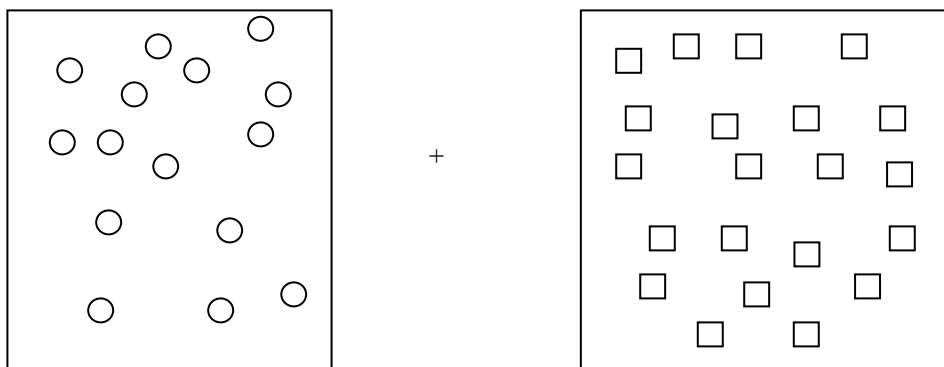


*These are some practice questions only. It is meant to show you the format of your Exam II will look like. It does NOT cover all the material that you are supposed to have learned for your upcoming exam. There will certainly be questions and topics that are not shown here. I do NOT have the answers handy. If you are worried about your answer to a particular question, you may send it to me and I will tell you whether you are correct, but don't expect me to check your answers to the all the questions presented below.*

1. (22pts) Give the name or formula as is appropriate:

| NAME                          | FORMULA | FORMULA                     | STOCK NAME |
|-------------------------------|---------|-----------------------------|------------|
| mercury(II) hydroxide         |         | $\text{CrSO}_4$             |            |
| lead(IV) hypobromite          |         | $\text{Li}_3\text{N}$       |            |
| potassium hydride             |         | $\text{CuIO}_3$             |            |
| tin(II) phosphate             |         | $\text{NiS}$                |            |
| calcium acetate               |         | $\text{NH}_4\text{Br}$      |            |
| copper(I) hydrogen phosphite  |         | $\text{Fe}(\text{HSO}_3)_2$ |            |
| mercury(I) dichromate         |         | $\text{HClO}_4 (aq)$        |            |
| barium bicarbonate            |         | $\text{HClO} (aq)$          |            |
| phosphorous acid              |         | $\text{CuMnO}_4$            |            |
| magnesium dihydrogenphosphite |         | $\text{H}_2\text{S} (aq)$   |            |
| calcium peroxide              |         | $\text{H}_3\text{O}^+$      |            |

2. (5 pts) Consider the following diagram, where atom X is represented by a  $\bigcirc$  and atom Y is represented by a  $\square$ . If X and Y are to react to form the product  $\text{XY}_3$ , after the reaction, **how many atoms** of the reactant that is in excess will be left over?



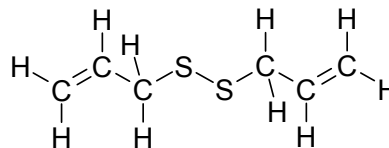
3. (10 pts) The structure shown on the right is that of diallyl disulfide (DADS) is responsible for the odor of garlic.

(a) Give the molecular formula of DADS. Ans. \_\_\_\_\_

(b) Give the empirical formula of DADS. Ans. \_\_\_\_\_

(c) Give the molar mass of DADS in 4 sig. fig.. Ans. \_\_\_\_\_

*Show your setup below.*



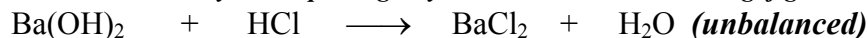
(d) Calculate the number of H atoms (not moles) in 0.0327 mol of DADS. Show your setup & watch your sig. fig.

