

Examples with its solution

Q-1- (0.2) g of saline solution consisting of mixing (potassium chloride and potassium nitrate) was passed through a cationic exchanger and the collected solution from the column was calibrated against the potassium hydroxide base, if the flow volume of the burette was (20) ml, calculate :

1. The weight of potassium chloride in the sample ?
2. The weight of potassium nitrate in the sample ?
3. The Normality concentration of the potassium hydroxide ?
4. PPM for potassium nitrate in the solution (5ml) ?
5. Write the equations for this question ?

If you know the percentage of potassium chloride in the sample is 80 %

And the Atomic weight for (K = 39 , N = 14 , O = 16 , Cl = 35.5)

$$\textcircled{1} \quad \% \text{ KCl} = \frac{\text{wt(KCl)}}{\text{wt Sample}} \times 100 \Rightarrow \frac{80}{100} = \frac{\text{wt(KCl)}}{0.2} \Rightarrow 0.16$$

$$\textcircled{2} \quad \% \text{ KNO}_3 = \frac{\text{wt(KNO}_3\text{)}}{\text{wt Sample}} \times 100 \Rightarrow \frac{20}{100} = \frac{\text{wt(KNO}_3\text{)}}{0.2} \Rightarrow 0.04$$

$$\textcircled{3} \quad \text{No. of Meq KCl} + \text{No. of Meq KNO}_3 = \text{No. of Meq KOH}$$

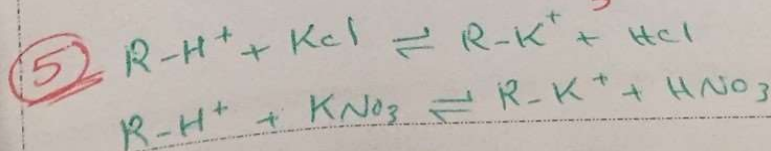
$$\frac{\text{wt}}{\text{eq. wt}} + \frac{\text{wt}}{\text{eq. wt}} = \frac{N \times V}{1000}$$

$$\frac{0.16}{74.5} + \frac{0.04}{101} = \frac{N \times 20}{1000} \Rightarrow N = 0.12$$

$$\textcircled{4} \quad \text{PPM for KNO}_3 = N \times \text{eq. wt} \times 1000$$

$$= \frac{\text{wt}}{\text{eq. wt}} \times \frac{1000}{V(\text{ml})} \times \text{eq. wt} \times 1000$$

$$= \frac{0.04 \times 10^6}{5} = 8000$$



Q-1- A sample of sodium bromide weighing (0.1) g was dissolved in (50) ml of the distilled water, The saline solution was then passed on a cationic column (H^+ Form), Then solution was collected from the column and calibrated with sodium hydroxide, If the volume of the sodium hydroxide was (50) ml,

Calculate :

1- The resin capacity if the resin weight is (0.5) g

2- The concentration of the sodium hydroxide in ppm .

3- Write the equation for this question $\Rightarrow R-H^+ + NaBr \rightleftharpoons R-Na^+ + HBr$

If you know the atomic weight of Na = 23 , O = 16 , H = 1 , Br = 80

① $T.C = \frac{\text{No. of Meq of } (H^+)}{\text{g of Resin}} \rightarrow \text{كامل الكمية في لتر}$

No. of Meq H^+ = No. of Meq of NaBr

$N \times V = \frac{wt}{eq. wt} \times \frac{1000}{V} \times V$

$= \frac{0.1}{103} \times 1000 \Rightarrow 0.97$ This No. of Meq H^+

$T.C = \frac{0.97}{0.5} = 1.94$

② No. of Meq of H^+ = No. of Meq NaOH

No. of Meq of NaBr = No. of Meq NaOH

$0.97 = N \times 50$

$N = 0.019$

$$\text{ppm} = N \times \text{eq. wt} \times 1000$$

$$= 0.019 \times 40 \times 1000$$

$$= 776$$

Q-1- (0.2) g of saline solution consisting of mixing (sodium chloride and sodium nitrate) was passed through a cationic exchanger and the collected solution from the column was calibrated against the sodium hydroxide base ,If the flow volume of the burette was

(20) ml , calculate :

1 . The weight of sodium chloride in the sample ?

2. The weight of sodium nitrate in the sample ?

3. The Normality concentration of the sodium hydroxide ?

4. PPM for sodium nitrate in the solution (5ml) ?

5. Write the equations for this question ?

If you know the percentage of sodium chloride in the sample is 80 %

And the Atomic weight for (K = 39 , N = 14 , O = 16 , Cl = 35.5)

$$\text{eq-wt (NaCl)} = \frac{23 + 35.5}{1} = 58.5$$

$$\text{eq-wt NaNO}_3 = \frac{23 + 14 + 3 \times 16}{1} = 85$$

$$\textcircled{1} \quad \% \text{ NaCl} = \frac{\text{wt(NaCl)}}{\text{wt of Sample}} \times 100$$

$$\frac{80}{100} = \frac{\text{wt(NaCl)}}{0.2 \text{ gm}} \Rightarrow 0.16 \text{ gm wt of NaCl}$$

$$\text{wt of NaNO}_3 \Rightarrow \% 100 - \% 80 = 20\%$$

$$\textcircled{2} \quad \% \text{ NaNO}_3 = \frac{\text{wt(NaNO}_3)}{\text{wt of Sample}} \times 100 \Rightarrow \frac{20}{100} = \frac{\text{wt(NaNO}_3)}{0.2}$$

