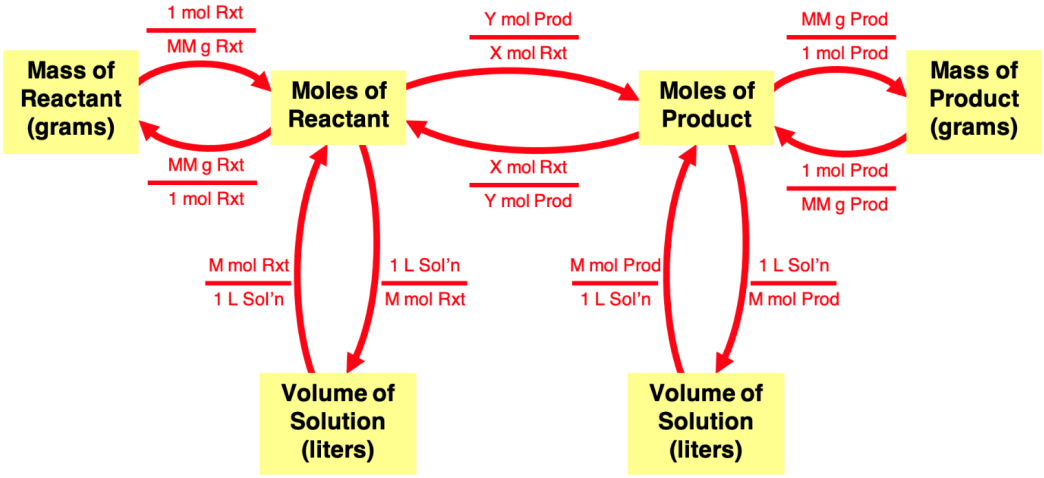
Solutions **Name**_____

Solution Stoichiometry

Read from **Lesson 2: Concentration** in the **Chemistry Tutorial Section, Chapter 13** of **The Physics Classroom**:
Part d: Solution Stoichiometry

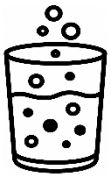
Solution stoichiometry examines the quantitative relationships between substances in chemical reactions that occur in solution. It builds on basic stoichiometry by incorporating solution concentration—typically expressed in moles per liter (molarity)—to calculate how much reactant is required or how much product is produced.

Use this Conversion Pathway to help you solve the following problems.



Solution Stoichiometry Problems

1. Ima Gobbler has just won the local hotdog eating contest. To ease her upset stomach, she takes an antacid tablet to relieve her indigestion. The sodium hydrogen carbonate in the antacid tablet reacts with the hydrochloric acid in her stomach.



   a. Write out the balanced equation for the reaction.

   b. If an antacid tablet contains 0.125 g of sodium hydrogen carbonate, how many mL of 0.200 M hydrochloric acid are required to completely neutralize it?

2 A chemistry student combines 50.0 mL of 0.300 M lead(II) nitrate with an excess of potassium iodide.

   a. Write the balanced equation and identify which product is the precipitate.

   b. What mass of precipitate forms?

Solutions

3. Ellie Ment is performing a titration in chem lab. She is titrating sodium hydroxide into a 0.200 M solution of sulfuric acid.
   a. Write the balanced equation for this acid base neutralization reaction.

   b. How many milliliters of 0.500 M sodium hydroxide would be needed to neutralize 35.0 mL of this acid solution?

4 A 0.512 g sample of a monoprotic acid (HA) is completely neutralized by 25.0 mL of 0.250 M potassium hydroxide.
   a. Write the balanced reaction for this acid base neutralization reaction.

   b. Determine the molar mass of the unknown acid, HA.

5. Ammonium phosphate is commonly used as a fertilizer. It is produced by reacting ammonia with phosphoric acid.
   a. Write the balanced equation for this synthesis reaction.

   b. If 100.0 mL of 1.20 M ammonia react with 50.0 mL of 0.900 M phosphoric acid, which reactant is the limiting reactant?

   c. How many grams of ammonium phosphate will actually be produced, theoretically?

   d. If only 4.50 g of ammonium phosphate is actually produced, what is the percent yield?