**Use dimensional analysis.**

4. (6 pts) A compound is composed of 89.9 % C, and the rest, hydrogen. What is its empirical formula? Show your work clearly. Be careful not to write any run-on statements!
5. (10 pts) (a) Calculate the molar mass of  $(\text{NH}_4)_2\text{HPO}_3$  in 4 sig. fig.. Show your setup.  
 (b) Calculate the mass % H in  $(\text{NH}_4)_2\text{HPO}_3$  in 4 sig. fig. Show your work!
6. (5 pts) If the molecular weight of the compound in Question 4 above is 120.2 amu/molecule, what is its molecular formula? Show your work.
7. (8 pts) Write balanced equations for the following:  
 a) The complete combustion of the liquid  $\text{C}_8\text{H}_{14}$ . Remember to include physical states.



8. (10 pts) When 10.0 g of  $\text{Ba}(\text{OH})_2$  reacts with 5.00 g of HCl in the reaction shown below, 11.3 g of  $\text{BaCl}_2$  is obtained.  
 (a) What is the theoretical yield of  $\text{BaCl}_2$  in grams? Molar masses are provided below.  
 MM of  $\text{Ba}(\text{OH})_2 = 171.4 \text{ g/mol}$     MM of HCl = 36.46 g/mol    MM of  $\text{BaCl}_2 = 208.2 \text{ g/mol}$     MM of  $\text{H}_2\text{O} = 18.02 \text{ g/mol}$   
**Show your dimensional analysis setup and give your answer to the correct sig. fig.**



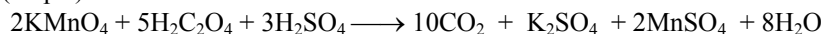
b) What is the percent yield of  $\text{BaCl}_2$ ? Show your work. Ans. \_\_\_\_\_

(c) How much (in grams) of the reactant that is in excess is left over? Show your work. Ans. \_\_\_\_\_

9. Give the oxidation numbers:

- a) N in  $\text{N}_2\text{O}_4$   
 b) C in  $\text{Fe}_2(\text{CO}_3)_3$   
 c) Br in  $\text{BrO}_4^-$   
 d) C in  $\text{C}_2\text{O}_4^{2-}$

10. (10 pts) Consider the reaction shown below:



Which element is undergoing oxidation? Which element is undergoing reduction?

Which is the oxidizing agent? The reducing agent?

Which element is gaining electrons? How many electrons are gained per atom?

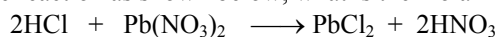
Which element is losing electrons? How many electrons are lost per atom?

What is the total number electrons transferred in the balanced equation above?

The electrons are going from \_\_\_\_\_ to \_\_\_\_\_.

Multiple Choice (2 pts each): **Circle ONE** letter corresponding to the best answer in each case.

11. In the reaction as shown below, what is the molar mass of the HCl?



A. 37.47 amu    B. 72.92 g/mol    C. 72.92 amu    D. 36.46 g/mol    E. 36.46 amu    F. 37.47 g/mol

12. Consider the reaction of  $2\text{A} + 5\text{B} \longrightarrow 3\text{C}$ .

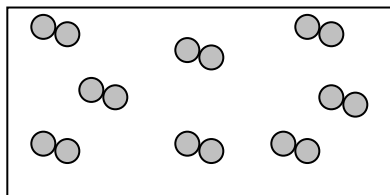
If 2 moles of A are allowed to react with 3 moles of B, which is the limiting reactant?

