R. K. GROUP OF COLLEGE

BEHIND KALWAR POLICE STATION, KALWAR, JAIPUR (RAJ.)

CERTIFICATE

Name : Tanu Sain *Class :* Bsc IIIrd sem.

Roll No.: *Exam No.:*

*Institution*____

*This is certified to be the bonafide work of the student in the*____________________ ____*Laboratory during the academic year 20 /20*

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Principal

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10.	To identify two functional groups (one solid and one liquid) in given organic compound also find M.P/ B.P and suitable derivatives				
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12.	To find out distribution cofficient iodine in water and organic chloride carbon monoxide or chloroform, carbon disulphide.				

Experiment - 1

Object :- Nickel dimethylglyoxine complexes
[Ni (DMG)$_2$]

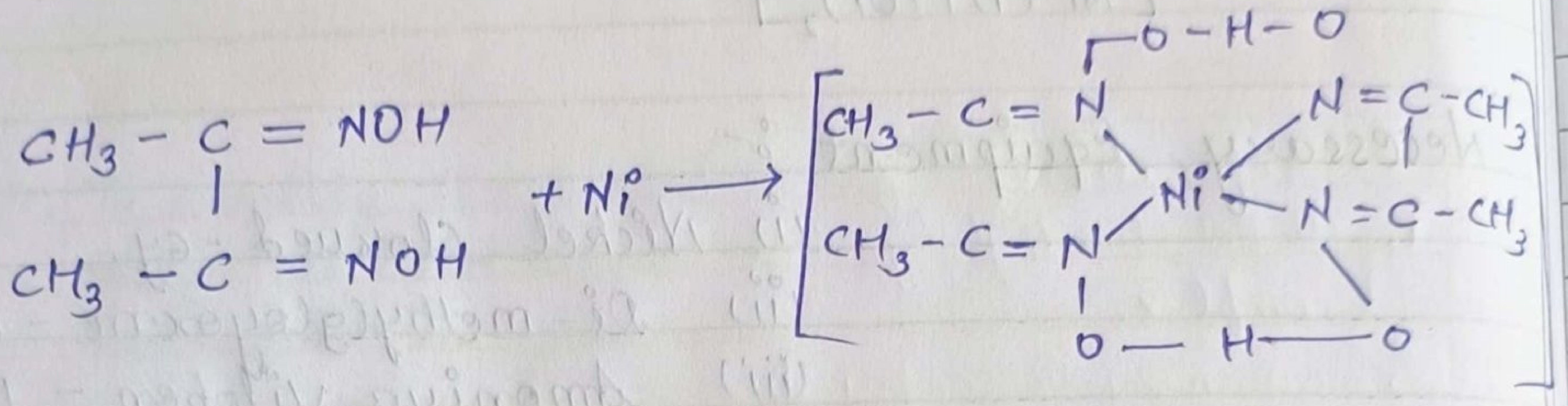
Necessary Equipment :-
(i) Nickel clorued - 6g.
(ii) Di-methylgloyoxne - 10%
(iii) Amoniya vilopen - 1 : 1

Equipments :- Breaker, watch glass, test tube, Burner, stirrer.

Method :-

One 400 mil. Beaker given nikal sulphate 6 gm Heat at 72 - 80°C and this Solution put in 42-50 miht. Demethylgloyoxine. after this S in solution 1:1 ammoniyum solution drop by drop in watch stress.

In Beaker the water heat at 20-30° the down droped read clour seem Di-methylgloy oxlek reagent mixed and testit. that the solution is complet or not. Beaker put for half-hours. This is seperated by funnel and this is wased could - water two three time and in the solution of wased 5 milehitoninl. alcohol. And dried . it.



$2H_2DMG + Ni^{+2} \longrightarrow Ni(DMG)_2 + 2H^+$

Result :-

Above method Ni (DMG) prod used Read Colour solution.

Grained :-

3-4 gm

Precaution :- Beaker should be clean and ~~dri~~ dired.

Beaker heat with the help of water reagent.

Experiment-2

Object :-

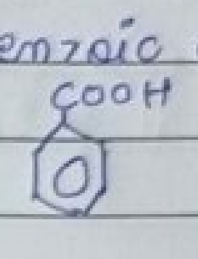
In the given organic compound identify one solid and one liquid functional, there B.P / M.P and its suitable derivative.

Test for solid Compound (A)

Primary Test - (i) Physical state - Solid
(ii) Colour - White
(iii) Odour - Bad odour
(iv) Solubility - Soluble in boiling water

Observation table :-

S.No.	Test	Observation	Result
1.	Flame Test - Take compound on Spatula & heat on burner	Burns with black flames	Compound is aromatic
2.	Litmus Test - Dip blue litmus paper in Sol^n of compounds	litmus paper turns red	Compound is acidic.
3.	Element test - L.S + freshly prepared $FeSO_4$ Sol^n + conc^n H_2SO_4	No Colour or ppt obtained	Nitrogen is absent.
4.	Functional group test Compound + neutral $FeCl_3$ Sol^n	PPt obtained	Carboxylic group present.

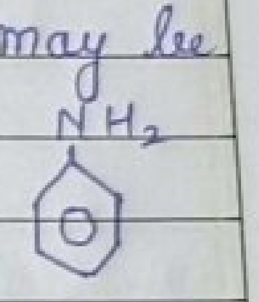
5.	H.P of compound H.P of given compound	≈ 121°C	Compound may be benzoic acid 
6.	Confirmatory Test		
i)	Compound + NH_4OH Sol^n + neutral $feCl_3$ Sol^n	ppt obtained	benzoic acid present.
ii)	Compound + conc. H_2SO_4 + alcohol + Δ	fruity smell obtained	benzoic acid present.

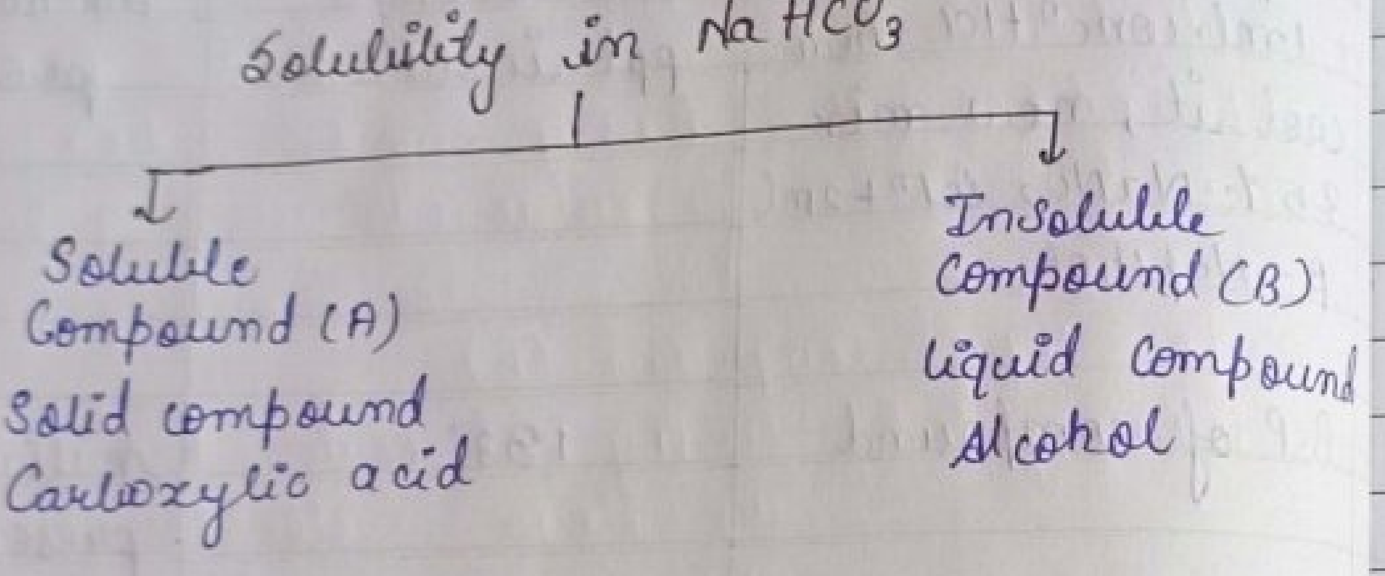
Test for liquid Compound. (B) -

Primary test - (i) Physical state - fluid
(ii) Colour - Colourless
(iii) Smell - Specific smell
(iv) solution - Soluble in water.

Observation Table

S.No	Test	observation	Result
1.	flame Test - Take compound on spatula & burn on burner	Burn without black flames	Compound is aromatic.
2.	Litmus test - Dip red litmus paper in solution of compound.	Litmus paper turns blue.	Compound is basic.

3.	Element test - L.S. + $FeSO_4$ Sol^n freshly prepared + conc^n H_2SO_4	Green ppt obtained	Nitrogen is present
4.	functional group test Compound + 2ml H_2O + 1ml. conc^n HCl then cool it, now mix 3-5% $NaNO_2$ Sol^n + 2ml β - Napthol	Red - orange ppt is obtained	Amino group present.
5.	B.P of compound	183° C	Aniline may be present 
6.	Confirmatory Test		
i)	2 drop compound + ether + 10ml H_2O + 1ml. Sol^n	purple Colour obtained	Aniline confirm
(ii)	Compound + $K_2Cr_2O_7$ + conc^n H_2SO_4	Blue or black Colour Sol^n	Aniline confirm
(iii)	dilute Sol^n of compound + Solid $NaNO_2$ + basic β - Naphthol Solution	Red dye obtained	Aniline is present.



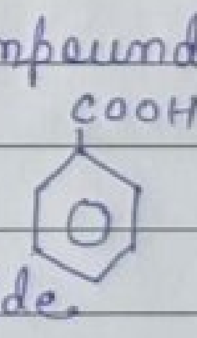
formation of derivative :-

Solid Compound (A) - Take 0.5 gram carbon compound in a flask, then add 2 ml. Thionyl chloride ($SOCl_2$) & heat for 20-30 minutes which leads to formation of acid chloride.

