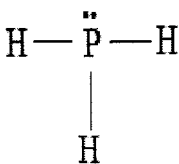


1. (5 points) The following Lewis dot structure for PH_3 is given below. Answer the following questions: HW (4.58)



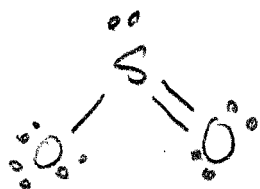
Using Vesper theory, describe the arrangement of:

(a) The electrons about phosphorous: Tetrahedral

(b) The atoms about phosphorous: Trigonal Pyramid
or TRIANGULAR

2. (10 points) Draw the Lewis dot structure for sulfur dioxide (SO_2), give the corresponding VSPER shape and indicate the polarity of the structure you draw. (HW 4.58 and lecture)

Lewis dot structure (4 points)



VSPER Shapes: (6 points)

Electronic: Trigonal Planar or Triangular

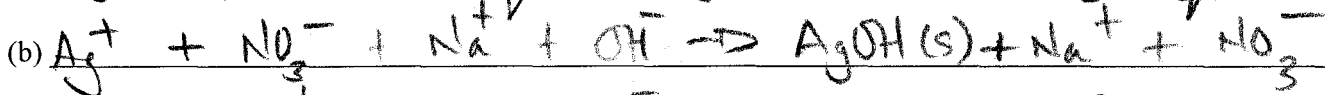
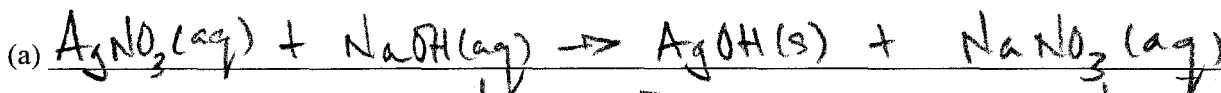
Molecular: Bent

Polar or non-polar (circle one)

3. (4 points) Complete and balance the equation for the combustion of ethene, $\text{C}_2\text{H}_4(\text{g})$. Include all (s), (g) and (l) etc... (HW and Lec)



4. (6 points) Solutions of silver (I) nitrate and sodium hydroxide are mixed producing a brown precipitate of the silver ion. Write the (a) molecular, (b) total ionic and (c) net ionic equations for the reaction. Include all (s), (g) and (l) etc... HW5.30



5. (5 points) The temperature of a 2.0 L sample of gas at 25.0°C is increased to 50.0°C at constant pressure. What is the new volume of the sample? (Lec, HW)

$$PV = nRT$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$V_2 = \frac{V_1}{T_1} \times T_2 = 2.0 \text{ L} \times \frac{50.0 + 273.15}{25.0 + 273.15}$$

Answer: 2.2 L (2 sf)

6. (10 points) Nitrogen and Oxygen react as follows:



Given 5.00 grams of each reactant, determine the limiting reactant and the maximum amount of product. Show all steps. (HW5.52)

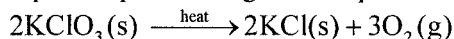
$$5.0 \text{ g N}_2 \times \frac{1 \text{ mol}}{28.01 \text{ g}} \times \frac{2 \text{ mol NO}_2}{1 \text{ mol N}_2} = 0.36 \text{ mol NO}_2$$

$$5.0 \text{ g O}_2 \times \frac{1 \text{ mol}}{32.00 \text{ g}} \times \frac{2 \text{ mol NO}_2}{2 \text{ mol O}_2} = 0.16 \text{ mol NO}_2 \times \frac{46.01 \text{ g}}{1 \text{ mol NO}_2}$$

Limiting reactant: O₂

or 0.16 mol
Theoretical Yield: 7.4 g (2sf)

7. (10 points) Potassium chlorate decomposes upon heating to form potassium chloride and oxygen:



A sample potassium chlorate was heated yielding 568 mL of gas at 22.0°C and 756 torr. How many grams of potassium chloride were initially present before heating? (lab) $\text{KClO}_3 = 122.55 \text{ g/mol}$

$$PV = nRT \quad n = \frac{PV}{RT}$$

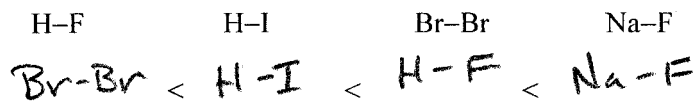
$$n_{\text{O}_2} = \frac{756 \text{ torr} \times \frac{1 \text{ atm}}{760 \text{ torr}} \times 568 \text{ mL} \times \frac{1 \text{ L}}{10^3 \text{ mL}}}{0.08206 \frac{\text{L atm}}{\text{mol K}} \times (22.0 + 273.15) \text{ K}} = 0.0233 \text{ mol}$$

$$0.0233 \text{ mol O}_2 \times \frac{2 \text{ mol KClO}_3}{3 \text{ mol O}_2} \times \frac{122.55 \text{ g}}{1 \text{ mol KClO}_3} =$$

Answer: 1.90 g KClO₃ (3sf)

Bonus: No partial credit

(5 points) Rank the following bonds by increasing polarity (least polar to most polar):



(Covalent)

(Polar Covalent)

(Ionic)

MC Ans:	EX2 6A F07
1	C
2	A
3	C
4	D
5	A
6	C
7	D
8	D
9	T
10	A
11	A
12	D
13	A
14	B
15	C
16	B
17	C
18	A
19	C
20	D
21	D
22	T
23	F
24	A
25	D
26	B
27	F
28	B
29	D
30	A