Unit 2

# PREPARATION OF SOLUTIONS ( CONCENTRATIONS )

- 1- The mw of $Na_2CO_3$ is : Na=23, O=16, C=12

A) 140

B) 106

C) 96

D) 100

E) 60

- 2- How many grams of $Na_2CO_3$ in 3 moles, (mw = 106 )

A) 318

B) 0.028

C) 134

D) 201

E) 67

- 3- Calculate the normal concentration (N ) of 0.1 M solution of HCl

A) 0.2 N

B) 0.3 N

C) 0.05 N

D) 0.1 N

4- The eq.wt of $H_3PO_4$ (mw=98) is:

A) 98

B) 49

C) 32.7

D) 196

E) 294

- 5- 2.5 g of $Na_2SO_4$ ( mw = 106 ) has been dissolved in water and the volume was completed to 500 mL , calculate the followings :

The molar concentration of $Na_2SO_4$

A) 5

B) 500

C) 0.5

D) 0.05

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

**The limiting reactant is:**

A) present in lower of moles

B) present in higherof moles

C) present in lower of mass

D) present in lower of mass

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

**The limiting reactant is:**

A) It is comletly used up in the reaction

B) It is not comletly used up in the reaction

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

**In chemical equilibrium:**

A) rate (forward= reverse)

B) rate (forward< reverse)

C) rate (forward> reverse)

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

**If Keq >> 1 (M=0.1 of product)**

A) Product 0.1-x

B) product 0.1+x

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

**If Keq << 1** **(M=0.1 of product)**

A) Product 0.1-x

B) Product x

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

Calculate the molar concentration of [ $H^+$ ] in 0.16 M solution of dichloroacetic acid $Cl_2CHCOOH$

( Ka = 5 X $10^{-3}$ ) . The concentration of the acid is initial ( before dissociation)

$Cl_2CHCOOH \rightarrow Cl_2CHCOO + H^+$

The concentration of $Cl_2CHCOO$ and $H^+$

A) 0.16-x

B) 0.16+x

C) X

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

Calculate the molar concentration of [ $H^+$ ] in 0.16 M solution of dichloroacetic acid $Cl_2CHCOOH$

( Ka = 5 X $10^{-3}$ ) . The concentration of the acid is initial ( before dissociation)

$Cl_2CHCOOH \rightarrow Cl_2CHCOO^- + H^+$

The concentration of $Cl_2CHCOOH$ and $H^+$

A) 0.16-x

B) 0.16+x

C) X

# Unit3: STOICHIOMETRY AND EQUILIBRIUM

Calculate the molar concentration of [ $H^+$ ] in 0.16 M solution of dichloroacetic acid $Cl_2CHCOOH$

( Ka = $5 \times 10^{-3}$ ) . The concentration of the acid is initial ( before dissociation)

$Cl_2CHCOOH \rightarrow Cl_2CHCOO^- + H^+$

The value of x

A) $5x10^{-3}$

B) 0.16

C) $5.9x10^{3}$

# Unite 4: ACID – BASE EQUILIBRIUM

Acid and base strong

A) high conc.

B) high vol.

C) Completely dissociate

# Unite 4: ACID – BASE EQUILIBRIUM

pH

A) 1-7

B) 1-14

C) 7-14

D) 0-14

# Unite 4: ACID – BASE EQUILIBRIUM

POH

A) 1-7

B) 1-14

C) 7-14

D) 0-14

# Unite 4: ACID – BASE EQUILIBRIUM

pH of HCl(0.01M)

A)pH= 1

B) pH=2

pH= 3

## Unite 4: ACID – BASE EQUILIBRIUM

pOH of Ba(OH)2 (0.01M)

A)pOH= 0.7

B) pOH=1.7

C) pOH= 3

# Unite 4: ACID – BASE EQUILIBRIUM

pOH of NaOH(0.03M)

A)pOH= 1

B) pOH=1.5

pOH= 3

pOH of HCl(0.01M)

