

Answer on Question #50438, Chemistry, Other

**Task:**

**Part I**

- a) Why are hydrogen ions NEVER found in an aqueous solution?

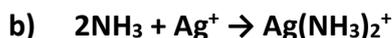


What is the Bronsted - Lowry acid in this equation?

What is the Bronsted - Lowry base in this equation?

What is the conjugate acid in this equation?

What is the conjugate base in this equation?



What is the Lewis acid in this equation?

What is the Lewis base in this equation?

**Part II**

Given  $\text{H}_2\text{SO}_4$  is sulfuric acid,  $\text{HNO}_3$  is nitric acid, and  $\text{H}_3\text{PO}_4$  is phosphoric acid, name the following:  $\text{HCl}$ ,  $\text{H}_2\text{SO}_3$ ,  $\text{HNO}_2$ ,  $\text{H}_3\text{PO}_2$ ,  $\text{HNO}_4$ ,  $\text{H}_2\text{SO}_5$ ,  $\text{HI}$ .

**Part III**

Work these titration calculations:

- a) A titration of  $15.0 \text{ cm}^3$  of household ammonia,  $\text{NH}_3$ , required  $38.70 \text{ cm}^3$  of  $8.0 \text{ M HCl}$ . Calculate the molarity of the ammonia.
- b) What volume of  $5.0 \text{ M HNO}_3$  is required to neutralize  $25.00 \text{ cm}^3$  of a  $2.0 \text{ M NaOH}$  solution.
- c) Calculate the volume of  $0.55 \text{ M HNO}_3$  necessary to neutralize  $55.00 \text{ cm}^3$  of  $0.45 \text{ M KOH}$ .

**Answer:**

**Part I**

a) Hydrogen ions never found in an aqueous solution because they attach to the water molecules to form  $\text{H}_3\text{O}^+$ .

Bronsted - Lowry acid in the equation is  $\text{HCN}(\text{aq})$ , because it donates the proton.

Bronsted - Lowry base in this equation is  $\text{SO}_4^{2-}(\text{aq})$ , because it receives the proton.

Conjugate acid in this equation is  $\text{SO}_4^{2-}(\text{aq})$ .

Conjugate base in this equation is  $\text{HCN}(\text{aq})$ .

b) Lewis acid in this equation is  $\text{Ag}^+$ .

Lewis base in this equation is  $\text{NH}_3$ .

**Part II**

$\text{HCl}$  – hydrochloric acid;

$\text{H}_2\text{SO}_3$  – sulfurous acid;

$\text{HNO}_2$  – nitrous acid;

$\text{H}_3\text{PO}_2$  – hypophosphorous acid;

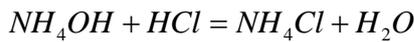
$\text{HNO}_4$  – peroxynitric acid;

$\text{H}_2\text{SO}_5$  – peroxydisulphuric acid;

$\text{HI}$  – hydroiodic acid.

**Part III**

- a)



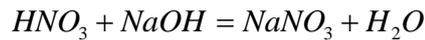
$$C_M = \frac{v}{V} \quad v = C_M \cdot V$$

$$v(NH_4OH) = v(HCl)$$

$$C_M(NH_4OH) \cdot V(NH_4OH) = C_M(HCl) \cdot V(HCl)$$

$$C_M(NH_4OH) = \frac{C_M(HCl) \cdot V(HCl)}{V(NH_4OH)}$$

$$C_M(NH_4OH) = \frac{8 \cdot 0.0387}{0.015} = 20.64 M$$



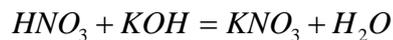
$$C_M = \frac{v}{V} \quad v = C_M \cdot V$$

$$v(HNO_3) = v(NaOH)$$

b)  $C_M(HNO_3) \cdot V(HNO_3) = C_M(NaOH) \cdot V(NaOH)$

$$V(HNO_3) = \frac{C_M(NaOH) \cdot V(NaOH)}{C_M(HNO_3)}$$

$$V(HNO_3) = \frac{2 \cdot 0.025}{5} = 0.01 l = 10 cm^3$$



$$v(HNO_3) = v(KOH)$$

c)  $C_M(HNO_3) \cdot V(HNO_3) = C_M(KOH) \cdot V(KOH)$

$$V(HNO_3) = \frac{C_M(KOH) \cdot V(KOH)}{C_M(HNO_3)}$$

$$V(HNO_3) = \frac{0.45 \cdot 0.055}{0.55} = 0.045 l = 45 cm^3$$