**Ion concentrations in dilution problems (or when two solutions are mixed with no reaction)**

*Suppose 100.0mL of a 0.50M solution of NaCl is added to 200.0mL of a 0.20M solution of MgCl2. How would you find the concentration of all the ions in the new (mixed) solution?*

There are several ways to solve this problem. We will go over two

1. **Find moles of each ion, and then divide by total volume**
2. Find moles of each solute (n = c\*v)

NaCl = (0.50M)(0.1000L) = 0.050 mol

MgCl2 = (0.20M)(0.2000L) = 0.040 mol

1. Use ratio from dissociation equation to find moles of each ion.

**NaCl 🡪 Na+ + Cl-**

0.050 mol

**MgCl2 🡪 Mg2+ + 2 Cl-**

0.040 mol

\*\*\*\* Add moles of chloride together – total moles Cl- =

1. Divide moles of each ion by FINAL volume to get new concentration

[Na+] =

[Mg2+] =

[Cl-] =

1. **Find final concentration of each solute and then multiply to get ion concentrations.**
2. Find diluted concentration of NaCl and MgCl2

[NaCl] = 0.50 M x (100mL/300mL) =

[MgCl2] = 0.40M x (200mL/300mL) =

1. Use dissociation equation/ratio to find ion concentrations

**NaCl 🡪 Na+ + Cl-**

**MgCl2 🡪 Mg2+ + 2 Cl-**

**Try these examples. Show your work!!**

1. Find the concentration of each ion resulting from mixing 150mL of 0.10M NaNO3 with 350mL of 0.20MBa(NO3)2.
2. 2.0L of 0.040M CaI2 is added to 500.0mL of 0.10M KI. Find the resulting concentration of iodide ions.
3. Find the concentration of hydroxide ions that results when 4.0g of solid sodium hydroxide is added to 250mL of 0.200M NaOH.
4. A beaker contains 150mL of 0.095M hydrochloric acid. Find the resulting concentration of each ion if 10.0mL of 12.0M HCl is added to this beaker.
5. CHALLENGE – Ca(OH)2 is NOT soluble (it will precipitate). Find the mass of Ca(OH)2 and the concentration of all remaining ions resulting from mixing 80mL of 0.20M CaCl2 with 160mL of 0.20M NaOH.