Now on adding 10 ml. concentrate ammonia solution drop by drop, there will be vigarous reaction. Now cool the mixture in ice, On cooling, white crystal of amide are obtained.

Liquid Compound (B) -

Take 1 gram aniline in a conical flask, add 10-15 ml - acetic acid and make it a solution. Now add bromine solution drop by drop till yellow colour obtained. Now heat it. Now slowly pour this solution in 50-100 ml water, to get seprate bromo derivative.

Result :- In the carbon compound solid compound (A) is benzoic acid  whose M.P = 121°C

and its derivatives is amide.

Liquid Compound (B) → Aniline ($C_6H_5NH_2$)
B.P = 183°C
Derivative = 2, 4, 6, tribromo aniline

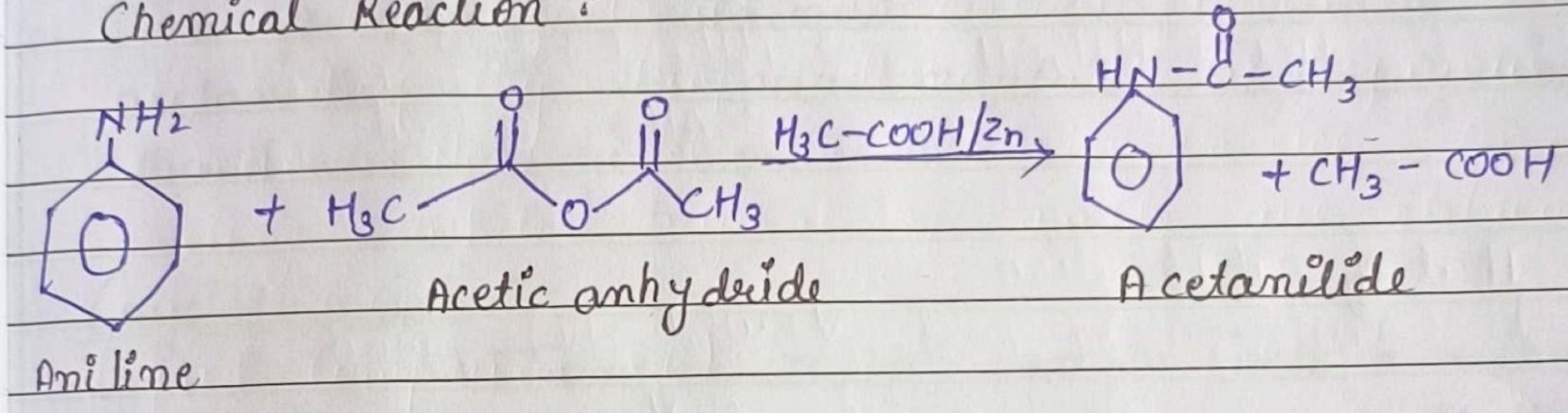
Experiment - 3

Object :- Synthesis of acetanilide from aniline.

Theory :-

Acetanilide is prepared from aniline when it reacts with acetic anhydride / glacial acetic acid in the presence of zinc dust.

Chemical Reaction :-



Material required :-

Aniline, Glacial acetic acid, acetic anhydride, zinc dust, distilled water, flask, beaker, pipette, reflux condenser, funnel, stirrer, burner, filter paper, Electronic balance.

Procedure :-

1. Wash all apparatus with distilled water before starting experiment.

2. Take flask and add 10 ml of aniline 20 ml of acetic anhydride, glacial acetic and mixture and zinc dust.
3. fix reflux condenser with flask & heat mixture gently for about 15-20 minutes in oil bath.

4. Pour hot mixture in beaker containing ice cold water with constant stirring & stir the mixture vigorously to hydrolose excess of acetic anhydride.

5. Once all acetanilide is precipitated collect & filter in funnel.
6. The precipitate obtained is crude sample of acetanilide. To get pure crystals, crystalization should be carried out.

Crystallization :-
Transfer crude sample into a beaker containing 20 ml water and heat gently. If the solution is coloured then add a small amount of activated carbon. filter the hot solution with a funnel. cool the mixture for 30 minute so that white shiny crystals of acetonilide separate out. filter off the crystals, wash them with water and dry in the folds of filter paper.

Result :- white shinning crystal of ~~aniline~~ acetanilide are obtain.

Yield of Acetanilide = 12 gm
Shape of crystals = Plate shaped.
melting point = 114°c
Colour of crystals = Colourless crystal

$$HCl + NH_4OH \longrightarrow NH_4Cl + H_2O$$
$$\Delta H = -Q \text{ k cal}$$

Heat of nutrilisation $= \dfrac{V+w(T_5-T_4)}{N_1V_1} \times 1000$

where

w = equivalent weight of water
V = Volume of mixture of acid & base
T_4 = temperature of acid & base.
T_5 = final temperature of mixture.
V_1 = Volume of acid
N_1 = Normality of acid.

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Object :-
To determine heat of neutralization of strong acid (HCl) and weak base (NH_4OH)

Principle :- Heat released in neutrilization of 1 gram equivalent of strong acid and 1 gram equivalent of weak base is called heat of neutrisation. Takes place in two steps:-

i) In the first step ionisation of weak acid takes place.
ii) In second stem combination of H^+ & OH^- gives H_2O. i.e. some amount of heat is absorbed during ionisation lowering value of heat of neutrilization 13.7 kcal.

Heat of nutrilisation
$$= \frac{V+w(T_5-T_4)}{N_1V_1} \times 1000$$

where

w = equivalent weight of water
V = Volume of mixture of acid & base
T_4 = temperature of acid & base
T_5 = final temperature of mixture
V_1 = Volume of acid
N_1 = Normality of acid

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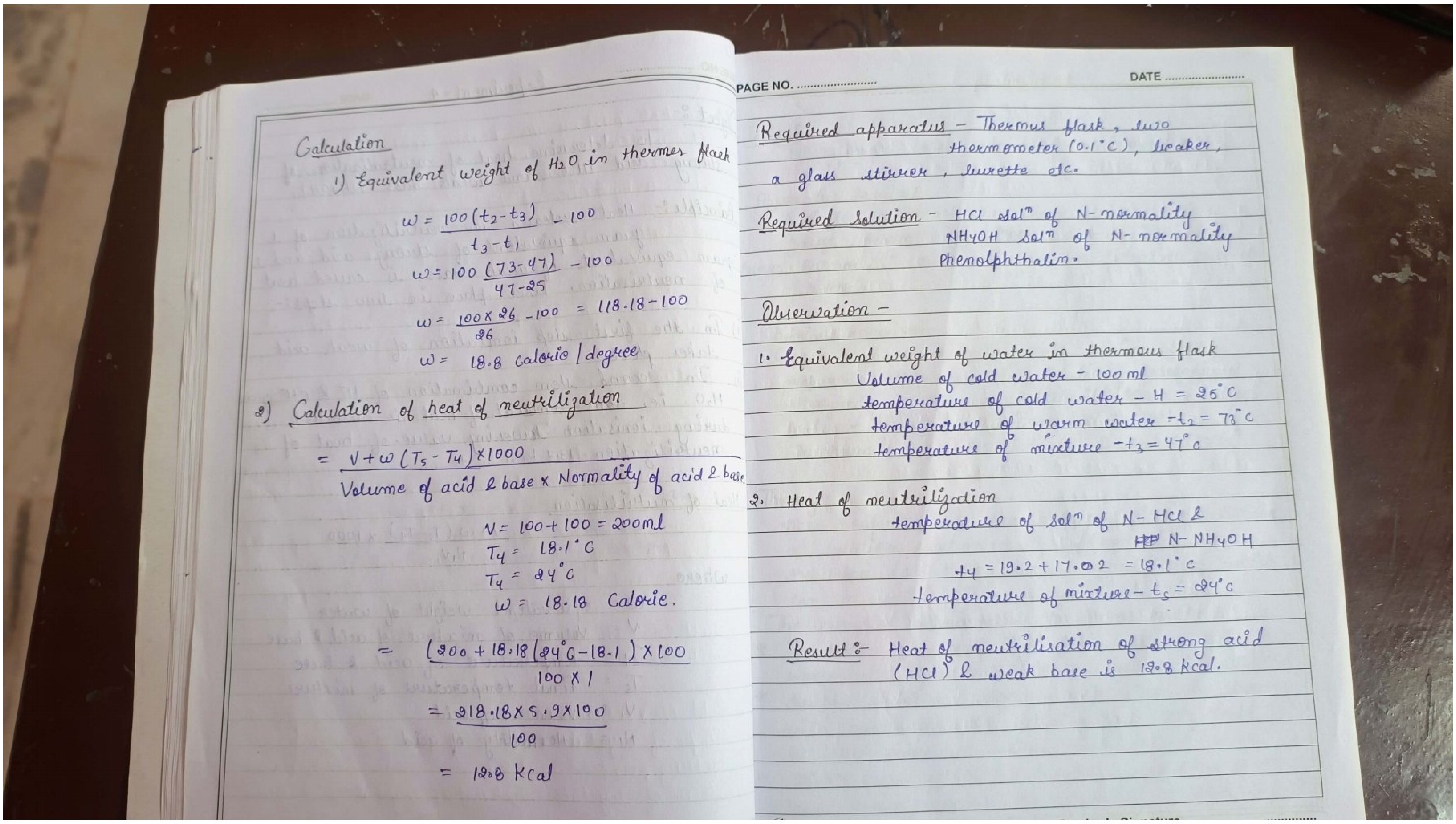

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Calculation

1) Equivalent weight of H_2O in thermes flask

$$w = \frac{100(t_2 - t_3)}{t_3 - t_1} - 100$$

$$w = 100\frac{(73-47)}{47-25} - 100$$

$$w = \frac{100 \times 26}{26} - 100 = 118.18 - 100$$

$$w = 18.8 \text{ calorie / degree}$$

2) Calculation of heat of neutrilization

$$= \frac{V + w(T_5 - T_4) \times 1000}{\text{Volume of acid \& base} \times \text{Normality of acid \& base}}$$

$V = 100 + 100 = 200ml$

$T_4 = 18.1°C$

$T_4 = 24°C$

$w = 18.18$ Calorie.

$$= \frac{(200 + 18.18(24°C - 18.1) \times 100}{100 \times 1}$$

$$= \frac{218.18 \times 5.9 \times 100}{100}$$

$= 12.8$ Kcal

Required apparatus - Thermus flask, two thermometer (0.1°C), beaker, a glass stirrer, burette etc.

