

1. Write the balanced ionization equation for the following solutes in water:

a. CaCO_3



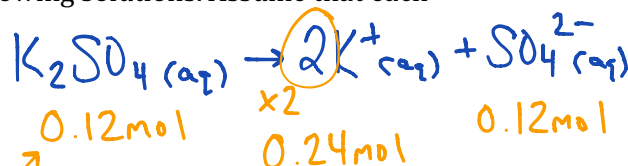
b. Cesium phosphate



2. Calculate the **number of moles** of aqueous ions in the following solutions. Assume that each dissolved substance complete dissociates.

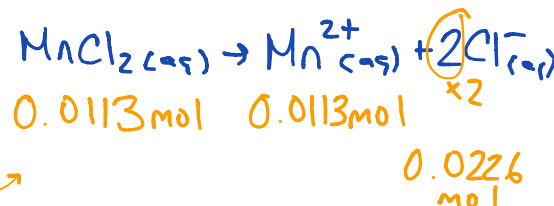
a. 0.60 L of 0.20 M K_2SO_4

$$0.60 \text{ L} \times \frac{0.20 \text{ mol}}{\text{L}} = 0.12 \text{ mol } \text{K}_2\text{SO}_4$$

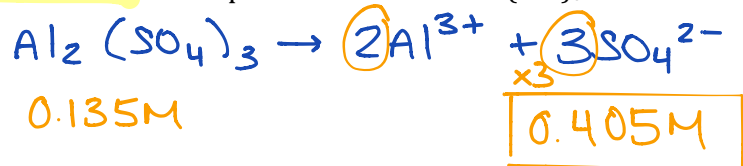


b. 75.0 mL of 0.150 M MnCl_2

$$0.075 \text{ L} \times \frac{0.150 \text{ mol}}{\text{L}} = 0.0113 \text{ mol } \text{MnCl}_2$$

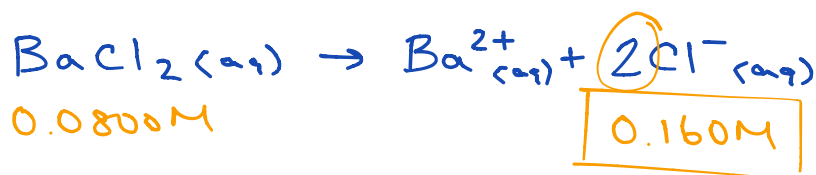


3. What is the **concentration** of SO_4^{2-} present in 0.135 M $\text{Al}_2(\text{SO}_4)_3$?



4. What is the $[\text{Cl}^-]$ formed when 10.0 g of $\text{BaCl}_2(\text{s})$ is dissolved and diluted to 0.600 L?

$$\frac{10.0 \text{ g } \text{BaCl}_2}{0.600 \text{ L}} \times \frac{1 \text{ mol } \text{BaCl}_2}{208.23 \text{ g}} = 0.0800 \text{ M } \text{BaCl}_2$$



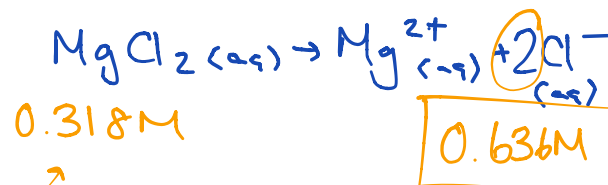
5. When 350.0 mL of 0.250 M MgCl_2 is boiled down to a final volume of 275.0 mL, what is the $[\text{Cl}^-]$ in the resulting solution?



$$C_1V_1 = C_2V_2$$

$$(0.250 \text{ M})(350.0 \text{ mL}) = C_2(275.0 \text{ mL})$$

$$C_2 = 0.318 \text{ M } \text{MgCl}_2$$



6. A solution is made by mixing 100.0 mL of 0.200 M MgSO_4 and 150.0 mL of 0.400 M Na_2SO_4 . What is the concentration of each ionic species in the final solution?



