How to Help Break Down and Solve a Chem 211 Question

RDC PEER TUTORING

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Note-There are many different ways to solve questions in chem 211 as there are many different types of questions. This is just a general procedure to help understand the problem, along with some tips on how to do stoichiometry.

Read the Problem
Decide if you are reacting two different chemicals or not.

Reacting Chemicals
(Refer to #1)

Not Reacting Chemicals
(Refer to #2)
1. Reacting Chemicals
   
   **Example**
   What is the concentration of HCl if you titrate 30.0mL of HCl with 25.0mL of 0.10M NaOH?

   **Step 1:** Write out the chemical reaction
   **Step 2:** Under the appropriate chemicals write down the information you know about them. Always work in the same units! (This might mean converting mL to L or other conversions)
     *Tip*-break down unit abbreviations like molar mass (mm) into g/mol and molarity/concentration (M) into mol/L.
   **Step 3:** Write down what you are looking for!
   **Step 4:** Use the appropriate method to solve (usually a method involving stoichiometry!!!)

   \[ \text{HCl} + \text{NaOH} \rightarrow \text{H}_2\text{O} + \text{NaCl} \]

   \[
   \begin{align*}
   V &= 30.0\text{mL} \rightarrow 0.030\text{L} \\
   M &= 0.1 \text{ mol/L}
   \end{align*}
   \]

2. Not Reacting Chemicals
   
   **Example**
   How many moles of Na are in 0.367g of NaCl?

   **Step 1:** Write down all the compounds given in the question.
   **Step 2:** Under the appropriate chemicals write down the information you know about them. Always work in the same units! (This might mean converting mL to L or other conversions) *Tip*-break down unit abbreviations like molar mass (mm) into g/mol and molarity/concentration (M) into mol/L.
   **Step 3:** Write down what you are looking for!
   **Step 4:** Use the appropriate method to solve (usually a method involving stoichiometry!!!)

   \[
   \begin{align*}
   \text{Na} &\quad \text{NaCl} \\
   \text{mol} &= ? \\
   \text{mm} &= 58.443 \text{ g/mol} \\
   m &= 0.367\text{g}
   \end{align*}
   \]
Tips on Stoichiometry

**Step 1:** Find a variable which has the units of what you are solving for.

**Step 2:** Write down this variable with the units of what you are looking for on the top! For example, if you are looking for mass of HCl, write down the molar mass as \( \frac{36.461 \text{ g HCl}}{\text{mol HCl}} \). If you are looking for moles of HCl, write down the molar mass as \( \frac{36.461 \text{ g HCl}}{\text{mol HCl}} \).

***Note! For things like concentration, you must find mol/L. To do this find something that contains the number of moles, arrange the units (if needed) so that the moles are on the top (above with HCl example) and then multiply it by something that has liters in the denominator. If you are given just the volume of the chemical, multiply the moles by \( \frac{1}{\text{L}} \).

**Step 3:** Use the rest of the information given to you in the problem (or molar mass if it applies) to cancel out any remaining units you do not want in your answer.

**Example**

What is the concentration of HCl if you titrate 30.0mL of HCl with 25.0mL of 0.10M NaOH?

\[
\frac{1 \text{ mol HCl}}{1 \text{ mol NaOH}} \times \frac{1}{0.0300 \text{ L HCl}} \times \frac{0.10 \text{ mol NaOH}}{\text{ L NaOH}} \times 0.0250 \text{ L NaOH}
\]

**You are left with mol/L of HCl which is your concentration, and thus this answers the problem!**