A)pOH= 2

B) pOH=5

pOH= 12

# Unite 4: ACID – BASE EQUILIBRIUM

## pH of strong acid :

A) $pH = -\log[H^+]$

B) $pH = -log\sqrt{K_a\ C_a}$

C) $pH = -log\sqrt{K_b\ C_b}$

# Unite 4: ACID – BASE EQUILIBRIUM

## pH of strong base :

A) $pH = -\log [H^+]$

B) $pOH = -\log [OH^-]$

C) $pH = -log\sqrt{K_a\ C_a}$

# Unite 4: ACID – BASE EQUILIBRIUM

## pH of weak acide :

A) $pH = -\log[H^+]$

B) $pOH = -\log[OH^-]$

C) $pH = -log\sqrt{K_a\ C_a}$

# Unite 4: ACID – BASE EQUILIBRIUM

## pH of weak base:

A) $pH = -\log[H^+]$

B) $pH = -log\sqrt{K_a\ C_a}$

C) $pH = -log\sqrt{K_b\ C_b}$

# Unite 4: ACID – BASE EQUILIBRIUM

**$K_w$ :**

**A)** $K_w = [H^+] + [OH^-]$

**B)** $K_w = [H^+][OH^-]$

**C)** $K_w = [H^+] - [OH^-]$

**D)** $K_w = \frac{[H^+]}{[OH^-]}$

# Unite 4: ACID – BASE EQUILIBRIUM

$pK_w$

A) $pK_w = [H^+][OH^-]$

B) $pK_w = [H^+] + [OH^-]$

C) $pK_w = pH + pOH$

D) $pK_w = \mathrm{pH} - \mathrm{pOH}$

# Unite 4: ACID – BASE EQUILIBRIUM

**Calculate the pH of. 0.5 M solution of $NH_4Cl$ ?**

**Kb ( $NH_3$ ) = 1.75 X $10^{-5}$**

**A)** $pH = -\log [H^+]$

**B)** $pH = -log\sqrt{K_a\ C_a}$

**C)** $pH = -log\sqrt{\frac{K_w C_s}{K_b}}$

**D)** $pH = -log\sqrt{K_{'a}\ C_s}$

# Unite 4: ACID – BASE EQUILIBRIUM

**Calculate the pH of. 0.5 M solution of $NH_4Cl$ ?**

**Kb ( $NH_3$ ) = 1.75 X $10^{-5}$**

**A)** $pH = -\log[H^+]$

**B)** $pH = -log\sqrt{K_a\ C_a}$

**C)** $pH = -log\sqrt{\frac{K_w\, C_s}{K_b}}$

**D)** $pH = -log\sqrt{K_a\ C_s}$

# Unite 4: ACID – BASE EQUILIBRIUM

**Calculate the pH of. 0.5 M solution of $NH_4Cl$ ?**

**Kb ( $NH_3$ ) = $1.75 \times 10^{-5}$**

A) pH = 2.1

B) pH = 4.8

C) pH= 7

D) pH = 9.6

# Unite 4: ACID – BASE EQUILIBRIUM

**Calculate the pH of 0.2 M solution of $Ba(OH)_2$**

A) pOH = 12.1

B) pOH = 8.9

C) pOH = 5.5

D) pOH = 0.4

# Unite 4: ACID – BASE EQUILIBRIUM

**Calculate the pH of 0.2 M solution of Ba(OH)2** •

A) 9.6

B) 11.6

C) 13.6

# Unite 4: ACID – BASE EQUILIBRIUM

pH of salt ( strong acid+ weak base)

A) pH=7

B) $pH = -log\sqrt{K_a\ C_a}$

C) $pH = -\log[H^+]$

D) $pH = -log\sqrt{\frac{K_w\ C_s}{K_b}}$

# Unite 4: ACID – BASE EQUILIBRIUM

pH of salt ( strong acid+ strong base)

A) pH=7

B) $pH = -log\sqrt{\frac{K_w C_s}{K_b}}$

C) $pOH = -log\sqrt{\frac{k_w\ c_s}{k_a}}$

pH of salt ( strong base + weak acid)

A) pH=7

B) $pH = -log\sqrt{\frac{K_w C_s}{K_b}}$

C) $pOH = -log\sqrt{\frac{k_w\ c_s}{k_a}})$

# Unite 5: BUFFER SOLUTIONS

pH of $CH_3COOH$ /$CH_3COONa$

A) $pOH = pK_b + log\ \frac{C_s}{C_b}$

B) $pH = pK_a + log\ \frac{C_s}{C_a}$

C) $pOH = -log\sqrt{\frac{k_w\ c_s}{k_a}}$

# Unite 5: BUFFER SOLUTIONS

pH of **$NH_4OH$ / $NH_4Cl$**

A) $pOH = pK_b + log \frac{C_s}{C_b}$

B) $pH = pK_a + log \frac{C_s}{C_a}$

C) $pOH = -log\sqrt{\frac{k_w \; c_s}{k_a}}$

# Unite 5: BUFFER SOLUTIONS

Calculate the pH of a solution containing 0.1 M $Na_2CO_3$ and o.2 M $NaHCO_3$ ? Ka2 ($H_2CO_3$ ) = 4.7 $X10^{-11}$ .

