Molarity Review Problems

- **Calculating the molarity of a solution**

1. Calculate the molarity of a solution made by dissolving 20.631 g $Ca(NO_3)_2$ in enough water to make 475mL of solution.

2. Calculate the molarity of a solution made when 8.956 g NaCl is dissolved in enough water to make 200mL of solution.

3. If a K_2CO_3 solution has a molarity of 3.00, what is the molarity of the K^+ in the solution? (Remember that the K_2CO_3 dissociates in solution, how many K^+ are there for each K_2CO_3?)

- **Using Molarity as a conversion factor.**

4. How many moles of NaCl are there in a 45.00mL sample of 2.50M NaCl solution?

5. What volume (liters is fine) of a 3.59M solution of LiCl contains 5.00 moles of LiCl?

6. What is the mass of $Mg(NO_3)_2$ that is contained in a 26.5mL sample of .25M $Mg(NO_3)_2$ solution?

7. I need 4.67 g of CsBr for a reaction. I found a bottle of CsBr solution in the stock room that has a concentration of 0.358M. How many mL of the solution do I need?

8. An industry wants 15.00 L of a 4.25M solution of NH_4NO_3. How many grams of NH_4NO_3 are needed to make the solution?

- **Molarity in stoichiometry**.

9. Consider the reaction:

   $K_2S\ (aq) + Co(NO_3)_2(aq) \rightarrow \quad 2\ KNO_3\ (aq) + CoS(s)$

   What volume of .750M K_2S is needed to form 5.00g of CoS?

   If you used the amount of K_2S you calculated above, but only recovered 3.98g of CoS instead of the 5.00 g you thought you would make, what is the percent yield of the reaction?

10. Use the reaction in the problem above to answer the following question. If I want to react 50.0mL of .95M $Co(NO_3)_2$ completely, what volume of .465M K_2S solution would I need?

11. What volume of 6.0M H_2SO_4 is needed to react with 14.20g of Aluminum in the following reaction?

    ____$Al(s)$ + ____$H_2SO_4(aq)$ → ____$Al_2(SO_4)_3(aq)$ + _____$H_2(g)$

12. Using the reaction above, how many grams of H_2 will I form if I combine 3.58g Al with 50mL of .450M H_2SO_4?