Required Solution - HCl solⁿ of N-normality
NH₄OH solⁿ of N-normality
Phenolphthalin.

Observation -

1. Equivalent weight of water in thermous flask
Volume of cold water - 100 ml
temperature of cold water - H = 25°C
temperature of warm water - t_2 = 73°C
temperature of mixture - t_3 = 47°C

2. Heat of neutrilization
temperature of solⁿ of N-HCl &
~~HP~~ N-NH_4OH
$t_4 = 19.2 + 17.02 = 18.1°C$
temperature of mixture - t_5 = 24°C

Result :- Heat of neutrilisation of strong acid (HCl) & weak base is 12.8 kcal.

Experiment - 5

Aim :-

To estimate copper as CuSCN gravimetrically

Apparatus Required

Desicates, sintered glass crumble (G4), wire gauze, ~~Reakert~~ Beaker (400ml), ~~black~~ Watch glass, Bunser Burner, Triped stand, Vaccum filtration, apparatus, Stirrer.

Chemical Required

Copper sulphate ~~ph~~pentahydrate solution, freshly prepared sulpharous acid solution, Ammonium thiocynate solution, wash liquid (200 cc distilled water + Ammonium thiocynate (24, 10%) + Sulphurous acid (10.15 drops) & Alcohol (20%)

Theory

When cupric ions are treated with NH_4SCN in a solution containing H_2SO_3 (reducing agent) the copper (I) thiocymate is precipitated which can be weighed after drying at 110°C

The essential experimental conditions are :-

* The presence of reducing agent such as H_2SO_3 or Ammonium hydrogen sulphate to reduce Cu(II) to Cu(I)
* Solution should be slighty acidic since in strong acidic medium CuSCN ppt dissolves HNO_3 should not be used since it oxidise Cu(I) to Cu(II)
* Slight excess of NH_4SCN should be added since the large excess increases the Solubility of copper due to the

Chemical Reactions

$2Cu^{2+} + HSO_3^- + H_2O \longrightarrow 2Cu^+ + HSO_4^- + 2H^+$

$Cu^+ + SCN^- \longrightarrow CuSCN \downarrow$
(white ppt)

Observation table

Mass of empty G4 crucible

$m_1 = 22.6370\,g$
$m_2 = 22.4192\,g$
$m_3 = 22.4188\,g$

since $m_2 - m_3 = 0.0004\,g$
consorut mass of empty G4 varialeb = 22.4188 g

mass of G4 critical with precupdar

$m_1 = 23.0177\,g$
$m_2 = 22.6841\,g$
$m_3 = 22.6837\,g$
solve $m_2 - m_3 = 0.0004\,g$
∴ concom mass of G4 cructile with precipitate = 22.6837 g

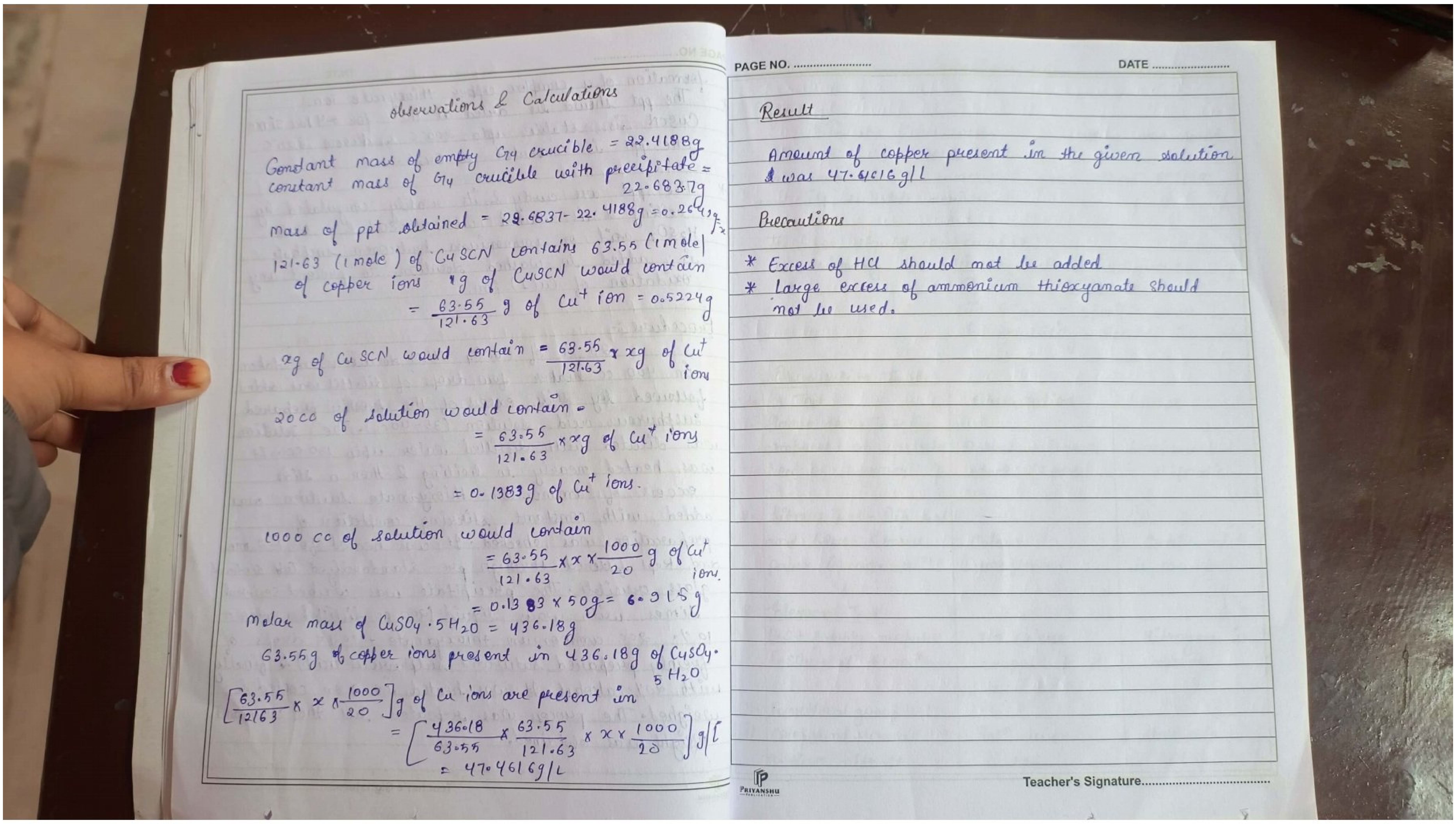
formation of a complex copper thioxyrate ion.

* The ppt should be dried at 110°C for 2-4 hrs since CuSCN is stable upto 200°C. Above 300°C the ppt is converted to Cu_2S.

* The ppt are curdy & its readily congulated by boiling & is washed with NH_4SCN & a little H_2SO_3 acid or ammonium hydrogen sulphate is added to washed solution to present any oxidation of Cu(I) ion.

Procedure :-

20 cc of $CuSO_4\ 5H_2O$ solution was taken in 400 cc beaker few drops of dil. HCl was added followed by slide excess of the freshly prepared sulphurous acid solution (35-40 cc). The solution was diluted with distilled water upto 150 cc. It was heated nearly to boiling & then a slide excess of ammonium thioxyanate solution was added with constant stirring completion of preparation was checked. It was heated for 1-2 min and kept filtered through pre-standardized G4 sintered glass crucible. The precipitate was washed several times with wash liquid (200 cc distilled water + 10%. 2cc ammonium thioxyanate + 10.15 drops of freshly prepared saturated sulphurous acid) & finally with 20% alcohol. It was heated in oven, cooled & weighed. The process was repeated till the constant weight was obtained.



Observations & Calculations

Constant mass of empty G_4 crucible = 22.4188g

Constant mass of G_4 crucible with precipitate = 22.6837g

mass of ppt obtained = 22.6837 - 22.4188g = 0.2649g

121.63 (1 mole) of CuSCN contains 63.55 (1 mole) of copper ions 1g of CuSCN would contain

$= \frac{63.55}{121.63}$ g of Cu^+ ion = 0.5224g

xg of CuSCN would contain $= \frac{63.55}{121.63} \times xg$ of Cu^+ ions

20cc of solution would contain -

$= \frac{63.55}{121.63} \times xg$ of Cu^+ ions

= 0.1383g of Cu^+ ions.

1000 cc of solution would contain

$= \frac{63.55}{121.63} \times x \times \frac{1000}{20}$ g of Cu^+ ions.