A) pH= 5
B) pH= 8
C) pH=10

# Unite 5: BUFFER SOLUTIONS

Calculate the pH of a solution resulting from adding 4 mL of 0.2 M of NaOH solution to 16 mL of a buffer solution containing 0.1 M $CH_3COOH$ ( $K_a = 1.8X10^{-5}$ ) and 0.2 M $CH_3COONa$

The number of mmol $CH_3COOH$

A) 0.8 mmol

B) 1.6 mmol

C) 4 mmol

# Unite 5: BUFFER SOLUTIONS

Calculate the pH of a solution resulting from adding 4 mL of 0.2 M of NaOH solution to 16 mL of a buffer solution containing 0.1 M $CH_3COOH$ ( $K_a = 1.8X10^{-5}$ ) and 0.2 M $CH_3COONa$

The number of mmol NaOH

A) 0.8 mmol

B) 1.6 mmol

C) 4 mmol

# Unite 5: BUFFER SOLUTIONS

Calculate the pH of a solution resulting from adding 4 mL of 0.2 M of NaOH solution to 16 mL of a buffer solution containing 0.1 M $CH_3COOH$ ( $K_a = 1.8X10^{-5}$ ) and 0.2 M $CH_3COONa$

The number of mmol $CH_3COONa$

A) 0.8 mmol

B) 1.6 mmol

C) 4 mmol

# Unite 5: BUFFER SOLUTIONS

Calculate the pH of a solution resulting from adding 4 mL of 0.2 M of NaOH solution to 16 mL of a buffer solution containing 0.1 M $CH_3COOH$ ( $K_a = 1.8X10^{-5}$ ) and 0.2 M $CH_3COONa$

The pH of a solution

A) pH = 2

B) pH= 5.4

C) pH= 9.4

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

In the case of titrating 10 mL solution of 0.1 M of $Cl^-$ ( in the conical flask ) by 0.2 M solution of $Ag^+$ ( in the burette ) , calculate Veq.p of $Ag^+$ solution

A)2.5 mL

B)5 mL

C)10 mL

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

In the case of titrating 10 mL of 0.1 M of $H_2SO_4$ solution by 0.2 M of NaOH solution , calculate Veq.p of NaOH solution

A)2.5 mL

B)5 mL

C)10 mL

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

Endpoint is

A) The same (equal) equivalence point

B) Before equivalence point

C) After equivalence point

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

300 mg of a $Na_2C_2O_4$ ( mw = 134 ) 95 %w/w pure reagent was transferred to a titration conical flask . After adding acid solution and a suitable indicator , $C_2O_4^{2-}$ was titrated with KMnO4 unknown solution according to the following titration reaction equation :

$$2\ KMnO_4 + 5\ C_2O_4 + 16H+ \text{------} 2Mn2+ + 10CO2 + 8H2O$$

If the volume of $KMnO_4$ solution at the equivalent point was 34 mL , calculate the molarity of $KMnO_4$ solution, **the pure wieght of $Na_2C_2O_4$**

A) 300 mg

B) 285 mg

C) 31.67 mg

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

300 mg of a $Na_2C_2O_4$ ( mw = 134 ) 95 %w/w pure reagent was transferred to a titration conical flask . After adding acid solution and a suitable indicator , $C_2O_4^{2-}$ was titrated with KMnO4 unknown solution according to the following titration reaction equation :

$$2\ KMnO_4 + 5\ C_2O_4 + 16H+ \text{------} 2Mn2+ + 10CO2 + 8H2O$$

If the volume of $KMnO_4$ solution at the equivalent point was 34 mL , calculate the molarity of $KMnO_4$ solution, **the moles of $Na_2C_2O_4$**

