$$V_{(conc)} = 0.0246\ L$$

**Step 2.** Subtract the $V_{(conc)}$ form the total volume of the diluted solution. The difference is the amount of volume of water that has to be added.

$$V_{(water)} = V_{(dil)} - V_{(conc)}$$

$$V_{(water)} = 320ml - 24.6ml$$

$$V_{(water)} = 295.4ml$$

**295.4ml of water should be added to the stock to prepare the diluted solution.**

**Example 3.** 10ml of a certain stock solution was used to prepare 750ml of a 0.015M solution. What is the molar concentration of the stock solution?

**Solution**

We determine the concentration of the solution using our dilution formula.

$$M_{(conc)} \times V_{(conc)} = M_{(dil)} \times V_{(dil)}$$

$$M_{(conc)} = \frac{M_{(dil)}\ x\ V_{(dil)}}{V_{(conc)}}$$

$$M_{(conc)} = \frac{0.015M\ x\ 0.750L}{0.01L}$$

$$M_{(conc)} = \frac{0.01125}{.01L}$$

$$M_{(conc)} = 1.13M$$

**The stock solution used has a concentration of 1.13M.**



## Solutions Stoichiometry

Reactions that occur in aqueous solutions follows the law of conservation of mass. We can determine the amounts of reactants and products used or produced, respectively, using:

Mass-mole relationships

Mole ratios in a balanced chemical equation

Molarity

Density

**Example 1.** How much Lead iodide ($PbI_2$) in grams will precipitate out by mixing 60 ml of 0.4M Potassium iodide (KI) solution and 60ml of a 0.4molar $Pb(NO_3)_2$ solution?

**Step 1. Determine the number of moles of solute.**

For KI $\quad$ mole KI = $(M_{KI})\ (V_{KI})$

mole KI = (0.4M)(0.06L)

mole KI = **0.024mol KI**

For $Pb(NO_3)_2$ – Since the solutes have the same concentration and volume, the number of moles are also the same. Hence mole $Pb(NO_3)_2$ = **0.024mol**