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B.Sc., Semester -3

CHEMISTRY PRACTICAL RECORD BOOK

Program Name : B. Sc. ChemPMJDSCistry

Semester : III

PROGRAM CODE : SCIUG102

COURSE CODE : SC23PMJDSCCHE301

Type of Course : Practicals Major Discipline Specific Course PMJDSC

Name of Course : Practical's for Basic chemistry I

Total Marks : 100

Name of Student: _____

Group: _____

Roll Number: _____

Practical Batch: _____

Exam Number: _____

Mobile Number: _____

Practical Index SC23PMJDSCCHE301

No.	Practical	Practical date	Teacher's Sign. /Date
GROUP: A Inorganic Qualitative analysis (25 MARKS)			
1	Inorganic Qualitative Mixture		
2	Inorganic Qualitative Mixture		
3	Inorganic Qualitative Mixture		
4	Inorganic Qualitative Mixture		
5	Inorganic Qualitative Mixture		
6	Inorganic Qualitative Mixture		
7	To separate Pb,Hg and Ag ions present in a mixture by paper chromatography.		
8	To separate Zn,Co, Ni ions present in a mixture by paper chromatography.		
GROUP: B Physical Chemistry (25 MARKS)			
1	To determine the end-point and find out the normality of given x N HCL/CH ₃ COOH using 0.1 N NaOH by conductometric titration-1		
2	To determine the end-point and find out the normality of given x N HCL using 0.1 N NH ₄ OH by conductometric titration-2		
3	To determine the Normality of given x N HCL using 0.1 N NaOH by pH metric titration-1		
4	To determine the Dissociation constant of monobasic acid using various mixtures of CH ₃ COOH and CH ₃ COONa by pH metry method-2		
5	To determine the Specific and Molar refraction of the given liquid A,B and C and Calculate % composition of A and B in Mixture C (Refractometer)		
6	To Study kinetic reaction of decomposition of H ₂ O ₂ catalyzed by iodide ion		
7	To determine the solubility of organic acid at different temperatures and to determine Heat of solution of the dissolution process		
8	To determine the Viscosity of a different mixture of Liquid 1 and liquid 2 and determine the % composition of given unknown mixture by graphical method		

Inorganic Qualitative Analysis (B.Sc.Semester-3)

Practical No. - 1

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl₂		
7	W.E.(Yellow)+HCl +H₂S		
8	W.E.(Orange)+H₂S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ **Group Classification.**

No	Test	Observation	Inferences

(iv) **Confirmative Test for Positive Radical.**

No	Test	Observation	Inferences

(v) **Confirmative Test for Negative Radical**

No	Test	Observation	Inferences

[E] **Result Table**

Positive Radical	
Negative Radical	

Teacher's Sign. and Date

Inorganic Qualitative Analysis (B.Sc.Semester-3)

Practical No. - 2

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl ₂		
7	W.E.(Yellow)+HCl +H ₂ S		
8	W.E.(Orange)+H ₂ S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iv) Confirmative Test for Positive Radical.

No	Test	Observation	Inferences

(v) Confirmative Test for Negative Radical

No	Test	Observation	Inferences

[E] Result Table

Positive Radical	
Negative Radical	

Teacher's Sign. and Date

Practical No. - 3

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl₂		
7	W.E.(Yellow)+HCl +H₂S		
8	W.E.(Orange)+H₂S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ **Group Classification.**

No	Test	Observation	Inferences

(iv) **Confirmative Test for Positive Radical.**

No	Test	Observation	Inferences

(v) **Confirmative Test for Negative Radical**

No	Test	Observation	Inferences

[E] **Result Table**

Positive Radical	
Negative Radical	

Teacher's Sign. and Date

Inorganic Qualitative Analysis (B.Sc.Semester-3)

Practical No. – 4

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl ₂		
7	W.E.(Yellow)+HCl +H ₂ S		
8	W.E.(Orange)+H ₂ S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ **Group Classification.**

No	Test	Observation	Inferences

(iv) **Confirmative Test for Positive Radical.**

No	Test	Observation	Inferences

(v) **Confirmative Test for Negative Radical**

No	Test	Observation	Inferences

[E] **Result Table**

Positive Radical	
Negative Radical	

Teacher's Sign. and Date

Inorganic Qualitative Analysis (B.Sc.Semester-3)

Practical No. – 5

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl ₂		
7	W.E.(Yellow)+HCl +H ₂ S		
8	W.E.(Orange)+H ₂ S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iv) Confirmative Test for Positive Radical.