A) 5.61 mol

B) 2.12 mol

C) 0.85 mol

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

300 mg of a $Na_2C_2O_4$ ( mw = 134 ) 95 %w/w pure reagent was transferred to a titration conical flask . After adding acid solution and a suitable indicator , $C_2O_4^{2-}$ was titrated with KMnO4 unknown solution according to the following titration reaction equation :

$$2\ KMnO_4 + 5\ C_2O_4 + 16H+ \text{------}\ 2Mn2+ + 10CO2 + 8H2O$$

If the volume of $KMnO_4$ solution at the equivalent point was 34 mL , calculate the molarity of $KMnO_4$ solution, **the moles of $KMnO_4$**

A) 5.61 mol

B) 2.12 mol

C) 0.85 mol

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

750 mg of a sample containing iron ( aw = 55.85 ) was transferred into a titration conical flask and all iron was converted to $Fe^{3+}$, then unknown excess of KI was added and the following reaction was occurred

$$2\ I^- + 2\ Fe^{3+} \rightarrow I2 + 2\ Fe^{2+}$$

The iodine I2 formed was titrated with 0.075 M of Na2S2O3 solution using starch as indicator according to the following reaction equation :

$$S_4O_6^{2-} + 2\ I_2 \rightarrow S_2O_3^{2-} + 2\ I^-$$

**mmol of $S_4O_6^{2-}$**

A) 18.51

B) 1.39

C) 4.77

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

750 mg of a sample containing iron ( aw = 55.85 ) was transferred into a titration conical flask and all iron was converted to $Fe^{3+}$, then unknown excess of KI was added and the following reaction was occurred

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$$S_4O_6^{2-} + 2\ I_2 \rightarrow S_2O_3^{2-} + 2\ I^{-}$$

**mmol of $I_2$**

A) 18.51

B) 1.39

C) 0.69

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

750 mg of a sample containing iron ( aw = 55.85 ) was transferred into a titration conical flask and all iron was converted to $Fe^{3+}$, then unknown excess of KI was added and the following reaction was occurred

$$2\,I^- + 2\,Fe^{3+} \rightarrow I2 + 2\,Fe^{2+}$$

The iodine I2 formed was titrated with 0.075 M of Na2S2O3 solution using starch as indicator according to the following reaction equation :

$$S_4O_6^{2-} + 2\,I_2 \rightarrow S_2O_3^{2-} + 2\,I^-$$

**mmol of $Fe^{3+}$**

A) 18.51

B) 1.39

C) 0.69

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**m.eq. of $K_2Cr_2O_7$**

**A) 0.05 m.eq**

**B) 0.5 m.eq**

**C) 1.5 m.eq**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**m.eq. of $Fe^{2+}$ (excess) which reacted with $K_2Cr_2O_7$**

**A) 0.05 m.eq**

**B) 0.5 m.eq**

**C) 1.5 m.eq**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**m.eq. of $Fe^{2+}$ total**

**A) 0.05 m.eq**

**B) 0.78 m.eq**

**C) 26.85 m.eq**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**m.eq. of $Fe^{2+}$ which reacted with $Cr^{6+}$**

**A) 0.05 m.eq**

**B) 0.78 m.eq**

**C) 26.36 m.eq**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**m.eq. of $Cr^{6+}$**

**A) 0.05 m.eq**

**B) 0.78 m.eq**

**C) 26.36 m.eq**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . Calculate the %w/w percentage of $Cr^{6+}$ in the sample .

**mass of $Cr^{6+}$**

**A) 17.33 mg**

**B) 456.91 mg**

**C) 630.02 mg**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

1.782 g of a sample containing $Cr^{6+}$ ( aw = 52 ) is dissolved in a conical flask . An excess of 1.5 g of $Fe^{2+}$ ( aw = 55.85 ) are added which is oxidized to $Fe^{3+}$ during its reduction of $Cr^{6+}$ to $Cr^{3+}$ . The excess $Fe^{2+}$ is titrated with 0.05 N of $K_2Cr_2O_7$ and was found to require 10 mL at the equivalent point . **Calculate the %w/w percentage of $Cr^{6+}$ in the sample .**