A. Compound A

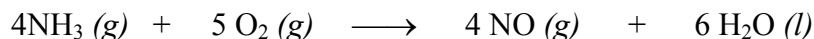
B. Compound B

13. Which of the following does not have a molecular weight?  
 A. HCl      B. SF<sub>6</sub>      C. MgBr<sub>2</sub>      D. None of the above
14. How many grams of NaCl is present in 50. mL of a 3.0 M NaCl solution?  
 A) 8.8 g      B) 0.88 g      C) 8800 g      D) 2.6x10<sup>-3</sup> g      E) none of the above
15. Of the four reactions below, only one will go. Which of the following reaction is expected to go?  
 A) Ca(NO<sub>3</sub>)<sub>2</sub> + K<sub>2</sub>SO<sub>4</sub> → CaSO<sub>4</sub> + 2 KNO<sub>3</sub>  
 B) FeCl<sub>2</sub> + 2NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub> → Fe(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>2</sub> + 2NaCl  
 C) MnBr<sub>2</sub> + (NH<sub>4</sub>)<sub>2</sub>S → MnS + 2NH<sub>4</sub>Br  
 D) AgCl + KNO<sub>3</sub> → AgNO<sub>3</sub> + KCl
16. Which of the following would you expect to be a strong electrolyte?  
 A. HNO<sub>3</sub>      B. BaSO<sub>4</sub>      C. Pb(OH)<sub>2</sub>      D. H<sub>2</sub>O      E. none of the above
17. What is the molarity of bromide ions in a solution that is 0.2 M MgBr<sub>2</sub> ?  
 A. 0.1 M      B. 0.2 M      C. 0.4 M      D. 0.6 M      E. none of the above
18. In the equation below, which reactant is acting as a base?  

$$\text{C}_2\text{H}^- + \text{HCO}_3^- \longrightarrow \text{CO}_3^{2-} + \text{C}_2\text{H}_2$$
  
 A) C<sub>2</sub>H<sup>-</sup>      B) HCO<sub>3</sub><sup>-</sup>      C) CO<sub>3</sub><sup>2-</sup>      D) C<sub>2</sub>H<sub>2</sub>
19. What does the figure below depict? I. an element    II. a compound    III. atoms    IV. molecules  
**Circle only one LETTER (A, B, C, OR D BELOW). Do not circle the Roman numerals above.**  
 A. Both I and III    B. Both I and IV    C. Both II and III    D. Both II and IV



20. (6 pts) If 3.9 moles of ammonia and 4.5 moles of oxygen are allowed to react in the reaction shown below, which is the limiting reactant? What is in excess and by how many moles is it in excess? ***You must show your DIMENSIONAL ANALYSIS setup*** and give your answers to the correct significant figures. Be sure to put your answers in the blanks provided.



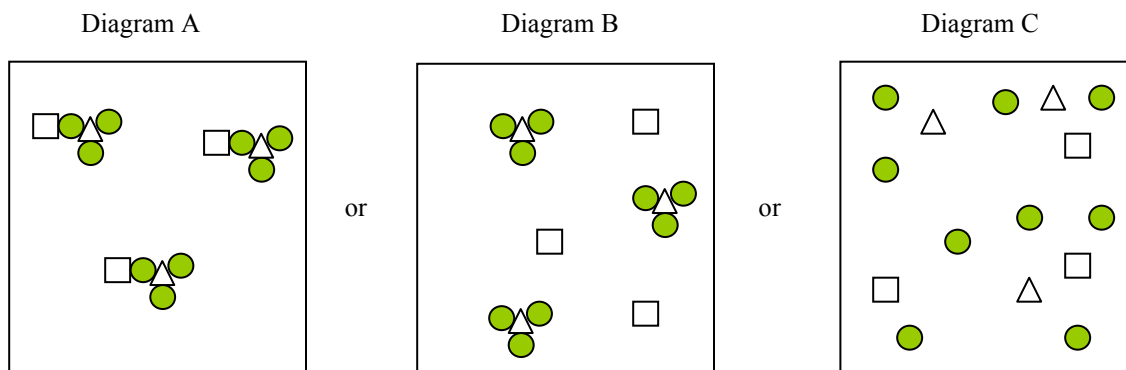
Which is the limiting reactant? Ans. \_\_\_\_\_