No	Test	Observation	Inferences

(v) Confirmative Test for Negative Radical

No	Test	Observation	Inferences

[E] Result Table

Positive Radical	
Negative Radical	

Teacher's Sign. and Date

Practical No. - 6

Date:.....

[A] Preliminary Test

No	Test	Observation	Inferences
1	State	Crystalline \ Amorphous	
2	Colour of Mixture		
3	Odour		

[B] Dry Test

(a) Dry Test for Positive Radical.

No	Test	Observation	Inferences
1	Heating in dry Test Tube		
2	Flame test		
3	Borex Bead Test		
4	Sub + NaOH Heat		
5	Acid extract test for (Fe⁺² and Fe⁺³)		

(b) Dry Test for Negative Radical.

No	Test	Observation	Inferences
1	Mix +dil. HCl		
2	Mix + Con.H ₂ SO ₄		
3	Mix + MnO ₂ + Con. H ₂ SO ₄		
4	Mix + Cu foil + Con. H ₂ SO ₄		

[C] Water Extract Test.

No	Test	Observation	Inferences
1	W.E. + Nessler's reagent		
2	W.E.+ Zinc Urenylacetate.		
3	W.E.+ Picric Acid		
4	W.E.+ FeSO ₄ (frees solution) + Con. H ₂ SO ₄		
5	W.E. + AgNO ₃		
6	W.E.+ BaCl₂		
7	W.E.(Yellow)+HCl +H₂S		
8	W.E.(Orange)+H₂S		

Result from the Dry Test and W.E. test.	
Positive Radical :	Negative Radical:

[D] Wet Test

(a) Wet Test for Positive Radical

(i) Preparation of Original Solution:

(ii) Group Separation for Positive Radical

No	Test	Observation	Inferences
1	O.S.+ dil HCl		
2	O.S.+ dil HCl + H ₂ S (g)		
3	O.S.+ NH ₄ Cl + NH ₄ OH		
4	O.S.+ NH ₄ Cl + NH ₄ OH + H ₂ S(g)		
5	O.S.+ NH ₄ Cl + NH ₄ OH + (NH ₄) ₂ CO ₃		
6	O.S.+ NH ₄ Cl + NH ₄ OH + NH ₄ H ₂ PO ₄		

(iii) _____ Group Classification.

No	Test	Observation	Inferences

(iii) _____ **Group Classification.**

No	Test	Observation	Inferences

(iv) **Confirmative Test for Positive Radical.**

No	Test	Observation	Inferences

(v) **Confirmative Test for Negative Radical**

No	Test	Observation	Inferences

[E] Result Table

Positive Radical	
Negative Radical	



Observation:

Distance travelled by the solvent from the origin line = _____ cm

Spot	Cations	Colour of Spot	Rf value
A	Ag		
B	Pb		
C (A+B)	Ag + Pb		

Calculation :

$$Rf = \frac{\text{Distance travelled by Cation solu. from origin line}}{\text{Distance travelled by Solvent from origin line}}$$

Analytical Chemistry Chromatographic Separation (B.Sc.Semester-3)

Practical No- 7

Date:.....

Aim: Paper Chromatographic separation of 1st group metal (Ag⁺¹ and Pb⁺²).

Requirement: Chromatography Paper, Jar, DW, Ag⁺¹ and Pb⁺² Salt solution.

Developing Solvent- DW

Locating Reagent; K₂CrO₄ and Ammonia solu.

Procedure:

Result:

1. Rf value of Ag = _____
2. Rf value of Pb= _____
3. Rf value of Ag = _____ and Pb= _____ in mixture

Signature of Teacher

Observation:

Distance travelled by the solvent from the origin line = _____ cm

Spot	Cations	Colour of Spot	Rf value
A	Co		
B	Ni		
C (A+B)	Co+Ni		

Calculation :

$$Rf = \frac{\text{Distance travelled by Cation solu. from origin line}}{\text{Distance travelled by Solvent from origin line}}$$

Analytical Chemistry Chromatographic Separation (B.Sc.Semester-3)

Practical No- 8

Date:.....