**A) 17.33 %**

**B) 40.91 %**

**C) 25.60%**

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

10 mL of 0.1 M of analyte A were titrated with 0.2 M of titrant B according to the following titration reaction equation :

$$A + 2\,B \leftrightarrow 3\,E\ ,\ K_{eq} = 1x10^{10}$$

**Calculate the molar concentration of each [A] , [B] and [E]** in the conical flask after the following additions of the titrant B solution : (1) 5 mL (2) 10 mL (3) 15 mL

calculate the **volume of the titrant B** solution at the equivalent point

A) 5 mL

B) 2.5mL

C) 10 mL

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

10 mL of 0.1 M of analyte A were titrated with 0.2 M of titrant B according to the following titration reaction equation :

$$A + 2\,B \leftrightarrow 3\,E\ ,\ Keq = 1x10^{10}$$

**Calculate the molar concentration of each [A] , [B] and [E]** in the conical flask after the following additions of the titrant B solution : (1) 3 mL (2) 10 mL (3) 15 mL

calculate the **molar concentration of [E]**

A) 1 mL

B) 0.07mL

C) 0.1 mL

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

10 mL of 0.1 M of analyte A were titrated with 0.2 M of titrant B according to the following titration reaction equation :

$$A + 2\,B \leftrightarrow 3\,E\ ,\ K_{eq} = 1\times10^{10}$$

**Calculate the molar concentration of each [A] , [B] and [E]** in the conical flask after the following additions of the titrant B solution : (1) 3 mL (2) 10 mL (3) 15 mL

calculate the **molar concentration of [A]**

A) 1 M

B) 0.03 M

C) 0.05 M

# Unite 6: INTRODUCTION TO VOLUMETRIC ANALYSIS

10 mL of 0.1 M of analyte A were titrated with 0.2 M of titrant B according to the following titration reaction equation :

$$A + 2\,B \leftrightarrow 3\,E\ ,\ K_{eq} = 1x10^{10}$$

**Calculate the molar concentration of each [A] , [B] and [E]** in the conical flask after the following additions of the titrant B solution : (1) 3 mL (2) 10 mL (3) 15 mL

calculate the **molar concentration of [B]**

A) 0.3 M

B) $1.8x10^{-6}$ M

C) $8.3x10^{-7}$

## Unit7: **ACID – BASE TITRATION CURVES**

If 10 mL of 0.1 M $CH_3COOH$ (($K_a = 1.8 \times 10^{-5}$ ) is titrated with 0.2 M NaOH solution , calculate the pH of the titration solution in the conical flask after the addition of the following volumes of NaOH solution : **V.eq.p**

A) 5

B) 10

C) 15

Unit7: **ACID – BASE TITRATION CURVES**

If 10 mL of 0.1 M $CH_3COOH$ ((Ka = $1.8 \times 10^{-5}$ ) is titrated with 0.2 M NaOH solution , calculate the pH of the titration solution in the conical flask after the addition of the following volumes of NaOH solution : **3mL**

A) 2.91

B) 4.96

C) 11.51

Unit7: **ACID – BASE TITRATION CURVES**

If 10 mL of 0.1 M $CH_3COOH$ ((Ka = 1.8 x $10^{-5}$ ) is titrated with 0.2 M NaOH solution , calculate the pH of the titration solution in the conical flask after the addition of the following volumes of NaOH solution : **5mL**

A) 5.2

B) 8.8

C) 11.51

Unit7: **ACID – BASE TITRATION CURVES**

If 10 mL of 0.1 M $CH_3COOH$ ((Ka = $1.8 \times 10^{-5}$ ) is titrated with 0.2 M NaOH solution , calculate the pH of the titration solution in the conical flask after the addition of the following volumes of NaOH solution : **10mL**

A) 2.91

B) 1.30

C) 12.71

## Unit7: **ACID – BASE TITRATION CURVES**

A) if pKa = 3, so, sharper the region of the curve near the equivalent point

B) if pKa = 7, so, sharper the region of the curve near the equivalent point

C) if pKa = 10, so, sharper the region of the curve near the equivalent point

## Unite 8: ACID – BASE TITRATION INDICATORS

At a low pH, the human can distinguish the acidic color if:

A) $\frac{[In]}{[\mathrm{HIn}]} = \frac{10}{1}$

B) $\frac{[\mathrm{HIn}]}{[\mathrm{In}]} = \frac{10}{1}$

C) $\frac{[In]}{[\mathrm{HIn}]} = \frac{20}{1}$

# Unite 8: ACID – BASE TITRATION INDICATORS

At a high pH, the human can distinguish the acidic color if:

