

Worksheet 3.2

Ion Concentration Calculations

1. What is the concentration of each ion in a 10.5 M sodium silicate solution?



$$10.5 \text{ M} \quad 21.0 \text{ M} \quad 10.5 \text{ M}$$

$$[\text{Na}^+] = 21.0 \text{ M}, \quad [\text{SiO}_3^{2-}] = 10.5 \text{ M}$$

2. What is the concentration of each ion in the solution formed when 94.5 g of nickel (III) sulphate is dissolved into 850.0 mL of water?

$$\text{Molarity} = \frac{94.5 \text{ g} \times \frac{1 \text{ mole}}{405.7 \text{ g}}}{0.850 \text{ L}} = 0.2740$$



$$0.2740 \quad 0.548 \text{ M} \quad 0.822 \text{ M}$$

$$[\text{Ni}^{3+}] = 0.548 \text{ M}, \quad [\text{SO}_4^{2-}] = 0.822 \text{ M}$$

3. If 3.78 L of 0.960 M sodium fluoride solution is added to 6.36 L of 0.550 M calcium nitrate solution, what is the resulting concentration of $[\text{Ca}^{2+}]$ and $[\text{F}^-]$?

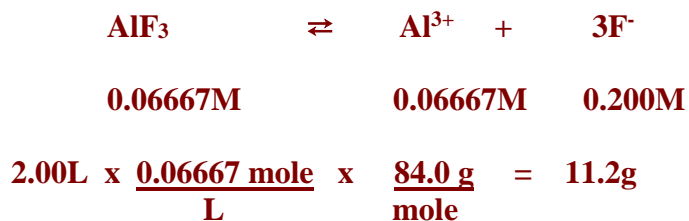


$$[\text{Ca}^{2+}] = 0.345 \text{ M}, \quad [\text{F}^-] = 0.358 \text{ M}$$

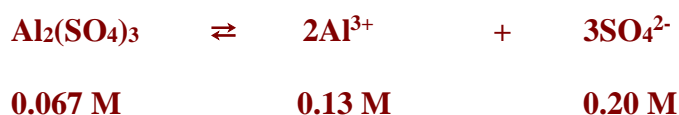
4. What is the concentration of each ion in the solution formed when 94.78 g of iron (III) sulphate is dissolved into 550.0 mL of water?

$$[\text{Fe}^{3+}] = 0.8619 \text{ M}, \quad [\text{SO}_4^{2-}] = 1.293 \text{ M}$$

5. If the $[F^-] = 0.200 \text{ M}$, calculate the number of grams AlF_3 that would be dissolved in 2.00 L of water.



6. If the $[SO_4^{2-}] = 0.200 \text{ M}$ in 2.0 L of $Al_2(SO_4)_3$, determine the $[Al^{3+}]$ and the molarity of the solution.



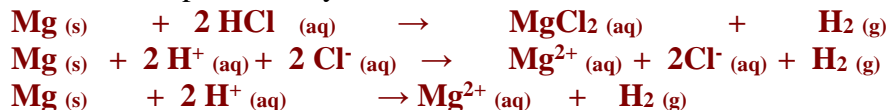
Dissociation Equations Write a dissociation equation for any chemical which dissociate when dissolved in water:

- $HCl_{(aq)} \rightleftharpoons H^+ + Cl^-$
- $C_6H_{12}O_6_{(s)} \rightleftharpoons C_6H_{12}O_{6(aq)}$ (molecular compounds do not dissociate)
- $Na_2S_{(s)} \rightleftharpoons 2Na^+_{(aq)} + S^{2-}_{(aq)}$
- $Al(CH_3COO)_3_{(s)} \rightleftharpoons Al^{3+}_{(aq)} + 3CH_3COO^-_{(aq)}$
- $MgBr_2_{(s)} \rightleftharpoons Mg^{2+}_{(aq)} + 2Br^-_{(aq)}$
- $Na_2CO_3_{(s)} \rightleftharpoons 2Na^+_{(aq)} + CO_3^{2-}_{(aq)}$
- $C_{12}H_{22}O_{11}_{(s)} \rightleftharpoons C_{12}H_{22}O_{11(aq)}$ (molecular compounds do not dissociate)
- $K_3PO_4_{(s)} \rightleftharpoons 3K^+_{(aq)} + PO_4^{3-}_{(aq)}$
- $CH_3OH_{(l)} \rightleftharpoons CH_3OH_{(aq)}$ (molecular compounds do not dissociate)