Aim: Paper Chromatographic separation of Co and Ni.

Requirement: Chromatography Paper, Jar, DW, CoCl₂ and NiCl₂ Salt solution.

Developing Solvent- Acetone +Ethyl acetate+6M HCl (45%+45%+10%).

Locating Reagent: alcoholic solution of alizarin with 0.1% of salicyldoxime and 0.1% of rubeanic acid.

Procedure:

Result:

1. R_f value of Co = _____
2. R_f value of Ni= _____
3. R_f value of Co = _____ and Ni = _____ in mixture

Signature of Teacher

EXPERIMENT NUMBER : 1 [CONDUCTOMETRIC TITRATION]

Observation Table :

No.	ml of 0.1 N NaOH solu. Form burette(V ml)	Conductivity (Mhos) C.
1	0.00	
2	0.25	
3	0.50	
4	0.75	
5	1.00	
6	1.25	
7	1.50	
8	1.75	
9	2.00	
10	2.25	
11	2.50	
12	2.75	
13	3.00	
14	3.25	
15	3.50	
16	3.75	
17	4.00	
18	4.25	
19	4.50	
20	4.75	
21	5.00	
22	5.25	
23	5.50	
24	5.75	
25	6.00	
26	6.25	
27	6.50	
28	6.75	
29	7.00	
30	7.25	

Graph : Draw the graph of Conductivity (C) against ml of 0.1 N NaOH.

From graph V_0 OR $V_2 =$ _____ ml volume of NaOH solution.

Calculation: $N_1V_1 = N_2V_2$
(Acid) = (NaOH)

N_1 = Normality of Acid = ?

N_2 = Normality of NaOH = 0.1 N

V_1 = Volume of acid solution = 20 ml

V_2 = Volume of NaOH = from graph = V_0

Date: _____

Aim: To determine the end-point and find out the normality of given x N HCL/CH₃COOH using 0.1 N NaOH by conductometric titration.

Requirements:

1. x N HCL/CH₃COOH (which is given in 100 ml. measuring flask)
2. 0.1 N NaOH

Procedure :**Results:**

1. The Normality of Given HCL / CH₃COOH Solution = _____ N
2. ml. of 0.1 N NaOH required for neutralizing 20 ml. acid V_2/V_0 = _____ ml (from graph)

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 2 [CONDUCTOMETRIC TITRATION]**Observation Table :**

No.	ml of 0.1 N NH ₄ OH sol. Form burette(V ml)	Conductivity (Mhos) C.
1	0.00	
2	0.25	
3	0.50	
4	0.75	
5	1.00	
6	1.25	
7	1.50	
8	1.75	
9	2.00	
10	2.25	
11	2.50	
12	2.75	
13	3.00	
14	3.25	
15	3.50	
16	3.75	
17	4.00	
18	4.25	
19	4.50	
20	4.75	
21	5.00	
22	5.25	
23	5.50	
24	5.75	
25	6.00	
26	6.25	
27	6.50	
28	6.75	
29	7.00	
30	7.25	

Graph : Draw the graph of Conductivity (C) against ml of 0.1 N NaOH.

From graph V₀ OR V₂ = _____ ml volume of NaOH solution.

Calculation: N₁V₁ = N₂V₂

(Acid) = (NH₄OH)

N₁ = Normality of HCL = ?

N₂ = Normality of NH₄OH = 0.1 N

V₁ = Volume of acid solution = 20 ml

V₂ = Volume of NH₄OH = from graph =V₀

Date: _____

Aim: To determine the end-point and find out the normality of given x N HCL using 0.1 N NH₄OH by conductometric titration.

Requirements:

1. x N HCL (which is given in 100 ml. measuring flask)
2. 0.1 N NH₄OH

Procedure :**Results:**

1. The Normality of Given HCL Solution = _____ N
2. ml. of 0.1 N NH₄OH required for neutralizing 20 ml. acid $V_2/V_0 =$ _____ ml (from graph)

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 3 [pH METRY TITRATION]

Observation Table :

No.	ml of 0.1 N NaOH solu. Form burette (V ml)	pH	Δ pH	Δ V	Δ pH / Δ V
1	0.00				
2	0.25				
3	0.50				
4	0.75				
5	1.00				
6	1.25				
7	1.50				
8	1.75				
9	2.00				
10	2.25				
11	2.50				
12	2.75				
13	3.00				
14	3.25				
15	3.50				
16	3.75				
17	4.00				
18	4.25				
19	4.50				
20	4.75				
21	5.00				
22	5.25				
23	5.50				
24	5.75				
25	6.00				
26	6.25				
27	6.50				
28	6.75				
29	7.00				
30	7.25				

Graph : 1. Draw the graph of pH against ml of 0.1 N NaOH.