= 0.1383 × 50g = 6.915g

Molar mass of $CuSO_4 \cdot 5H_2O$ = 436.18g

63.55g of copper ions present in 436.18g of $CuSO_4 \cdot 5H_2O$

$\left[\frac{63.55}{121.63} \times x \times \frac{1000}{20}\right]$ g of Cu ions are present in

$= \left[\frac{436.18}{63.55} \times \frac{63.55}{121.63} \times x \times \frac{1000}{20}\right]$ g/l

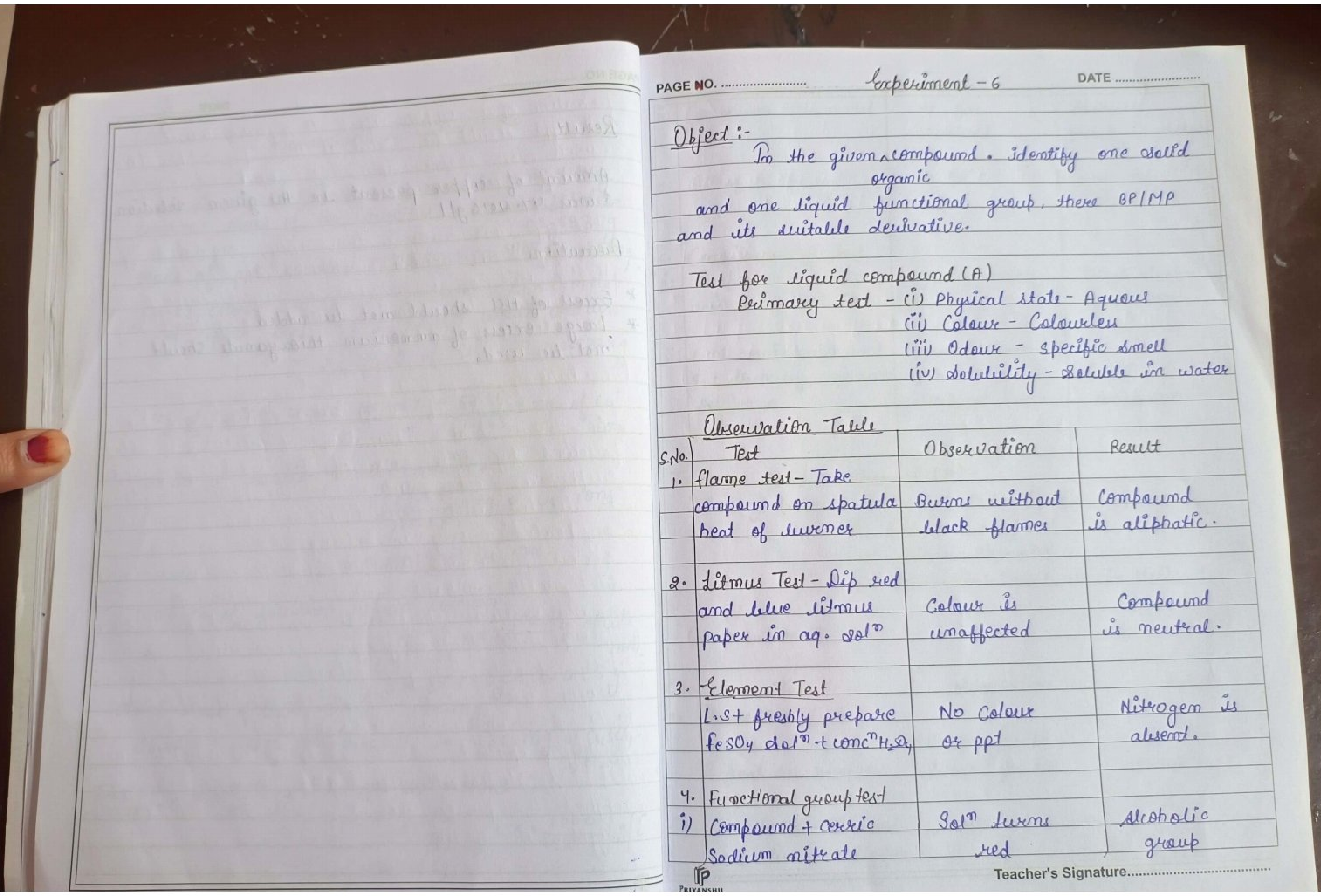
= 47.4616g/L

Result

Amount of copper present in the given solution was 47.4616 g/l

Precautions

* Excess of HCl should not be added
* Large excess of ammonium thiocyanate should not be used.



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Object :-

In the given organic compound. identify one solid and one liquid functional group, there BP/MP and its suitable derivative.

Test for liquid compound (A)

Primary test - (i) Physical state - Aqueous
(ii) Colour - Colourless
(iii) Odour - specific smell
(iv) solubility - Soluble in water

Observation Table

S.No.	Test	Observation	Result
1.	flame test - Take compound on spatula heat of burner	Burns without black flames	Compound is aliphatic.
2.	Litmus Test - Dip red and blue litmus paper in aq. sol^n	Colour is unaffected	Compound is neutral.
3.	Element Test L.S + freshly prepare FeSO$_4$ sol^n + conc^n H_2SO_4	No Colour or ppt	Nitrogen is absent.
4. i)	Functional group test Compound + ceric Sodium nitrate	Sol^n turns red	Alcoholic group

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ii)	Compound + Na metal	H_2 gas evolved	Alcoholic group is present
5.	B.P of compound	≈ 78°C	May be C_2H_5OH
6. i)	Confirmatory test compound + acidic acid + concⁿ H_2SO_4	fruity smell	Ethyl alcohol is present.
(ii)	1 ml compound + 2 ml I_2 + drop by drop NaOH solⁿ + Δ	Brown colour of I_2 disappear yellow ppt from	C_2H_5OH is confirmed.

Test for solid compound (B) -

Primary test - (i) Physical test - Solid
(ii) Colour - Purple
(iii) Odour - Phenolic
(iv) Solubility - Insoluble in H_2O

Observation Table

S.No.	Test	Observation	Result
1.	Flame Test - Take compound on spatula & heat on burner	Burns with black flames	compound is aromatic.
2.	Litmus Test - Dip red and blue litmus paper in Solⁿ	litmus paper turns red.	compound is acidic

3. Element test- L.S + freshly solⁿ of $FeSO_4$ + concⁿ. H_2SO_4	No colour or ppt	Nitrogen is absent.
1. functional group ~~present~~ test compound + neutral $FeCl_3$ solⁿ	Purple colour solⁿ	phenol group present.
5. M.P for compound	≈ 94°c	Compound may be napthol.
6. Confirmatory test i) Compound + H_2O + $FeCl_3$ solⁿ	white ppt	2-napthol present.
) 2 gm compound + 2 ml NaOH solⁿ + 2 drop $CHCl_3$ + Δ	Blue colour solⁿ	2-napthol present.

Formation of Derivative :-

Liquid Compound (A) :- In small beaker compound + 3,5-dinitro. benzoyal. Chloride + Δ + $NaHCO_3$ then cool, it, we obtain 3,5 - dinitrobenzoate derivative obtained.

Solid compound (B) -

In a test tube take 0·2gm compound + 1ml benzene sol^n + 2ml picric acid, then stir it, yellow solid is of picrate.

<u>Result</u> :-

In the given organic compound liquid component (A) - C_2H_5OH

B.P = 78°C

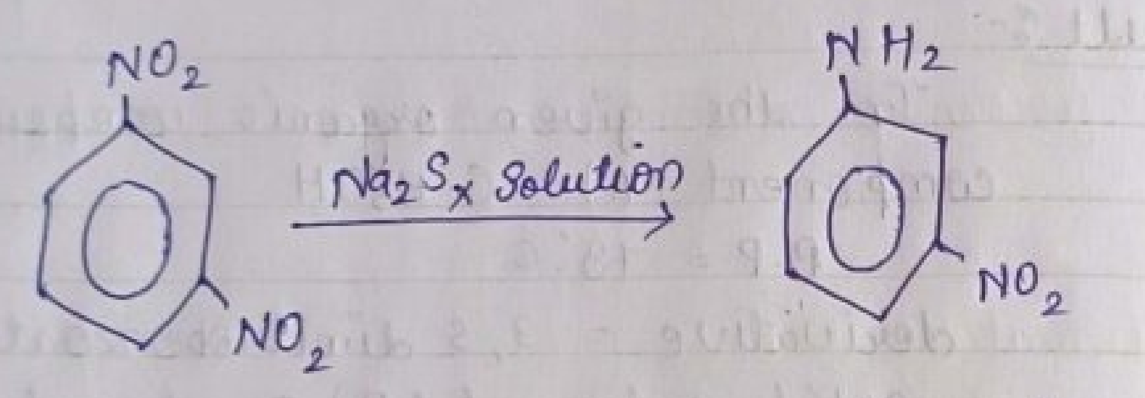
derivative = 3,5 dinitrobenzoate

Solid component (B) - phenol

M.P B.P = 94°c

derivative - picrate.

Reaction –



m-dinitrobenzene m-dinitroaniline

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Experiment-7

Object :- Synthesis of meta-nitro aniline from meta dinitrobenzene.

Reagents required :-

(i) m-dinitrobenzene = 5gm
(ii) Sodium Sulphide = 8gm
(iii) Sulphur powder = 2gm
(iv) ice (v) Jantav Kaumla.

Equipment : Two beakers, dropping funnel.

Method –

Sodium sulphide and 8gm of sulphur powder are dissolved in 30ml water in a beaker. It is 2gm of heated slowly till a solution of sulphur is obtained. This water sulphide solution is taken in a dropping funnel. In another beaker, 5gm of m-dihydrobenzene and 50ml of lazal are heated on a sand heater and boiled. In this solution polysulphide solⁿ is added slowly through a dropping funnel by continuously stirring it rapidly. This mixture is boiled for about half an hour. Thereafter, the mixture is quickly filtered through a sieved funnel and the sieved mixture is cooled in ice. Yellow crystals of metanitroaniline are formed. After dissolving the crystals in sufficient quantity of hot water, a small animal is used to remove the crystals.

Add komla and boil the mixture ~~Result.~~

Result :-

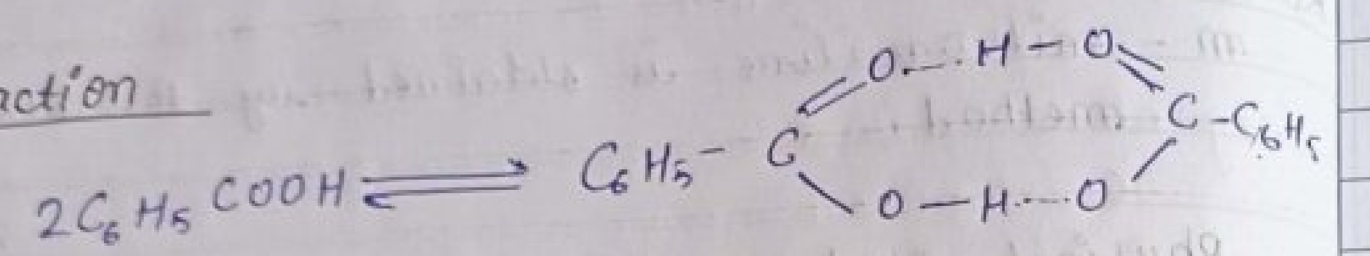
m - nitroaniline is obtained by the above method.

