

## Solution Chemistry II Worksheet

## ✓ Ions in Solutions

Name: key.

Date:

Block:

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

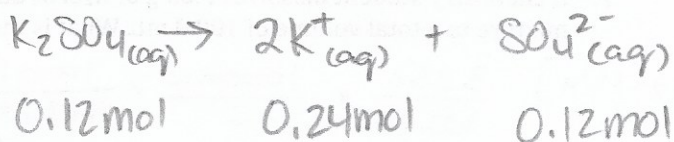


2. Calculate the number of moles of aqueous ions in the following solutions. Assume that each dissolved substance completely dissociates.

- a. 0.60 L of 0.20 M
- $\text{K}_2\text{SO}_4$

$$0.60\text{L} \times \frac{0.20\text{mol}}{\text{L}}$$

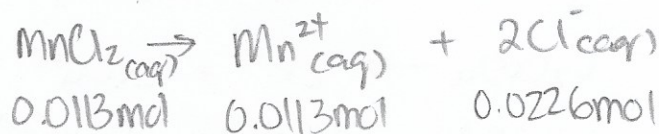
$$= 0.12\text{ mol } \text{K}_2\text{SO}_4$$



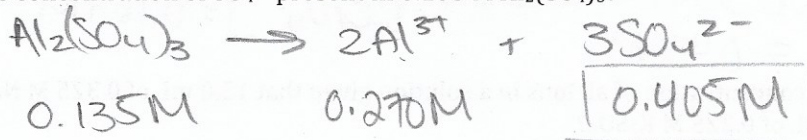
- b. 75.0 mL of 0.150 M
- $\text{MnCl}_2$

$$75.0\text{mL} \times \frac{1\text{L}}{1000\text{mL}} \times \frac{0.150\text{mol}}{\text{L}}$$

$$= 0.0113\text{ mol } \text{MnCl}_2$$



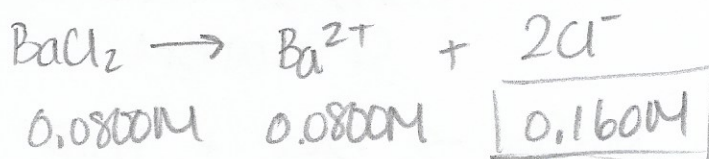
3. What is the concentration of
- $\text{SO}_4^{2-}$
- present in 0.135 M
- $\text{Al}_2(\text{SO}_4)_3$
- ?



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?

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

$$= 0.0800\text{M}$$

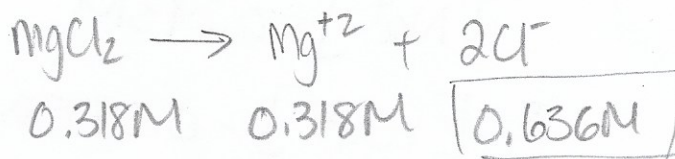


5. When 350.0 mL of 0.250 M
- $\text{MgCl}_2$
- is boiled down to a final volume of 275.0 mL, what is the
- $[\text{Cl}^-]$
- in the resulting solution?

$$C_1V_1 = C_2V_2$$

$$(0.250)(350.0) = C_2(275.0)$$

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

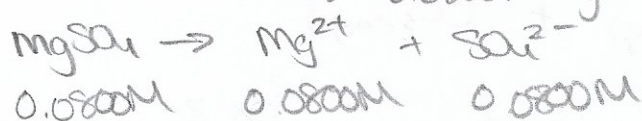


6. A solution is made by mixing 100.0 mL of 0.200 M  $\text{MgSO}_4$  and 150.0 mL of 0.400 M  $\text{Na}_2\text{SO}_4$ . What is the concentration of each ionic species in the final solution?