2. Draw the graph of Δ pH / Δ V against ml of 0.1 N NaOH

From graph V_0 OR $V_2 =$ _____ ml volume of NaOH solution.

Calculation: $N_1V_1 = N_2V_2$
 (Acid) = (NaOH)

N_1 = Normality of Acid = ?

N_2 = Normality of NaOH = 0.1 N

V_1 = Volume of acid solution = 20 ml

V_2 = Volume of NaOH = from graph = V_0

Date: _____

Aim: To determine the Normality of given x N HCL using 0.1 N NaOH by pH metric titration.

Requirements:

1. x N HCL (which is given in 100 ml. measuring flask)
2. 0.1 N NaOH

Procedure :

Results:

1. The Normality of Given HCL Solution = _____ N
2. ml. of 0.1 N NaOH required for neutralizing 20 ml. acid $V_2/V_0 =$ _____ ml (from graph)

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 4 [pH METRY- Dissociation Constant]

Observation Table :

Flas k No.	V ml of 0.05 M CH ₃ COO H	V ml of 0.05 M CH ₃ COON a	p H	Molarity of [CH ₃ COONa) in mixture	Molarity of [CH ₃ COOH) in mixture	$\log \frac{[CH_3COONa]}{[CH_3COOH]}$
1	45 ml	05 ml				
2	35 ml	15 ml				
3	25 ml	25 ml				
4	15 ml	35 ml				
5	05 ml	45 ml				

Calculation: Calculation of [CH₃COOH] in flask no.1

$$N_1V_1 = N_2V_2$$

(Acid) = (Mixture)

Calculation of [CH₃COONa] in flask no.1

$$N_1V_1 = N_2V_2$$

(Acid) = (Mixture)

(From using above method Calculate all concentration of CH₃COOH and CH₃COONa in mixture)

Graph : Draw the graph of pH against $\log \frac{[CH_3COONa]}{[CH_3COOH]}$

From the graph (intercept of graph) pKa

= _____

Calculation of Dissociation Constant of CH₃COOH :

$$pKa = -\log Ka$$

$$Ka = \text{anti log}(-pKa)$$

$$Ka = \text{anti log}(\underline{\hspace{10em}})$$

$$Ka = \underline{\hspace{10em}}$$

EXPERIMENT NUMBER : 4 [pH METRY- Dissociation Constant]

Date: _____

Aim: To determine the Dissociation constant of monobasic acid using various mixtures of CH₃COOH and CH₃COONa by pH metry method.

Requirements:

1. 0.05 M CH₃COOH
2. 0.05 M CH₃COONa
3. 4 pH buffer solution.

Procedure :

Results:

1. The Dissociation constant of CH₃COOH (K_a) = _____

Signeture and Date of Teacher: _____

EXPERIMENT NUMBER : 5 [Refractometry]

Observation :

1. Wt. of Specific gravity bottle = (W_0) = _____ gm
2. Wt. of Specific gravity bottle + Water = (W_w) = _____ gm
3. Wt. of Specific gravity bottle + Liquid A = (W_A) = _____ gm
4. Wt. of Specific gravity bottle + Liquid B = (W_B) = _____ gm
5. Wt. of Specific gravity bottle + Liquid C = (W_C) = _____ gm
6. Net Wt. of Water = ($W_w - W_0$) = _____ gm
7. Net Wt. of Liquid A = ($W_A - W_0$) = _____ gm
8. Net Wt. of Liquid B = ($W_B - W_0$) = _____ gm
9. Net Wt. of Liquid C = ($W_C - W_0$) = _____ gm
10. Density of Water at Room Temp. = _____ $^{\circ}\text{C}$ = (d_w) = _____ gm/cm³

Calculation of Density for Liquid A and B and C using following equation.