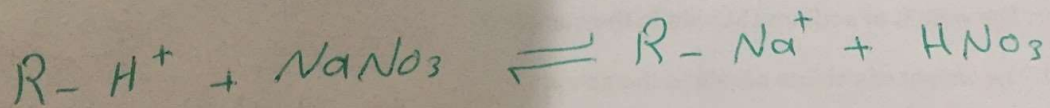
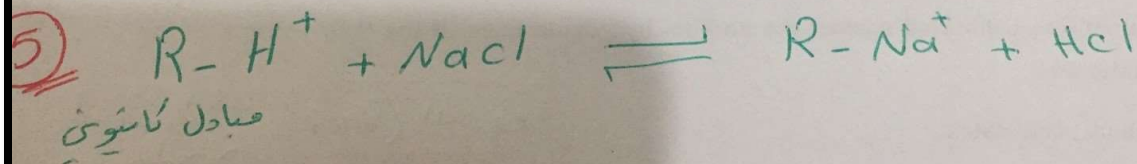
$$\Rightarrow 0.04 \text{ gm}$$

$$\textcircled{3} \quad \text{No. of Meq(NaCl)} + \text{No. of Meq(NaNO}_3) = \text{No. of Meq(NaOH)}$$

$$\frac{\text{wt}}{\text{eq-wt}} \times 1000 + \frac{\text{wt}}{\text{eq-wt}} \times 1000 = N \times V$$

$$\frac{0.16}{58.5} + \frac{0.04}{85} = \frac{N \times 20}{1000} \Rightarrow N = 0.15 \text{ for NaOH}$$

$$\begin{aligned}
 \textcircled{4} \quad \text{PPM for NaNO}_3 &= N \times \text{eq. wt} \times 1000 \\
 &= \frac{\text{wt}}{\text{eq. wt}} \times \text{eq. wt} \times \frac{1000}{V} \times 1000 \\
 &= \frac{0.04 \times 10^6}{5 \text{ (ml)}} \Rightarrow \boxed{8000}
 \end{aligned}$$



Q-1- (0.5) g of the potassium chloride solution was transferred to the cationic exchanger (H⁺ Form), if The volume of the come down solution from the cationic exchanger was (10) ml, which was calibrated with the sodium hydroxide, The volum of the sodium hydroxide was (12) ml,

Calculate :

- 1- The concentration of sodium hydroxide in ppm
- 2- The pH of the acid that come down from Ion exchange column
- 3- Write the equation for this question $\Rightarrow R-H^+ + KCl \rightleftharpoons R-K^+ + HCl$

If you know the atomic weight for K = 39, Cl = 35.5, Na = 23, O = 16, H = 1

①

$$\text{No. of Meq KCl} = \text{No. of Meq NaOH}$$

$$\frac{wt}{eq. wt} \times \frac{1000}{V} \times V = N \times V$$

$$\frac{0.5}{74.5} = \frac{N \times 12}{1000} \Rightarrow N = 0.55$$

$$\text{PPM} = N \times eq. wt \times 1000 \Rightarrow 0.55 \times 40 \times 1000 \Rightarrow 22,371.3$$

②

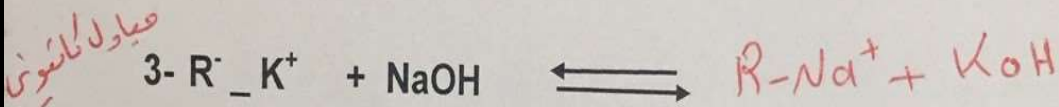
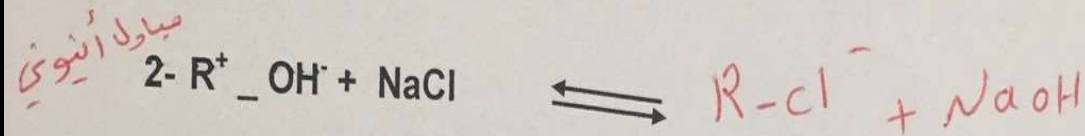
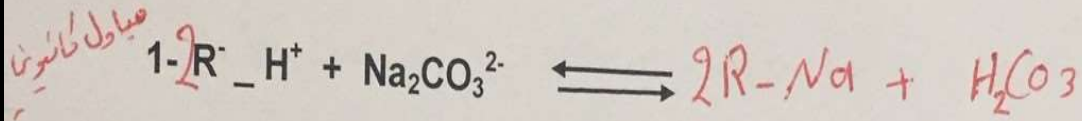
$$\text{No. of Meq for acid} = \text{No. of Meq NaOH}$$

$$N \times V = N \times V$$

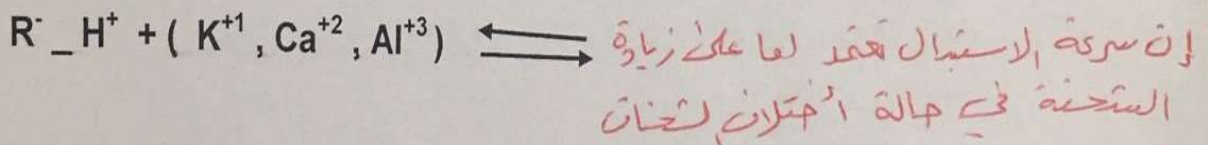
$$N \times 10 = 0.55 \times 12 \Rightarrow N = 0.66$$

$$\begin{aligned} \therefore \text{pH} &= -\log [H] \\ &= -\log [0.66] \Rightarrow \end{aligned}$$

Q-1- Answer the following questions :



Q-2- Sort the ions according to the speed of replacement:



أو
زيادة الوزن الذري في حالة تساوي الشحنة