$$C_1V_1 = C_2V_2$$

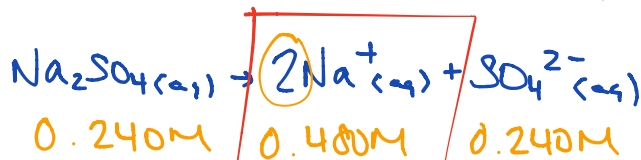
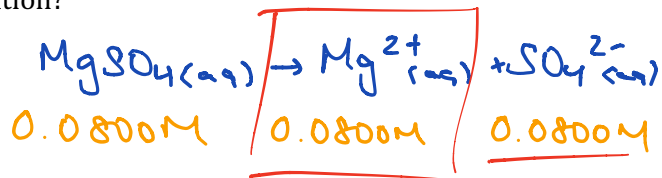
$$(0.200\text{M})(100.0\text{mL}) = C_2(250.0\text{mL})$$

$$C_2 = 0.0800\text{M MgSO}_4$$



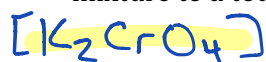
$$(0.400\text{M})(150.0\text{mL}) = C_2(250.0\text{mL})$$

$$C_2 = 0.240\text{M Na}_2\text{SO}_4$$



$$[\text{SO}_4^{2-}] = 0.320\text{M}$$

7. A chemistry student dissolves 3.25 g of K_2CrO_4 and 1.75 g of $\text{K}_2\text{Cr}_2\text{O}_7$ in water and dilutes the mixture to a total volume of 100.0 mL. What is the concentration of all the ions in the solution?



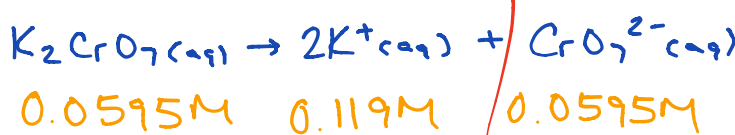
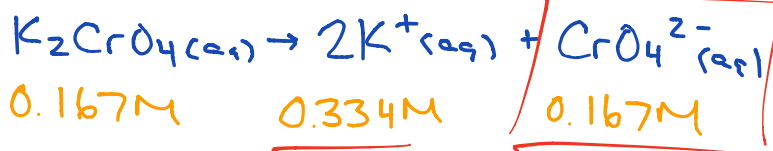
$$\frac{3.25\text{g}}{100.0\text{mL}} \times \frac{1000\text{mL}}{1\text{L}} \times \frac{1\text{mol}}{194.20\text{g}}$$

$$= 0.167\text{M K}_2\text{CrO}_4$$



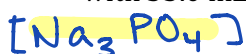
$$\frac{1.75\text{g}}{100.0\text{mL}} \times \frac{1000\text{mL}}{1\text{L}} \times \frac{1\text{mol}}{294.20\text{g}}$$

$$= 0.0595\text{M K}_2\text{Cr}_2\text{O}_7$$



$$[\text{K}^+] = 0.453\text{M}$$

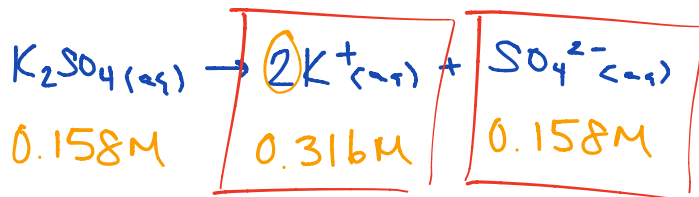
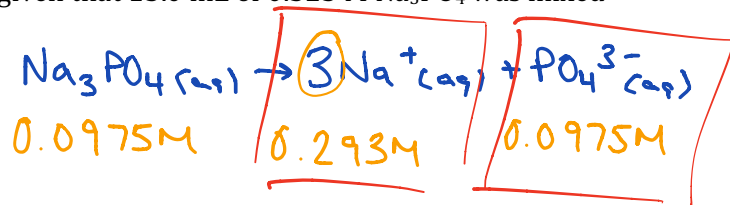
8. What is the concentration of all ions in a solution given that 15.0 mL of 0.325 M Na_3PO_4 was mixed with 35.0 mL of 0.225 M K_2SO_4 ?



$$C_1V_1 = C_2V_2$$

$$(0.325\text{M})(15.0\text{mL}) = C_2(50.0\text{mL})$$

$$C_2 = 0.0975\text{M Na}_3\text{PO}_4$$



$$C_1V_1 = C_2V_2$$

$$(0.225\text{M})(35.0\text{mL}) = C_2(50.0\text{mL})$$

$$C_2 = 0.158\text{M K}_2\text{SO}_4$$