$$d_A = \frac{W_A}{W_w} \times d_w$$

$$d_B = \frac{W_B}{W_w} \times d_w$$

$$d_C = \frac{W_C}{W_w} \times d_w$$

Observation Table :

Liquids	Density (d)	Refractive Index (n)	Sp. Refraction (R)	Molar Refraction (R _m)
A				
B				
C(A+B)				

Calculation: Calculation of % composition of Liquid A and Liquid B in Liquid C (A+B)

$$\% \text{ of Liquid A in Mixture C} = x = \frac{R_c - R_b}{R_a - R_b}$$

$$\% \text{ of Liquid B in Mixture C} = 100 - X = \underline{\hspace{2cm}}$$

EXPERIMENT NUMBER : 5 [Refractometry]

Date: _____

Aim: To determine the Specific and Molar refraction of the given liquid A,B and C and Calculate % composition of A and B in Mixture C.

Requirements:

Abbe's Refractometer, Sp. gravity bottle, Liquid for practical.

Procedure :

Results:

% of Liquid A = _____ and B = _____ in Mixture C.

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 6 [Chemical Kinetics / Clock Reaction.]

Preparation of solution :

Solution A = 25 ml 3% H₂O₂ + 25 ml 2.5 M H₂SO₄ + 10 ml Starch + 190 ml Water. (Total vol. 250 ml)

Solution B₁ = 10 ml 0.04 M Na₂S₂O₃ + **10 ml** 0.1 M KI + **80 ml** Water. (Total vol. 100 ml)

Solution B₂ = 10 ml 0.04 M Na₂S₂O₃ + **20 ml** 0.1 M KI + **70 ml** Water. (Total vol. 100 ml)

Solution B₃ = 10 ml 0.04 M Na₂S₂O₃ + **30 ml** 0.1 M KI + **60 ml** Water. (Total vol. 100 ml)

Solution B₄ = 10 ml 0.04 M Na₂S₂O₃ + **40 ml** 0.1 M KI + **50 ml** Water. (Total vol. 100 ml)

Solution B₅ = 10 ml 0.04 M Na₂S₂O₃ + **50 ml** 0.1 M KI + **40 ml** Water. (Total vol. 100 ml)

Observation Table :

Set No.	ml. from Sol. A	ml. from Sol. B					Reaction time (Sec.)				$\frac{1}{t} \text{ sec}^{-1}$	Morality of [I ⁻]
		B ₁	B ₂	B ₃	B ₄	B ₅	t ₁	t ₂	t ₃	Average t		
1	25	25										0.005
2	25		25									
3	25			25								
4	25				25							
5	25					25						

Calculation: Calculation of Morality [I⁻]

(1) In B₁ solution ; $N_1V_1 = N_2V_2 \Rightarrow N_1 \times 100 = 0.1 \times 10 \Rightarrow N_1 = 0.01N$

In Mixture of Set No. 1. ; $N_1V_1 = N_2V_2 \Rightarrow N_1 \times 50 = 0.01 \times 25 \Rightarrow N_1 = 0.005N$

(2) In B₂ solution ;

In Mixture of Set No. 2. ;

(3) In B₃ solution ;

In Mixture of Set No. 3. ;

(4) In B₄ solution ;

In Mixture of Set No. 4. ;

(5) In B₅ solution ;

In Mixture of Set No. 5. ;

Graph : Draw the graph of $\frac{1}{t} \text{ sec}^{-1}$ against Morality [I⁻]

If graph is straight line **order of reaction** is **first order** reaction.

EXPERIMENT NUMBER : 6 [Chemical Kinetics / Clock Reaction.]

Date: _____

Aim: To Study kinetic reaction of decomposition of H₂O₂ catalyzed by iodide ion.

Requirements: H₂O₂ ; 2.5 M H₂SO₄ ; Starch; Water; 0.04 M Na₂S₂O₃; 0.1 M KI;

Procedure :

Results: (from the graph)

Order of reaction is _____

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 7 [Solubility.]