Physical State - Yellow coloured shiny crystals

Yield - 2.5 gm

Melting point - 114°C

Reaction


$2C_6H_5COOH \rightleftharpoons C_6H_5-C$ (O…H–O)(O–H…O) $C-C_6H_5$

or

$$2C_6H_5COOH \rightleftharpoons (C_6H_5COOH)_2$$

$$k = \frac{C_{H_2O}}{\sqrt{C_{C_6H_6}}}$$

Experiment - 8

Object:- To study the distribution of benzoic acid between benzene and water.

Equipment - Beaker, Burette stand, reagent bottle, seperating funnel, Pipette.

Chemical - Benzoric acid, benzene,
phenolphthalene, NaOH
Distilled water

Theory:-

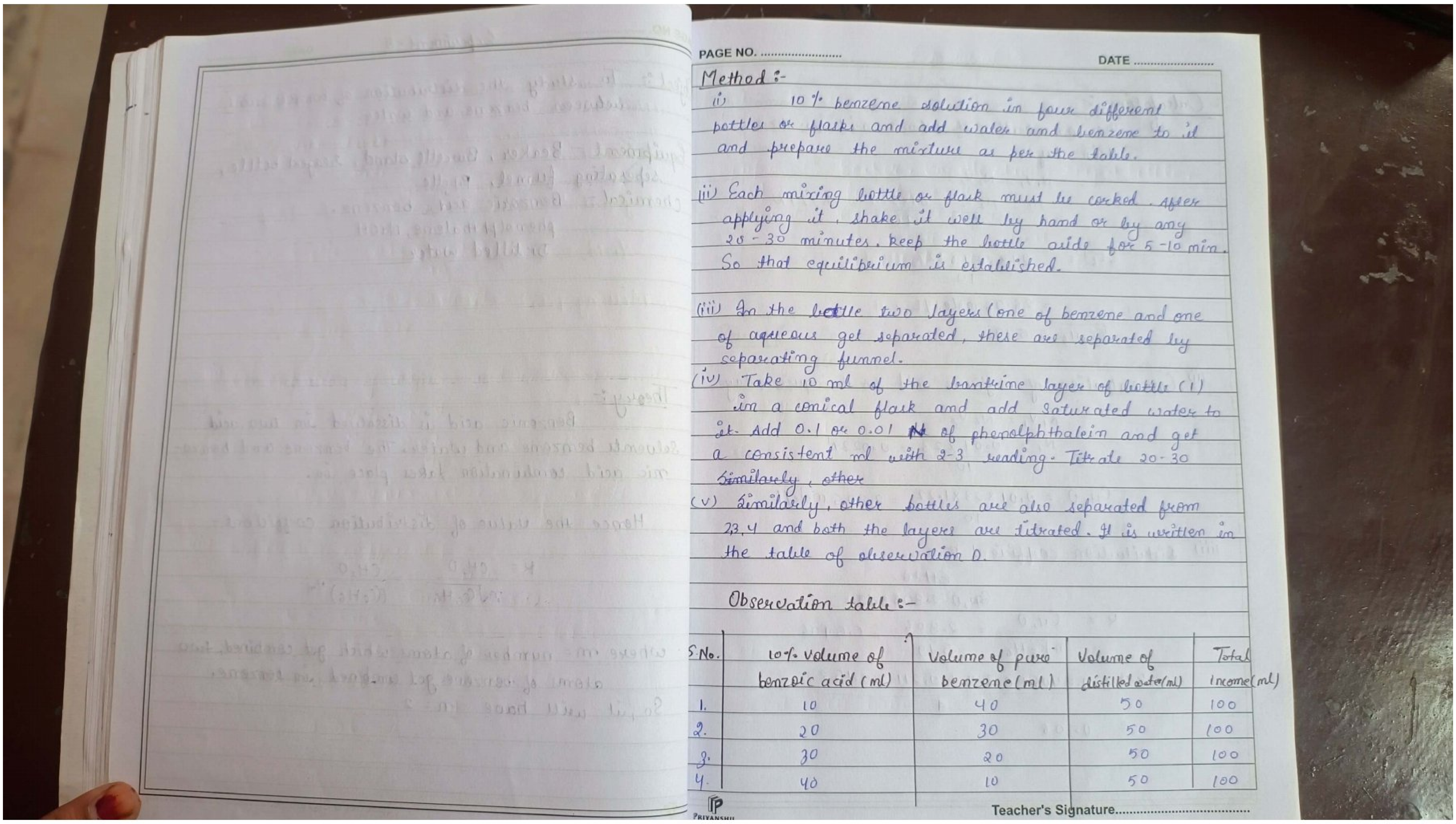
Benzonic acid is dissolved in two acid solvents benzene and water. The benzene and benzonic acid combination takes place in.

Hence the value of distribution coefficient -

$$k = \frac{C_{H_2O}}{n\sqrt{C_{C_6H_6}}} = \frac{C_{H_2O}}{(C_{C_6H_6})^{1/n}}$$

where m = number of atoms which get combined, two atoms of benzene got combined in benzene.

So, it will have n = 2



Method :-

(i) 10 % benzene solution in four different bottles or flasks and add water and benzene to it and prepare the mixture as per the table.

(ii) Each mixing bottle or flask must be corked. After applying it, shake it well by hand or by any 25 - 30 minutes. Keep the bottle aside for 5 - 10 min. So that equilibrium is established.

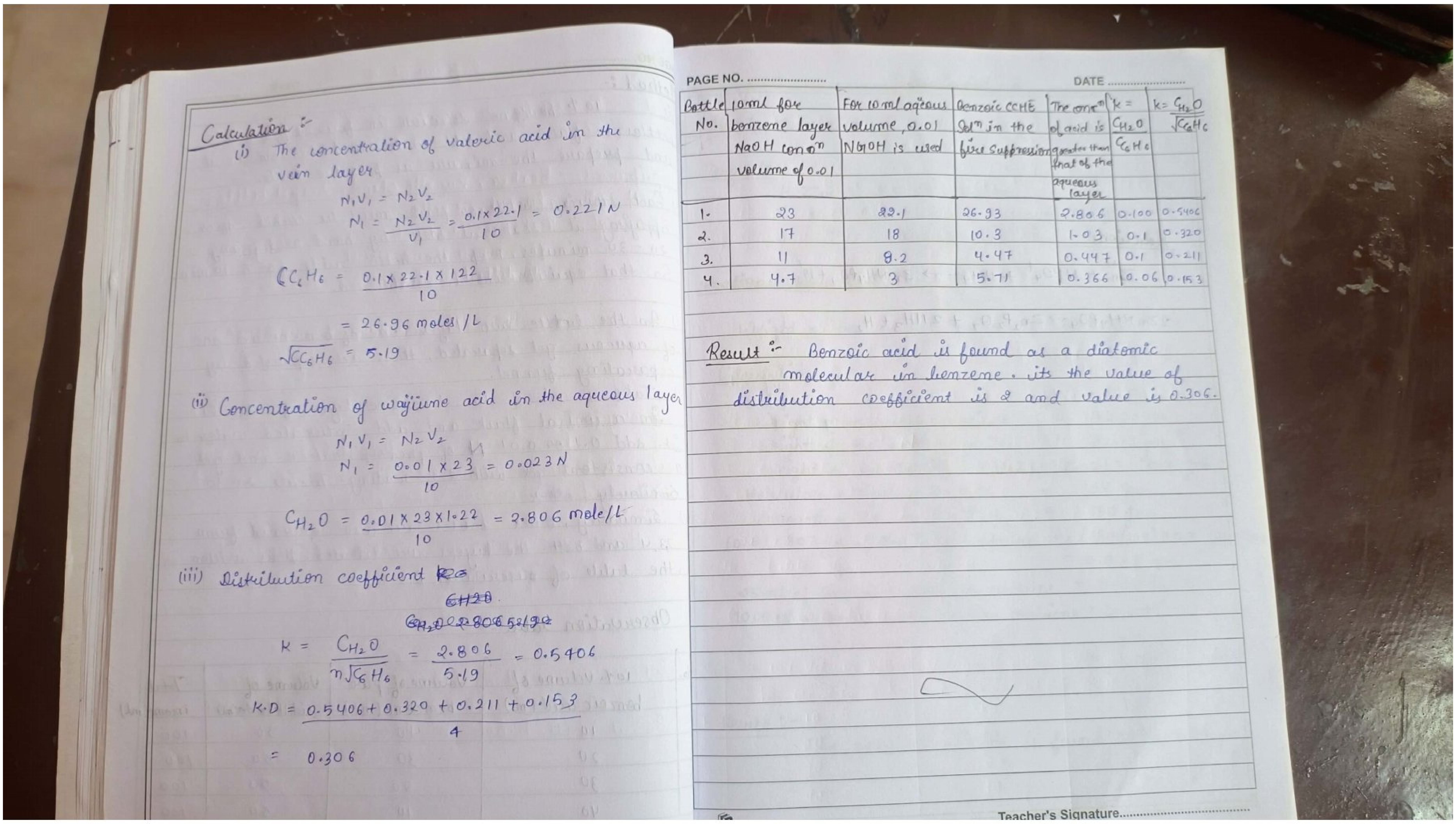
(iii) In the bottle two layers (one of benzene and one of aqueous get separated, these are separated by separating funnel.

(iv) Take 10 ml of the benzene layer of bottle (1) in a conical flask and add saturated water to it. Add 0.1 or 0.01 ~~N~~ of phenolphthalein and get a consistent ml with 2-3 reading. Titrate 20 - 30 ~~Similarly, other~~

(v) Similarly, other bottles are also separated from 2,3,4 and both the layers are titrated. It is written in the table of observation D.

