 3.54 g of oxygen reacts with an excess of nitrogen monoxide? (Assume STP.)  
 $2\text{NO} + \text{O}_2 \rightarrow 2\text{NO}_2$

$$3.54 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32.0 \text{ g O}_2} \times \frac{2 \text{ mol NO}_2}{1 \text{ mol O}_2} \times \frac{22.4 \text{ L NO}_2}{1 \text{ mol NO}_2} = 4.96 \text{ L NO}_2$$

7. Write balanced equations for the following chemical reactions. ~~X~~ include the states of matter.

- a) mercury and oxygen are prepared by heating mercury(II) oxide  
 $2HgO(s) \rightarrow 2Hg(l) + O_2(g)$
- b) aluminum and copper(II) sulfate form aluminum sulfate and copper  
 $2Al(s) + 3CuSO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + 3Cu(s)$
- c) ammonium sulfate and calcium hydroxide react to produce calcium sulfate and ammonium hydroxide  
 $(NH_4)_2SO_4(aq) + Ca(OH)_2(aq) \rightarrow CaSO_4(s) + 2NH_4OH(aq)$
- d) aluminum and chlorine react to form aluminum chloride  
 $2Al(s) + 3Cl_2(g) \rightarrow 2AlCl_3(s)$
- e) decane ( $C_{10}H_{22}$ ) burns in the presence of oxygen to produce carbon dioxide and water  
 $C_{10}H_{22}(l) + O_2(g) \rightarrow CO_2(g) + H_2O(l)$

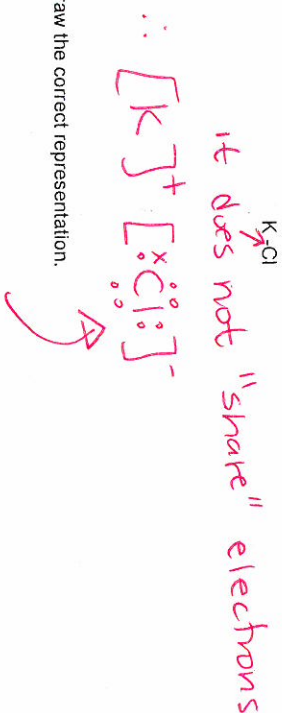
8. Identify the type of each reaction in the question above.

- a) Decomposition
- b) single replacement
- c) double replacement
- d) synthesis
- e) combustion

9. Complete the following table.

Electron Configuration	Name of Element	Symbol of Element	# of Unpaired Electrons	# of Valence Electrons
$1s^2 2s^2 2p^6 3s^1$	<u>Sodium</u>	<u>Na</u>	<u>1</u>	<u>1</u>
$1s^2 2s^2 2p^3$	<u>Nitrogen</u>	<u>N</u>	<u>3</u>	<u>5</u>
$1s^2 2s^2 2p^6 3s^2 3p^4$	<u>Selenium</u>	<u>Se</u>	<u>2</u>	<u>6</u>

10. Why can't the ionic compound KCl be represented by the following diagram?



Draw the correct representation.

11. Define electronegativity – the tendency of an atom to attract electrons from neighboring atoms. Using electronegativity values, determine the type of bond between the following: (Show work.)

a) C and Cl

$2.8 - 2.5 = 0.3$  true covalent

b) O and O

$3.5 - 3.5 = 0.0$  true covalent

c) Mg and F

$3.9 - 1.2 = 2.7$  ionic

12. Define the following terms:

a) catalyst – substance that speeds up a chemical rxn.

b) limiting reagent – substance that determines the amount of product that can form.

c) electron configuration – the current understanding of electron placement according to the quantum mechanic model.

d) valence electron – electrons involved in the "bonding"

e) lone pair – an un-bonding pair of electrons.