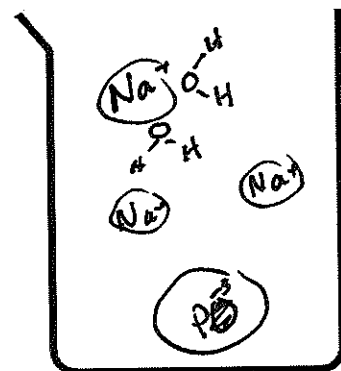


Proportional Dilutions and Molarity Calculations of Ionic compounds

Sample A: A solid sample of  $\text{Na}_3\text{P}$  is dissolved in 100mL of water forming a 0.2M solution.

Draw the relative proportions and quantities of ions in sample A and include 2 water molecules.

- $\text{Na}_3\text{P} \rightarrow 3\text{Na}^+ + \text{P}^{3-}$
- Write the dissolving equation for the salt and balance.
  - Determine the
    - $[\text{Na}^+] = 0.2 \times 3 = \underline{0.6\text{M}}$
    - $[\text{P}^{3-}] = \underline{0.2\text{M}}$



2. 50 ml of the sample A is added to 200mL of water.

a. Determine the concentrations in the new volume:

- $[\text{Na}^+]$
- $[\text{P}^{3-}]$

$$M_1 V_1 = M_2 V_2$$

$$\text{Na}^+ = 0.6 \cdot 50 = x \cdot 250$$

$$x = 0.12\text{M}$$

$$\text{P}^{3-} = 0.2 \cdot 50 = x \cdot 250$$

$$x = 0.04\text{M}$$

Sample B: 100mL of .5M  $\text{AgNO}_3$

Sample C: 100mL .2M  $\text{MgCl}_2$

3. Determine the concentration of each ion in sample B: (No calculator no work)

$$\text{Ag}^+ = 0.5\text{M}$$

$$\text{NO}_3^- = 0.5\text{M}$$

4. Determine the concentration of each ion in sample C: (no calculator no work)

$$\text{Mg}^{2+} = 0.2\text{M} \quad \text{Cl}^- = 0.4\text{M}$$

5. Mix the sample B and sample C together. What are the concentrations of each ion?

-----NO CALCULATOR-----

Volume doubled  
use proportions

$$\text{Ag}^+ \rightarrow 0.5 \rightarrow 0.25$$

$$\text{NO}_3^- \rightarrow 0.5 \rightarrow 0.25$$

$$\text{Cl}^- \rightarrow 0.2 \rightarrow 0.1$$

$$\text{Mg}^{2+} \rightarrow 0.4 \rightarrow 0.2$$

Same Volume

Sample D: 100mL of .1M BaCl<sub>2</sub>      Sample E: 100mL of .2M NaCl

6. Determine the concentration of each ion in sample D:

$$\text{Ba}^{2+} = 0.1$$

$$\text{Cl}^- = 0.2$$

7. Determine the concentration of each ion in sample E:

$$\text{Na}^+ = 0.2$$

$$\text{Cl}^- = 0.2$$

8. Mix the solutions of D and E, determine the concentration of each ions in the solution.

Volume doubles

$$\text{Ba}^{2+} \rightarrow 0.1 \rightarrow 0.05\text{M}$$

$$\text{Na}^+ \rightarrow 0.2 \rightarrow 0.1\text{M}$$

Cl<sup>-</sup> is not just a dilution

<u>D</u>		<u>E</u>
0.2M		0.2M
<div style="border: 1px solid black; display: inline-block; padding: 5px;">0.2M</div>		

Sample F: 100mL of .3M Al(NO<sub>3</sub>)<sub>3</sub>

Sample G: .2M 500mL of Al(C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>)<sub>3</sub>

9. Determine the concentration of each ion when we mix sample F and G.:

In Both Solutions →

	moles F	moles G		total
[Al <sup>3+</sup> ]	$.3 = \frac{x}{.1} \quad x = .03$	$.2 = \frac{x}{.5} \quad x = .1$		$\frac{0.13}{.6L} = 0.216\text{M}$

Dilute

	$M_1V_1 = M_2V_2$
[NO <sub>3</sub> ] 0.9M	$6.9 \cdot 100 = x \cdot 600$
[C <sub>2</sub> H <sub>3</sub> O <sub>2</sub> ]	<div style="border: 1px solid black; display: inline-block; padding: 5px;">x = 0.15M</div>

$.2 \times 3 = .6\text{M}$

	$M_1V_1 = M_2V_2$
$.6 \cdot 500 = x \cdot 600$	<div style="border: 1px solid black; display: inline-block; padding: 5px;">x = 0.5M</div>