Observation table :-

S.No.	10% volume of benzoic acid (ml)	Volume of pure benzene (ml)	Volume of distilled water (ml)	Total income (ml)
1.	10	40	50	100
2.	20	30	50	100
3.	30	20	50	100
4.	40	10	50	100



Calculation :-

(i) The concentration of valeric acid in the vein layer

$N_1V_1 = N_2V_2$

$N_1 = \frac{N_2V_2}{V_1} = \frac{0.1 \times 22.1}{10} = 0.221 N$

$C_{C_6H_6} = \frac{0.1 \times 22.1 \times 122}{10}$

$= 26.96$ moles / L

$\sqrt{C_{C_6H_6}} = 5.19$

(ii) Concentration of wajiune acid in the aqueous layer

$N_1V_1 = N_2V_2$

$N_1 = \frac{0.01 \times 23}{10} = 0.023 N$

$C_{H_2O} = \frac{0.01 \times 23 \times 1.22}{10} = 2.806$ mole/L

(iii) Distribution coefficient ~~KD~~

~~C_{H_2O}~~.

~~$C_{H_2O} = 2.806 \; 5.19 \; 2$~~

$k = \frac{C_{H_2O}}{n\sqrt{C_6H_6}} = \frac{2.806}{5.19} = 0.5406$

$K.D = \frac{0.5406 + 0.320 + 0.211 + 0.153}{4}$

$= 0.306$

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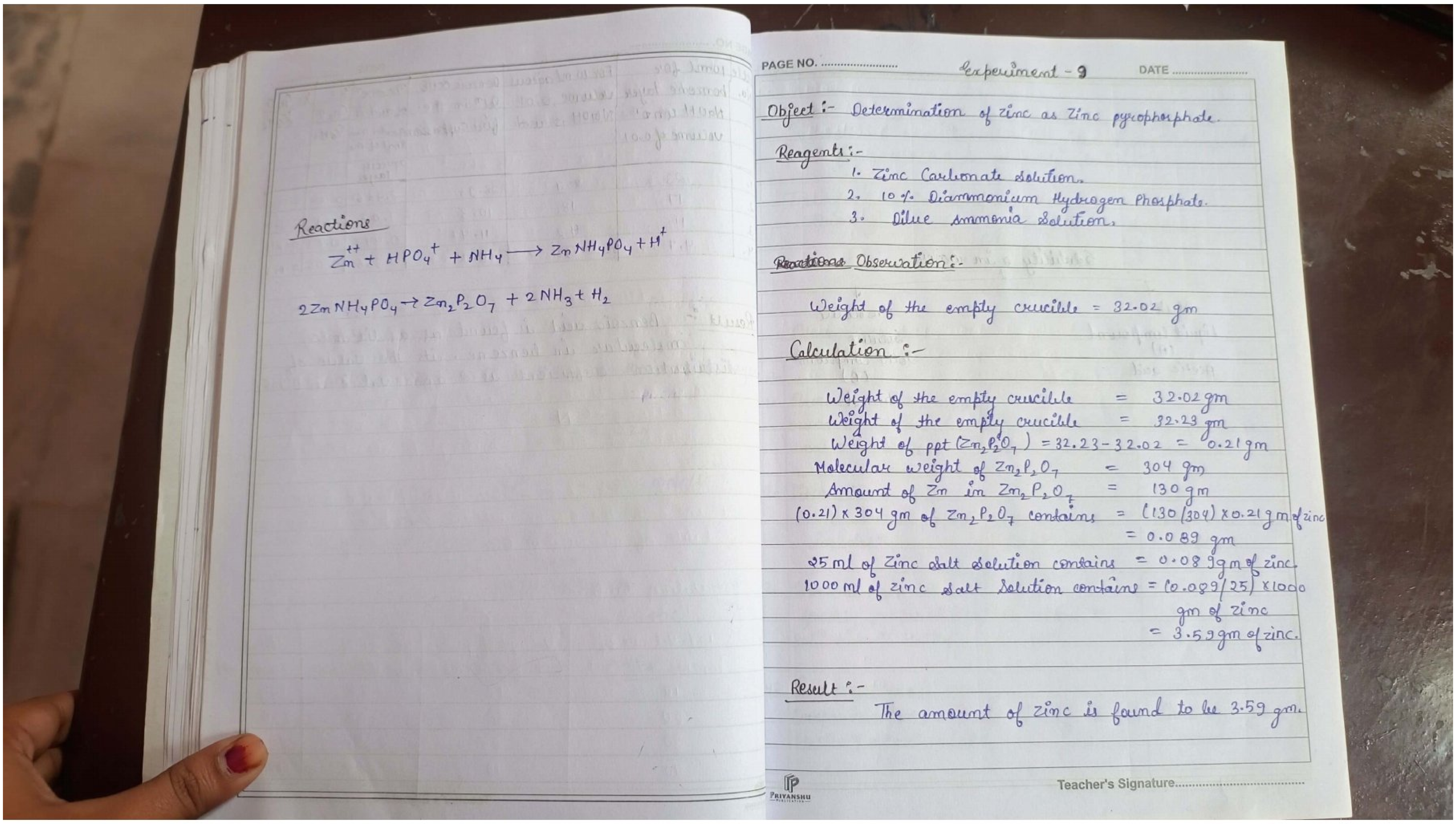
Bottle No.	10ml for benzene layer NaOH con^n volume of 0.01	For 10ml aqeous volume, 0.01 NaOH is used	Benzoic CCHE Sol^n in the fire suppression	The con^n of acid is greater than that of the aqueous layer	$k = \frac{C_{H_2O}}{C_{C_6H_6}}$	$k = \frac{C_{H_2O}}{\sqrt{C_{C_6H_6}}}$
1.	23	22.1	26.93	2.806	0.100	0.5406
2.	17	18	10.3	1.03	0.1	0.320
3.	11	8.2	4.47	0.447	0.1	0.211
4.	4.7	3	5.71	0.366	0.06	0.153

Result :- Benzoic acid is found as a diatomic molecular in benzene. its the value of distribution coefficient is 2 and value is 0.306.

Teacher's Signature..........................



Reactions

$$Zn^{++} + HPO_4^{+} + NH_4 \longrightarrow ZnNH_4PO_4 + H^{+}$$

$$2ZnNH_4PO_4 \rightarrow Zn_2P_2O_7 + 2NH_3 + H_2$$

Experiment - 9

Object :- Determination of zinc as Zinc pyrophosphate.

Reagents :-

1. Zinc Carbonate solution.
2. 10 % Diammonium Hydrogen Phosphate.
3. Dilue ammonia Solution.

~~Reactions~~ **Observation :-**

Weight of the empty crucible = 32.02 gm

Calculation :-

Weight of the empty crucible = 32.02 gm
Weight of the empty crucible = 32.23 gm
Weight of ppt ($Zn_2P_2O_7$) = 32.23 − 32.02 = 0.21 gm
Molecular weight of $Zn_2P_2O_7$ = 304 gm
Amount of Zn in $Zn_2P_2O_7$ = 130 gm
(0.21) x 304 gm of $Zn_2P_2O_7$ contains = (130/304) x 0.21 gm of zinc
= 0.089 gm
25 ml of Zinc salt solution contains = 0.089 gm of zinc.
1000 ml of zinc salt Solution contains = (0.089/25) x 1000 gm of zinc
= 3.59 gm of zinc.

Result :-

The amount of zinc is found to be 3.59 gm.

Solubility in water

Soluble
Liquid Compound
(A)
Acetic acid

Insoluble
Solid compound
(B)
Phenol.

Experiment - 10

Object :- To identify two functional groups (one solid & one liquid) in given organic compound. Also find M.P/B.P & suitable derivative.

Test for liquid compound (A)
Primary test (i) Physical state - Aqueous
(ii) Colour - Colourless
(iii) Odour - Vinegar like
(iv) Solubility - soluble in water

Observation table

S.No.	Test	Observation	Result
1.	flame test - Take compound on spatula & heat on burner	Burns with black flames	Compound is aromatic.
2.	Litmus Test - Dip blue litmus paper in sol^n	litmus paper turns red.	Compound is acidic.
3.	Element test - L.S + freshly prepared $FeSO_4$ sol^n + $conc^n$ H_2SO_4	No colour or ppt	Nitrogen absent.
4.	Functional group test Compound + C_2H_5OH + Conc H_2SO_4 + Δ + cool + water	fruity smell	Carboxyl group present.

5. B.P of compound	≈ 118°C	compound is CH_3COOH.
6. Confirmatory Test		
i) Compound neutral sol^n neutral $FeCl_3$	Sol^n turns red	Acetic acid is confirmed.
(ii) 1 ml acid + 10 drops of alcohol + 0 drops conc^n H_2SO_4 + Δ + cool.	fruity smell	CH_3COOH is confirmed.

Test for solid compound (B)

Primary test - (i) Physical State - Solid
(ii) Colour - Colourless
(iii) Odour - Phenolic
(iv) Solubility - Insoluble in H_2O.

Observation table

S.No.	Test	observation	Result
1.	flame test - Take compound on spatula & heat on burner	Burns with black flames	Mixture is aromatic
2.	Litmus test - Dip red and blue litmus paper in sol^n	litmus paper turns blue to red.	Compound is acidic.