$$[\text{MgSO}_4] \quad C_1V_1 = C_2V_2$$

$$(0.200)(100.0) = C_2(250.0)$$

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



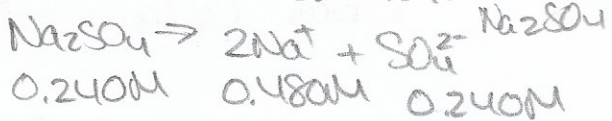
$$[\text{Mg}^{2+}] = 0.0800 \text{ M}$$

$$[\text{Na}^+] = 0.480 \text{ M}$$

$$[\text{Na}_2\text{SO}_4] \quad C_1V_1 = C_2V_2$$

$$(0.400)(150.0) = C_2(250.0)$$

$$C_2 = 0.240 \text{ M}$$



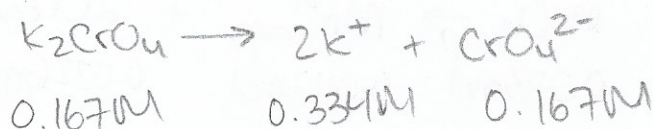
$$[\text{SO}_4^{2-}] = 0.0800 \text{ M} + 0.240 \text{ M}$$

$$= 0.320 \text{ M}$$

7. A chemistry student dissolves 3.25 g of  $\text{K}_2\text{CrO}_4$  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?

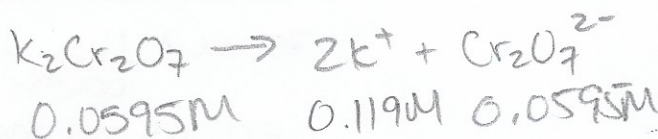
$$[\text{K}_2\text{CrO}_4] \quad \frac{3.25 \text{ g}}{100.0 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol}}{194.20 \text{ g}}$$

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



$$[\text{K}_2\text{Cr}_2\text{O}_7] \quad \frac{1.75 \text{ g}}{100.0 \text{ mL}} \times \frac{1000 \text{ mL}}{1 \text{ L}} \times \frac{1 \text{ mol}}{294.20 \text{ g}}$$

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



$$[\text{K}^+] = 0.334 \text{ M} + 0.119 \text{ M}$$

$$= 0.453 \text{ M}$$

$$[\text{CrO}_4^{2-}] = 0.167 \text{ M}$$

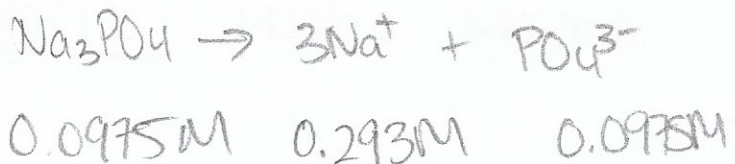
$$[\text{Cr}_2\text{O}_7^{2-}] = 0.0595 \text{ M}$$

8. What is the concentration of all ions in a solution given that 15.0 mL of 0.325 M  $\text{Na}_3\text{PO}_4$  was mixed with 35.0 mL of 0.225 M  $\text{K}_2\text{SO}_4$ ?

$$[\text{Na}_3\text{PO}_4] \quad C_1V_1 = C_2V_2$$

$$(0.325)(15.0) = C_2(50.0)$$

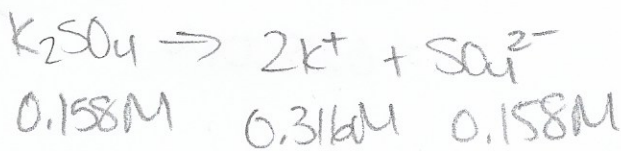
$$C_2 = 0.0975 \text{ M}$$



$$[\text{K}_2\text{SO}_4] \quad C_1V_1 = C_2V_2$$

$$(0.225)(35.0) = C_2(50.0)$$

$$C_2 = 0.158 \text{ M}$$



$$[\text{Na}^+] = 0.293 \text{ M}$$

$$[\text{K}^+] = 0.316 \text{ M}$$

$$[\text{PO}_4^{3-}] = 0.0975 \text{ M}$$

$$[\text{SO}_4^{2-}] = 0.158 \text{ M}$$