What is in excess? \_\_\_\_\_ How much of it is in excess? Ans. \_\_\_\_\_ moles

21. (5 pts) You are asked to prepare 500.0 mL of a 6.00 M NaOH solution, and you are handed a bottle of solid sodium hydroxide. Describe exactly what you will have to do to prepare this solution. Show any calculations you might have to perform and describe in detail, all the steps you will take, including the apparatus and instruments you would use. USE FULL SENTENCES. BE PRECISE IN YOUR DESCRIPTION.
22. (2 pts ) Write a chemical equation to show that HClO<sub>2</sub> is a weak acid.
23. Write a chemical equation to show the ionization of CH<sub>3</sub>CH<sub>2</sub>NH<sub>2</sub> in water.
24. (4 pts) What volume of a 12M HCl solution would I need in order to prepare 250.0 mL of a 3.50 M HCl solution? Show your setups and give the answer to the proper sig. fig.

25. (2 pts) Which diagram below illustrates best how 3 molecules of  $\text{HNO}_3$  dissolve in water? H is represented by a square, N by a triangle and oxygen is represented by a circle.

Answer by circling one of these: **Diagram A** or **Diagram B** or **Diagram C**



26. (12 pts) Write a **balanced** molecular equation (regardless of whether the reaction will go) for each of the following. **Include physical states!**

a) Aqueous solutions of lead acetate and potassium sulfate  $\longrightarrow$

b)  $\text{C}_7\text{H}_{14} (g) + \text{O}_2 (g) \longrightarrow$

c)  $\text{HBr} (aq) + \text{K}_2\text{CO}_3 (aq) \longrightarrow$

d)  $\text{MnSO}_4 \cdot 3\text{H}_2\text{O} (s) + \text{heat} \longrightarrow$

e)  $\text{HC}_2\text{H}_3\text{O}_2 (aq) + \text{NH}_3 (aq) \longrightarrow$

f)  $\text{SrO} (s) + \text{H}_2\text{O} (l) \longrightarrow$

g)  $\text{Mg}(\text{HCO}_3)_2 (s) + \text{HBr} \longrightarrow$

h)  $\text{HNO}_3 (aq) + \text{NH}_3 (aq) \longrightarrow$

i)  $\text{NH}_4\text{Cl} (aq) + \text{AgNO}_3 (aq) \longrightarrow$

27. (4 pts) Classify the following reactions from Question 4 above by circling one of the choices:

Reaction 5a)      precipitation      acid-base      redox      none of the above

Reaction 5c)      precipitation      acid-base      redox      none of the above

Reaction 5e)      precipitation      acid-base      redox      none of the above

28. (12 pts) Write the total ionic and net ionic equations and specify the spectator ions for the following reactions:

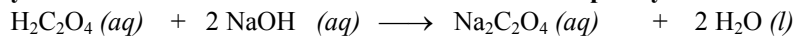
a)  $2\text{Na}_3\text{PO}_4 (aq) + 3\text{CaBr}_2 (aq) \longrightarrow \text{Ca}_3(\text{PO}_4)_2 (s) + 6\text{NaBr} (aq)$ :

b)  $\text{Ba}(\text{OH})_2 (aq) + 2\text{HC}_2\text{H}_3\text{O}_2 (aq) \longrightarrow 2\text{H}_2\text{O} (l) + \text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2 (aq)$

c)  $2\text{HCl} (aq) + \text{Sn} (s) \longrightarrow \text{SnCl}_2 (aq) + \text{H}_2 (g)$

29. (6 pts) A 1.372-g sample of impure oxalic acid is dissolved in 25.00 mL of water and titrated with 0.568 M NaOH. The sample requires 43.82 mL of the NaOH solution to reach the equivalence point. What is the percent of oxalic acid by mass in the sample?

**Show your work and remember to include units in all steps of your calculation.**



At the end of the titration what is the molar concentration of the sodium ions?