3.	Element test L.S + freshly prepared $FeSO_4$ Sol^n + conc^n. H_2SO_4	No colour or ppt	Nitrogen is absent.
4.	functional group test Compound + neutral $FeCl_3$	Purple colour Sol^n	Phenol group present.
5.	B.P of compound	182°C	Phenol present
6.	Confirmadory Test		
i)	Phenol + Thalic acid (2:1) + Δ + NaOH	Solution turns pink	Phenol is confirmed.
ii)	Compound + Solid Sodium nitrate + conc^n. H_2SO_4	green ppt which on dilution turn red	Phenol is confirmed.

formation of derivative

Liquid Compound (A) = In 1 ml acid add NH_4OH Sol^n slowly, till smell of ammonia obtained. Then on burner heat the Sol^n, obtained Solid is ammonia.

$$RCOOH + NH_3 \longrightarrow RCOONH_4$$

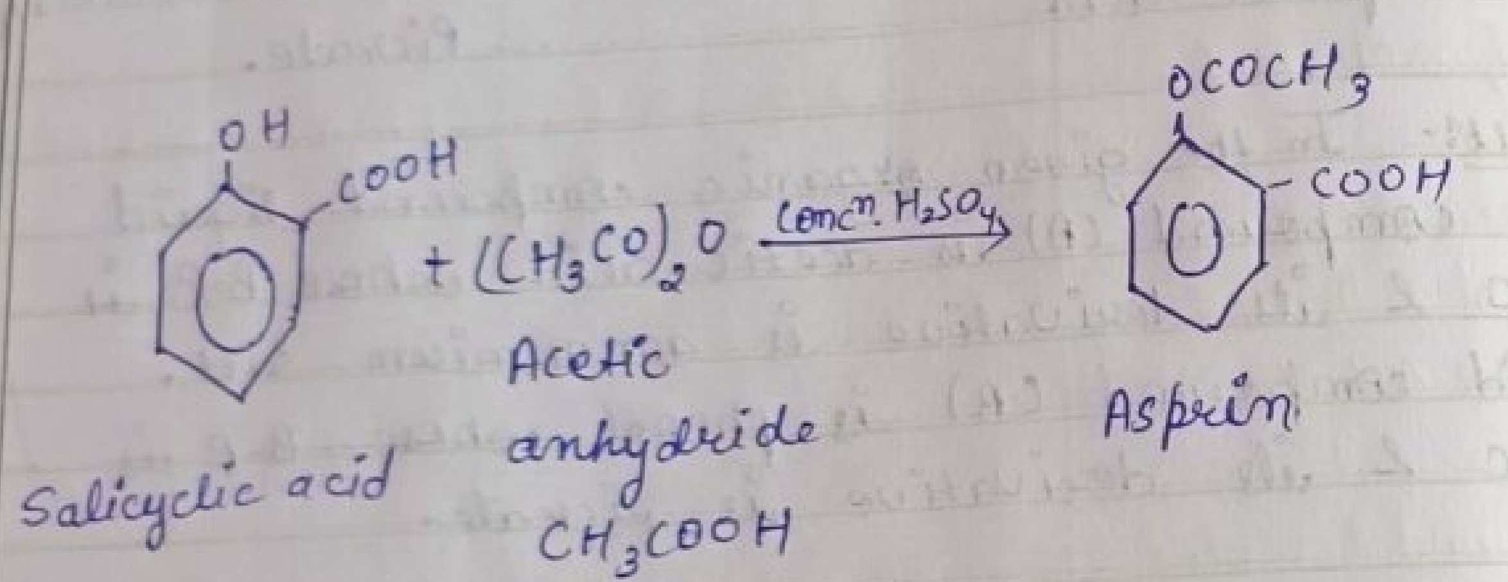
Solid Compound (B) -

In a test tube take 0.5 gm compound & dissolve in 1ml benzene them 2ml of picric acid, solid obtained is picrate.

$C_6H_5 + C_6H_5(OH)(NOH_2)_3 \longrightarrow C_6H_5OH \cdot C_6H_2(OH)(NO_2)_3$

picric acid Picrate.

Result:- In the given organic compound liquid compound (A) is acetic acid whose B.P is 118°C & its derivative is ammonium salt. Solid compound (B) is phenol whose B.P is 182°C & its derivative is picrate.



Experiment - 11

Aim :-

Synthesis asprin by ~~acy~~ acetylation of salicylic acid and compared it with the ingradient of an aspirin tablet by TLC.

Step 1 :- Preparation of aspirin :-

Aspirin is prepared in the Laboratatory by acetylation of salicylic acid with acetic anhydride in the presence of concentrated sulphuric acid or syrupy phosphoric acid.

The reaction involved is given as under -

Requirement :-

Salicyclic Acid - 5g
Acetic anhydride - 5g
Conc. H_2SO_4 - 5g

Procedure :-

Take 5g of Salicyclic acid in a small round bottomed flask. Add 6-7 ml of acetic anhydride and 5/6 drops of concentrated Sulphuric acid to it. Shake well so that the reagents get mixed throughly. Fix an air condenser into the mouth of flask and warm the contents to about 50°c in a water bath for 5-10 minutes with occassional shaking.

To the warms mixture add 10-15 ml of ice cold water to decompose excess of acetic anhydride.

Pour the contents of the flask with stirring into crushed ice contained in a beaker, stir well by means of a glass rod. white Crystal of aspirin separate out. If a white Solid does not appear (due to the presence of excess of acetic anhydride), Scratch the walls of the beaker with a glass rod. Filter the crude product and wash it with cold water. Dry by pressing between folds of filter paper.

Purification :-

Recrystallise the crude products aspirin from equal volume of water and glacial acetic acid. Pure white products is obtained.

Result:-

Yield - 5-8 g

melting point - 136 - 137°c (with dicomposition)

PAGE NO. .... Experiment - 12 DATE ....

Object :-

To find out the distribution coefficient of iodine in water and organic chloride, carbon monoxide or chloroform, carbon disulphide etc.

Principle :- Iodine remains in the same intrinsic state in water and organic solvent carbon data sulphur. Hence the value of distribution coefficient does not depend on the solidity of the solution. Hence the coefficient is calculated using the following formula

$$K = \frac{C_{ccl_4}}{C_{H_2O}}$$

where the solubility of iodine in organic solvent is C_{ccl_4} and in water is C_{H_2O}.

Equipment :- Burette, pipette, conical flask in four bottles, sterllising funnel, conical flask

Chemicals :-

(i) Iodine (ii) Pottassium Iodide KI
(iii) Starch (iv) Sodium thiosulphate $Na_2S_2O_3$
(v) organic solvent (carbon data)

Teacher's Signature........................

Observation Table :-

B.No.	Titration of aqueous layer			Titration of the CCl$_4$ layer			
	Initial Reading	final reading	N/100 Hypo Solution value	B.No.	Initial Reading	final reading	N/10 Hypo Solution value
I	1	2.9	1.8	I	1	4.5	10.5
II	2.2	3.7	1.5	II	1	4	8
III	3	9	1	III	3	10	7
IV	1.5	2.5	0.8	IV	2	8	6

Calculation -

→ concentration of iodine in the aqueous layer

- Calculation bottle - I

$N_1V_1 = N_2V_2$ $N_2 = \frac{N}{100}$

$N_1 \times 5 = \frac{1}{100} \times V_2$ $[V_2 = 1.8]$

$N_1 = \frac{V_2}{500}$

$N_1 = \frac{1.8}{500} = 0.0036$

- Calculation Bottle - II

$N_1V_1 = N2V_2$ ~~1.5~~ $[V_2 = 1.5]$

$N_2 = \frac{1.5}{500} = 0.003$

- Calculation Bottle - III → $N_3 = \frac{1}{500} = 0.002$ $[V_2 = 1]$

- Calculation Bottle - IV -

$N_4 = \frac{0.8}{500} = 0.0016$ $[V_2 = 0.8]$

Required Solution :- (i) 10 % dissolution of Iodine in carbon data chloride

meaning - 100 ml of total iodine in CCl$_4$

(ii) Solution - 100 gm of 10 modalied is dissolved in 100 ml water.

(iii) N/20 Sodium gramosulfate (Hyo Solution) N/20 for Bio sulfate sol^n, wgt 3.1 gm it in the biosulfate and prepare a 250 ml graduated sodium flask. Dissolve.

(iv) $\frac{N}{200}$ sodium bisulphate (hypo) sol^n - above sol^n is prepared by dilution method in 400.

method :-

1. first of all, prepare the following four mixture with 1% iodine sol^n and make the total volume of all the mixture equal by mixing puzzles. four mixture can be made as per the table.

S. No of Bottle or plastic	Volume of iodine sol^n (ml)	Volume of pure CCl$_4$ (ml)	Volume of distilled water (ml)	Total volume (ml)
1	50	0	100	150
2	40	10	100	150
3	30	20	100	150
4	20	30	100	150

→ what is the concentration of iodine in carbon dioxide chloride sol^n ?

$N_1V_1 = N_2V_2$ $\left[V_2 = \frac{N}{20}\right]$

$N_1 = \frac{N \times V_2}{20 \times V_1}$

- Calculation Bottle - I

$N_1 = \frac{10.5}{20 \times 5} = 0.10$ $\left[\begin{matrix} V_1 = 5 \\ V_2 = 10.5 \end{matrix}\right]$

- Calculation Bottle - II

$N_{II} = \frac{8}{100} = 0.08$ $\left[\begin{matrix} V_1 = 5 \\ V_2 = 8 \end{matrix}\right]$

- Calculation Bottle III

$N_{III} = \frac{7}{100} = 0.07$ $[V_2 = 7]$

- Calculation Bottle IV -

$N_{IV} = \frac{6}{100} = 0.06$ $[V_2 = 6]$

Calculation of the distribution coefficient

S. No.	Consentration of iodine in the aquaous layer	Iodine conc.^{n} in carbon tetrachloride layer	The distribution coefficient K $K = \frac{CCl_4}{CH_2O}$
I	0.0036	0.10	$K_1 = 27.7$
II	0.003	0.08	$K_2 = 26.6$
III	0.002	0.07	$K_3 = 35$
IV	0.0016	0.06	$K_4 = 37.5$

$$K_D = \frac{K_1 + K_2 + K_3 + K_4}{4} = \frac{27.7 + 26.6 + 35 + 37.5}{4} \Rightarrow \frac{126.8}{4}$$

$$\Rightarrow 31.7\, g/L$$

PAGE NO. ....

DATE ....

(ii) Each bottle or flask is corked and shaken well with a cork or any other instrument for about 20-30 mint. After this, it kept 15-20 mint. so that equilibrium can be established in it

(iii) Two layers are separated in the bottle. These are separated by a seperating layer of water.

(iv) Bottle number (1) obtained from CCl_4 layer and add 10 ml of 10% solution to it. Tirate this solution with $\frac{N}{20}$ $Na_2C_2O_3$. This is done with the help of an indicator. The blue colour disappears at the last point. Repeat the reading corresponding action. Till 10 ml of the aqueous layer obtained from the bottle is taken in a conical flask, 10 ml KI solution is added to it. $\frac{N}{100}$ $Na_2S_2O_3$ Solution and titration is done using starch as indicator from the solution. The final point is repeat till the blue colour disappears. also different from the layer of blue colour are the corresponding readings. Titrate other bottles in the same manner.

write the observation in the table.