Observation :

Weight of empty titration flask : (W₁) _____ gm

Observation Table :

Ob. No.	Temp. (°C)	Wt. Of flask (W ₂) gm	Wt. of Solu. (W ₂ -W ₁)	Vol. of 0.05N NaOH (V ml)	Wt. of acid (gm)	Solubility (S)
1	t ₁ =					
2	t ₂ =					

Calculation:

(1) Weight of Acid $A_1 = \frac{0.05 \times M.W. \times V \cdot ml}{1000} =$

Weight of Acid A₂=

(2) Solubility of Acid S

For t₁=_____ °C temp. $S_1 = \frac{A \times 1000}{(B - A) \times M.W.}$ moles/1000gm

For t₂=_____ °C temp. $S_2 = \frac{A \times 1000}{(B - A) \times M.W.}$ moles/1000gm

(3) Heat of Solution

$$\Delta H = \frac{\log\left(\frac{S_2}{S_1}\right) \times 2.303 \times R \times T_1 \times T_2}{(T_2 - T_1)} \text{ J/mole};$$

where, R= 8.314 J mole⁻¹

T₁=t₁+273 = _____

T₂=t₂+273 = _____

Date: _____

Aim: To determine the solubility of organic acid at different temperatures and to determine Heat of solution of the dissolution process.

Requirements: Small and big beaker ; Thermometer, Organic acid

Procedure :

Results:

Solubility of acid at $t_1 =$ _____ $^{\circ}\text{C} = S_1 =$ _____

Solubility of acid at $t_2 =$ _____ $^{\circ}\text{C} = S_2 =$ _____

Heat of Dissolution = _____

Signature and Date of Teacher: _____

EXPERIMENT NUMBER : 8 [Viscosity]

Observation :

1. Wt. of Specific gravity bottle = (W_0) = _____ gm
2. Wt. of Specific gravity bottle + Water = (W_w) = _____ gm
3. Wt. of Specific gravity bottle + Mixture A = (W_A) = _____ gm
4. Wt. of Specific gravity bottle + Mixture B = (W_B) = _____ gm
5. Wt. of Specific gravity bottle + Mixture C = (W_C) = _____ gm
6. Wt. of Specific gravity bottle + Mixture D = (W_D) = _____ gm
7. Wt. of Specific gravity bottle + Mixture E = (W_E) = _____ gm
8. Net Wt. of Water = ($W_w - W_0$) = _____ gm
9. Net Wt. of Mixture A = ($W_A - W_0$) = _____ gm
10. Net Wt. of Mixture B = ($W_B - W_0$) = _____ gm
11. Net Wt. of Mixture C = ($W_C - W_0$) = _____ gm
12. Net Wt. of Mixture D = ($W_D - W_0$) = _____ gm
13. Net Wt. of Mixture E = ($W_E - W_0$) = _____ gm
14. Density of Water at Room Temp. = _____ $^{\circ}\text{C}$ = (d_w) = _____ gm/cm³
15. Flow time of water at Room Temp. (t_w) = _____ sec.
16. (d_w) \times (t_w) = _____

Calculation of Density for Mixture A,B,C,D and Unknown mixture E using following equation.

$$d_A = \frac{W_A}{W_w} \times d_w =$$

$$d_B = \frac{W_B}{W_w} \times d_w =$$

$$d_C = \frac{W_C}{W_w} \times d_w =$$

$$d_D = \frac{W_D}{W_w} \times d_w =$$

$$d_E = \frac{W_E}{W_w} \times d_w =$$

EXPERIMENT NUMBER : 8 [Viscosity]

Date: _____

Aim: To determine the Viscosity of a different mixture of Liquid 1 and liquid 2 and determine the % composition of given unknown mixture by graphical method.

Requirements:

Viscometer, Stop-watch, Liquid mixtures.

Procedure :

Results: (from the graph)

% of Liquid 1 = _____ and Liquid 2 = _____ in Unknown Mixture E.

Signature and Date of Teacher: _____

Observation Table :

Mixture Number	Mixture Composition		Time of Flaw in Sec. (t)				Density (d)	(d × t)	Relative Viscosity (η)
	Liquide 1	Liquide 2	i	ii	iii	Mean(t)			
A	20%	80%							
B	40%	60%							
C	60%	40%							
D	80%	20%							
E	Unknown composition								

Calculation: Calculation of Relative viscosity using equation.
$$\eta = \frac{d \times t}{d_w \times t_w}$$

Graph : Draw the graph of Viscosity against % Composition of Mixture 1 OR 2.

Calculation of % composition of Liquid 1 and Liquid 2 in Liquids Mixture E from the graph.