A) $\frac{[In]}{[\mathrm{HIn}]} = \frac{10}{1}$

B) $\frac{[\mathrm{HIn}]}{[\mathrm{In}]} = \frac{10}{1}$

C) $\frac{[In]}{[\mathrm{HIn}]} = \frac{20}{1}$

# Unite 8: ACID – BASE TITRATION INDICATORS

At low pH ( acidic), The pH of indicator is :

A) $pH_{In} = pK_{HIn} - 1$

B) $pH_{In} = pK_{HIn} + 1$

C) $pK_{HIn} = pH_{In} - 1$

# Unite 8: ACID – BASE TITRATION INDICATORS

The Indicator’s Range is:

A) $\Delta pK_{HIn} = pK_{HIn} \pm 1$

B) $\Delta pK_{HIn} = pH_{In} \pm 1$

C) $\Delta pH_{In} = pK_{HIn} \pm 1$

# Unite 8: ACID – BASE TITRATION INDICATORS

How do the following indicators behave with the titration of 10 mL of 0.05 M of the weak acid HA ($K_a = 1 \times 10^{-5}$ ) with 0.1 M NaOH :

(1) $pK_{In} = 7$ (2) $pK_{In} = 9$ (3) $pK_{In} = 11$

**Calculate $V_{eq.p.}$**

A) 2.5 mL

B) 5mL

C) 7.5mL

# Unite 8: ACID – BASE TITRATION INDICATORS

How do the following indicators behave with the titration of 10 mL of 0.05 M of the weak acid HA ($K_a = 1 \times 10^{-5}$ ) with 0.1 M NaOH :

(1) $pK_{In} = 7$ (2) $pK_{In} = 9$ (3) $pK_{In} = 11$

**Calculate the pH at eq.p.**

A) 4.7 mL

B) 9.3mL

C) 12.5mL

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**The suitable indicatore is**

A) ) $pK_{In} = 7$

B) $pK_{In} = 9$

C) $pK_{In} = 11$

## Unite 8: ACID – BASE TITRATION INDICATORS

How do the following indicators behave with the titration of 20 mL of 0.1 M of $NH_3$ ( $K_b \approx 2 \times 10^{-5}$ ) with 0.4 M HCl :

(1) $pK_{In} = 3$ (2) $pK_{In} = 5$ (3) $pK_{In} = 7$

**Calculate $V_{eq.p.}$**

A) 2.5 mL

B) 5mL

C) 7.5mL

# Unite 8: ACID – BASE TITRATION INDICATORS

How do the following indicators behave with the titration of 20 mL of 0.1 M of $NH_3$( $K_b \approx 2x\ 10^{-5}$ ) with 0.4 M HCl :

(1) $pK_{In}$ = 3 (2) $pK_{In}$ = 5 (3) $pK_{In}$ = 7

**Calculate the pH at eq.p.**

A) 11.9

B) 9.8

C) 5.2

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How do the following indicators behave with the titration of 20 mL of 0.1 M of $NH_3$( $K_b \approx 2x\ 10^{-5}$ ) with 0.4 M HCl :

(1) $pK_{In} = 3$ (2) $pK_{In} = 5$ (3) $pK_{In} = 7$

**The suitable indicatore is**

A) $pK_{In} = 3$

B) $pK_{In} = 5$

C) $pK_{In} = 7$

# Unite 9: **COMPLEX FORMATION TITRATION**

Example of unidentate

A) $H_2NCH_2CH_2NH_2$

B) $Br^-$, $F^-$ , $I^-$ , CN-, RNH2 , RCOO

C) EDTA

## Unite 9: **COMPLEX FORMATION TITRATION**

The charge of complex $Fe^{3+}$ , $Fe(CN)_6$

A) 3+

B) 3-

C) 6-

D) 6+

## Unite 9: **COMPLEX FORMATION TITRATION**

Calculate the molar concentration of $[CN^-]$ in a solution of $Cu(CN)_4^{2-}$ ($K_d = 5.2 \times 10^{-28}$) prepared by dissolving 0.05 mole of the complex in water and completing the volume to one liter

A) $2.52x10\ 10^{-5}$

B) $5.63x10^{-2}$

C) $32.2x10^{-28}$