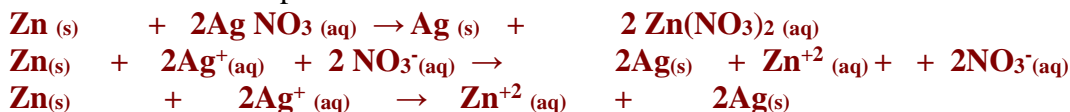
Net Ionic Equations

Write chemical equations, total ionic equations and net ionic equations for each reaction. The first one is done for you. (assume that all reactions occur):

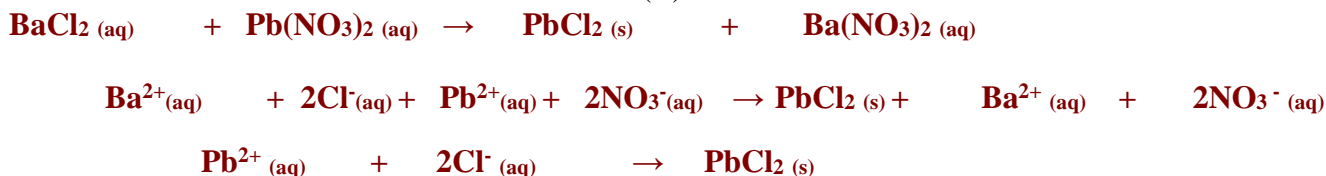
1. Magnesium metal is placed in hydrochloric acid



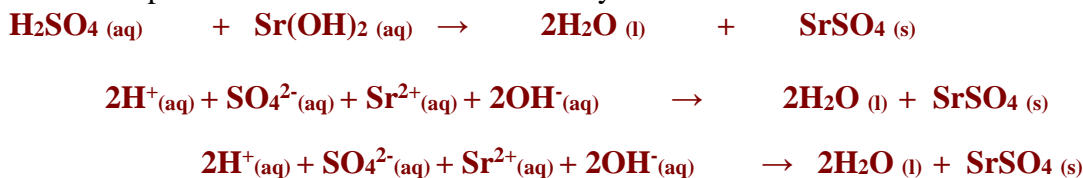
2. Zinc metal is placed in silver nitrate solution



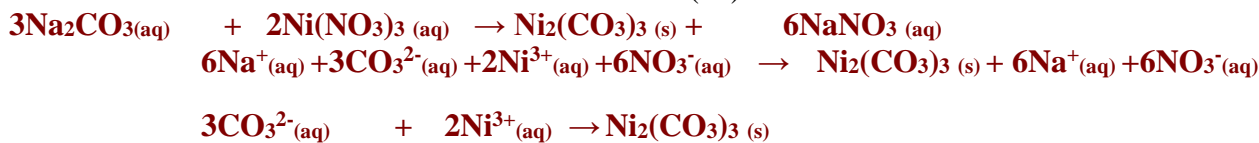
3. Barium chloride solution is added to lead (II) nitrate solution.



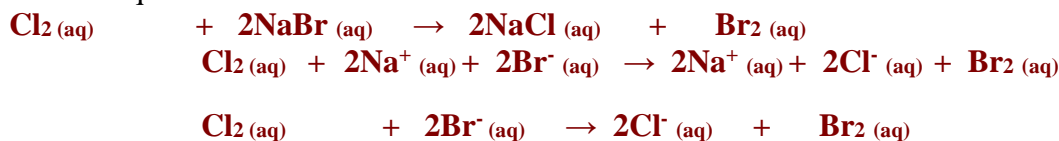
4. Sulphuric acid is added to Strontium hydroxide solution.



5. Sodium carbonate solution is added to nickel (III) nitrate solution.



6. Aqueous chlorine is added to sodium bromide solution.



7. Nitric acid is added to aluminum hydroxide solution.

