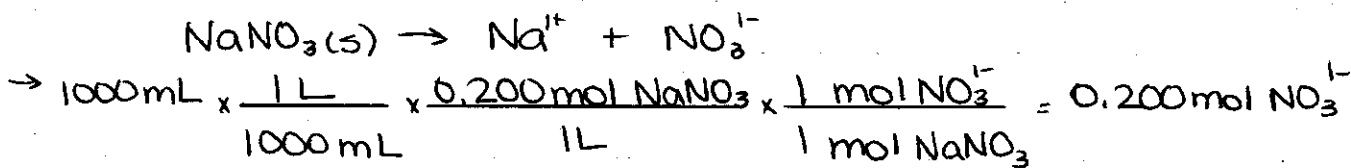
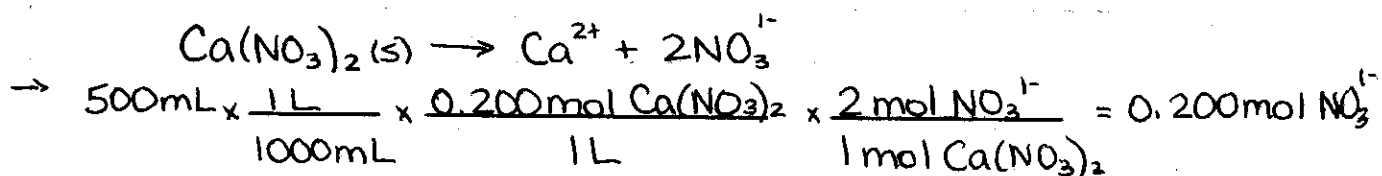
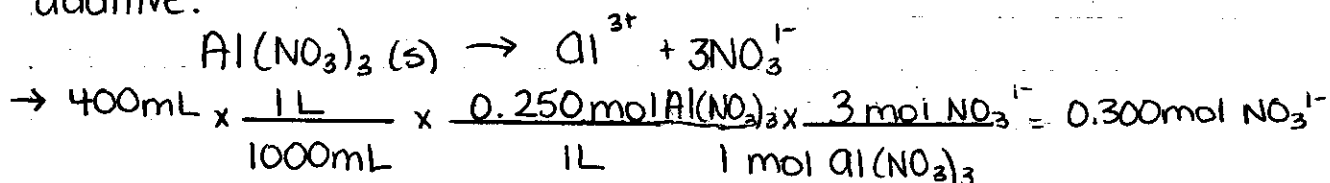


# Advanced Solution Calculations

Jan. 21/13

example #1: 400mL of 0.250M  $\text{Al}(\text{NO}_3)_3$ , 500mL of 0.200M  $\text{Ca}(\text{NO}_3)_2$  and 1000mL of 0.200M  $\text{NaNO}_3$  are mixed together.

What is the  $[\text{NO}_3^-]$  you would expect. Assume volumes are additive.



$$n_{\text{T}}^{\text{NO}_3^{-}} = n_{\text{Al}(\text{NO}_3)_3}^{\text{NO}_3^{-}} + n_{\text{Ca}(\text{NO}_3)_2}^{\text{NO}_3^{-}} + n_{\text{NaNO}_3}^{\text{NO}_3^{-}}$$

$$= 0.300\text{mol NO}_3^{-} + 0.200\text{mol NO}_3^{-} + 0.200\text{mol NO}_3^{-}$$
$$= 0.700\text{mol NO}_3^{-}$$

$$V_{\text{T}} = V_{\text{Al}(\text{NO}_3)_3} + V_{\text{Ca}(\text{NO}_3)_2} + V_{\text{NaNO}_3}$$
$$= 400\text{mL} + 500\text{mL} + 1000\text{mL}$$
$$= 1900\text{mL}$$
$$= 1.900\text{L}$$

$$n = 0.700\text{mol NO}_3^{-}$$

$$C = ?$$

$$V = 1.900\text{L}$$

$$C = \frac{n}{V}$$

$$= \frac{0.700\text{mol NO}_3^{-}}{1.900\text{L}}$$

$$= 0.368\text{mol/L}$$

$$\therefore [\text{NO}_3^{-}] = 0.368\text{M}$$

Reminder : p.p.m

p.p.m is  $\frac{\text{mg}}{\text{L}}$

↳ can be used as a conversion factor

example #2:

What volume of bottled water would you need to drink in order to obtain 0.5g  $\text{Ca}^{2+}$  given the  $[\text{Ca}^{2+}]$  is 100 p.p.m.

$$0.5 \text{ g Ca}^{2+} \times \frac{1000 \text{ mg}}{1 \text{ g}} \times \frac{1 \text{ L}}{100 \text{ mg Ca}^{2+}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 5000 \text{ mL}$$

example #3:

2.5 L of water is found to contain 0.088 mol  $\text{Na}^+$ . What is the concentration of  $\text{Na}^+$  in p.p.m.

$$\frac{0.088 \text{ mol Na}^+}{2.5 \text{ L}} \times \frac{22.99 \text{ g Na}^+}{1 \text{ mol Na}^+} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 809 \text{ mg Na}^+ / \text{L}$$

$$\therefore [\text{Na}^+] = 809 \text{ p.p.m}$$

example #4:

500 mL of solution is found to contain 5.2 mmol of  $\text{Ag}^+$ . Find p.p.m.

$$\frac{5.2 \text{ mmol Ag}^+}{500 \text{ mL}} \times \frac{1 \text{ mol}}{1000 \text{ mmol}} \times \frac{107.87 \text{ g Ag}^+}{1 \text{ mol Ag}^+} \times \frac{1000 \text{ mg}}{1 \text{ g}} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 1121 \text{ mg Ag}^+ / \text{L}$$

$$\therefore [\text{Ag}^+] = 1121 \text{ p.p.m Ag}^+$$