Distribution Coefficient :- $K = \frac{CCl_4}{CH_2O}$

And find the value of K by using CCl_4 and CH_2O

Result :- The distribution coefficient of iodine in the organic H_2O layer CCl_4 and 31.7 g equivalent / liter.

PRIYANSHU

Teacher's Signature..

Practical assignment work

Ques-1 Estimate zinc as Zinc ammonium phosphate.

Ques-2 (a) Identification of organic compound (solid for liquid) through element detection (N and S) melting point, boiling point, functional group analysis with preparation of suitable derivative
(A - acetic acid, B - Phenol)

(b) Synthesis of Aspirin from Salicyclic acid

Ques-3 To determine the heat of neutralisation of given acid and base.

OR

~~Ques~~-4 To determine partition coefficient iodine between water and CCl_4, $CHCl_3$, CS_2 at room temperature.

Experiment - 1

Object :- Determination of zinc as Zinc ammonium ~~pyro~~phosphate.

Reagents :-

1. Zinc Carbonate solution.
2. 10% Diammonium Hydrogen Phosphate.
3. Dilue ammonia Solution.

~~Reactions~~ Observation :-

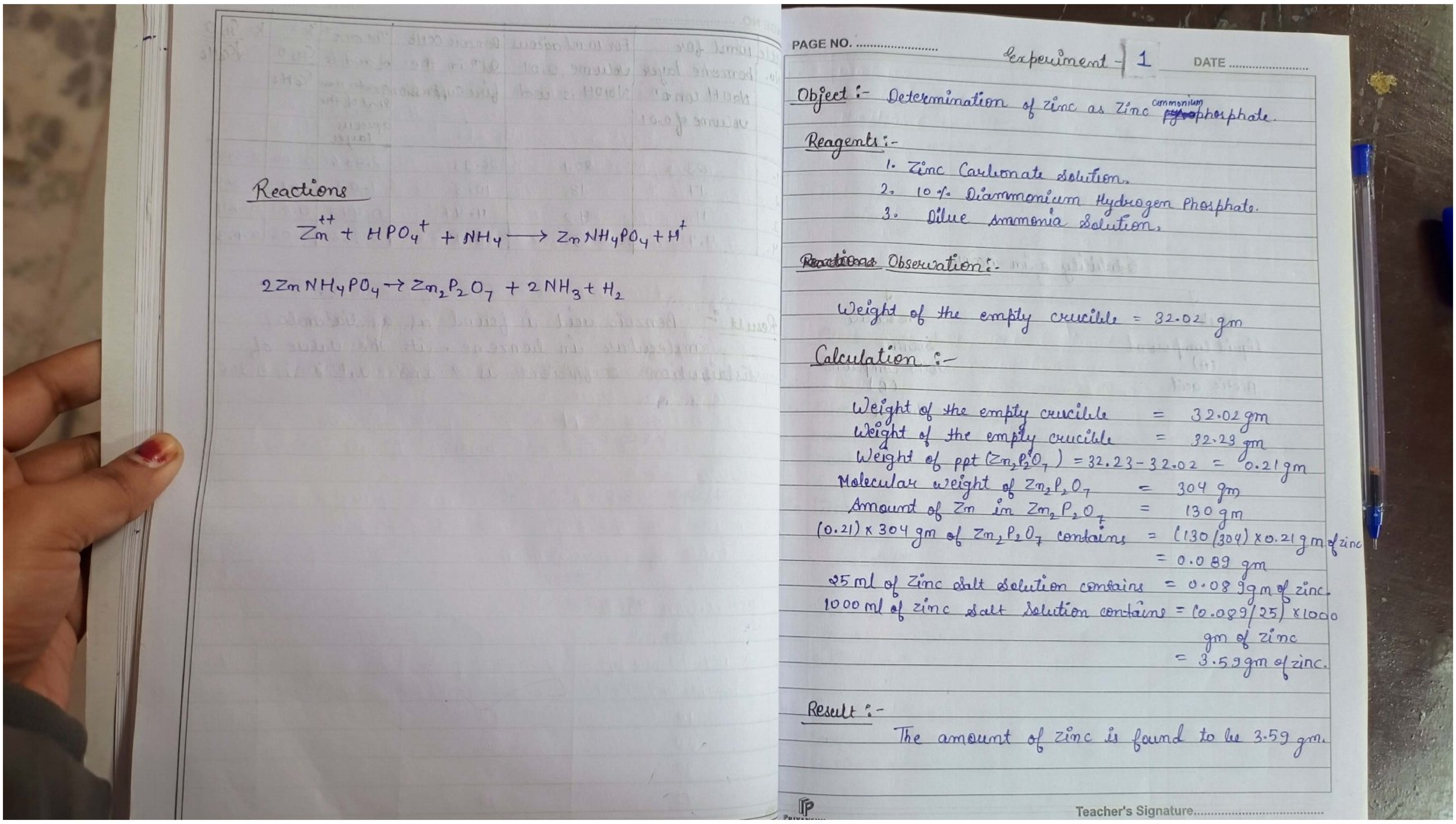
Weight of the empty crucible = 32.02 gm

Calculation :-

Weight of the empty crucible = 32.02 gm
Weight of the empty crucible = 32.23 gm
Weight of ppt ($Zn_2P_2O_7$) = 32.23 − 32.02 = 0.21 gm
Molecular weight of $Zn_2P_2O_7$ = 304 gm
Amount of Zn in $Zn_2P_2O_7$ = 130 gm
(0.21) x 304 gm of $Zn_2P_2O_7$ contains = (130/304) x 0.21 gm of zi
= 0.089 gm
25 ml of Zinc salt solution contains = 0.089 gm of zinc.
1000 ml of zinc salt Solution contains = (0.089/25) x 1000 gm of zinc
= 3.59 gm of zinc.

Result :-

The amount of zinc is found to be 3.59 gm.



Reactions

$Zn^{++} + HPO_4^{+} + NH_4 \longrightarrow ZnNH_4PO_4 + H^{+}$

$2ZnNH_4PO_4 \rightarrow Zn_2P_2O_7 + 2NH_3 + H_2$

PAGE NO. .... Experiment - 1 DATE ....

Object :- Determination of zinc as Zinc ~~pyro~~ammonium phosphate.

Reagents :-

1. Zinc Carbonate solution.
2. 10 % Diammonium Hydrogen Phosphate.
3. Dilue ammonia Solution.

~~Reactions~~ Observation :-

Weight of the empty crucible = 32.02 gm

Calculation :-

Weight of the empty crucible = 32.02 gm
Weight of the empty crucible = 32.23 gm
Weight of ppt ($Zn_2P_2O_7$) = 32.23 - 32.02 = 0.21 gm
Molecular weight of $Zn_2P_2O_7$ = 304 gm
Amount of Zn in $Zn_2P_2O_7$ = 130 gm
(0.21) x 304 gm of $Zn_2P_2O_7$ contains = (130/304) x 0.21 gm of zinc
= 0.089 gm
25 ml of Zinc salt solution contains = 0.089 gm of zinc.
1000 ml of zinc salt Solution contains = (0.089/25) x 1000 gm of zinc
= 3.59 gm of zinc.

Result :-

The amount of zinc is found to be 3.59 gm.

Teacher's Signature..

Solubility in water

Soluble
Liquid Compound
(A)
Acetic acid

Insoluble
Solid compound
(B)
Phenol.

PAGE NO. .... Experiment - 2(a) DATE ....

Object:- To identify two functional groups (one solid & one liquid) in given organic compound. Also find M.P/B.P & suitable derivative.

Test for liquid compound (A)
Primary test (i) Physical state - Aqueous
(ii) Colour - Colourless
(iii) Odour - Vinegar like
(iv) Solubility - soluble in water

Observation table

S.No.	Test	Observation	Result
1.	Flame test - Take compound on spatula & heat on burner	Burns with black flames	Compound is aromatic.
2.	Litmus Test - Dip blue litmus paper in solⁿ	Litmus paper turns red.	Compound is acidic.
3.	Element test - L.S + freshly prepared $FeSO_4$ solⁿ + concⁿ H_2SO_4	No colour or ppt	Nitrogen absent.
4.	Functional group test Compound + C_2H_5OH + Conc H_2SO_4 + Δ + cool + water	Fruity smell	Carboxyl group present.

Teacher's Signature......................................

5.	B.P of compound	≈ 118°C	compound is CH_3COOH.
6.	Confirmatory Test		
i)	Compound neutral solⁿ neutral $FeCl_3$	Solⁿ turns red	Acetic acid is confirmed.
ii)	1 ml acid + 10 drops of alcohol + 0 drops concⁿ H_2SO_4 + Δ + cool.	fruity smell	CH_3COOH is confirmed.

Test for solid compound (B)

Primary test – (i) Physical State – Solid

(ii) Colour – Colourless

(iii) Odour – Phenolic

(iv) Solubility – Insoluble in H_2O.

Observation table

S.No.	Test	observation	Result
1.	flame test - Take compound on spatula & heat on burner	Burns with black flames	Mixture is aromatic
2.	Litmus test- Dip red and blue litmus paper in solⁿ	litmus paper turns blue to red.	Compound is acidic.

3. Element test		
L.S + freshly prepared $FeSO_4$ Solⁿ + concⁿ. H_2SO_4	No colour or ppt	Nitrogen is absent.
4. functional group test		
Compound + neutral $FeCl_3$	Purple colour Solⁿ	Phenol group present.
5. B.P of compound	182°C	Phenol present
6. Confirmatory Test		
i) Phenol + Thallic acid (2:1) + Δ + NaOH	Solution turns pink	Phenol is confirmed.
ii) Compound + Solid sodium nitrate + concⁿ. H_2SO_4	green ppt which on dilution turn red	Phenol is confirmed.

formation of derivative

Liquid Compound (A) = In 1 ml acid add NH_4OH Solⁿ slowly, till smell of ammonia obtained. Then on burner heat the Solⁿ, obtained Solid is ammonia.

$$RCOOH + NH_3 \longrightarrow RCOONH_4$$

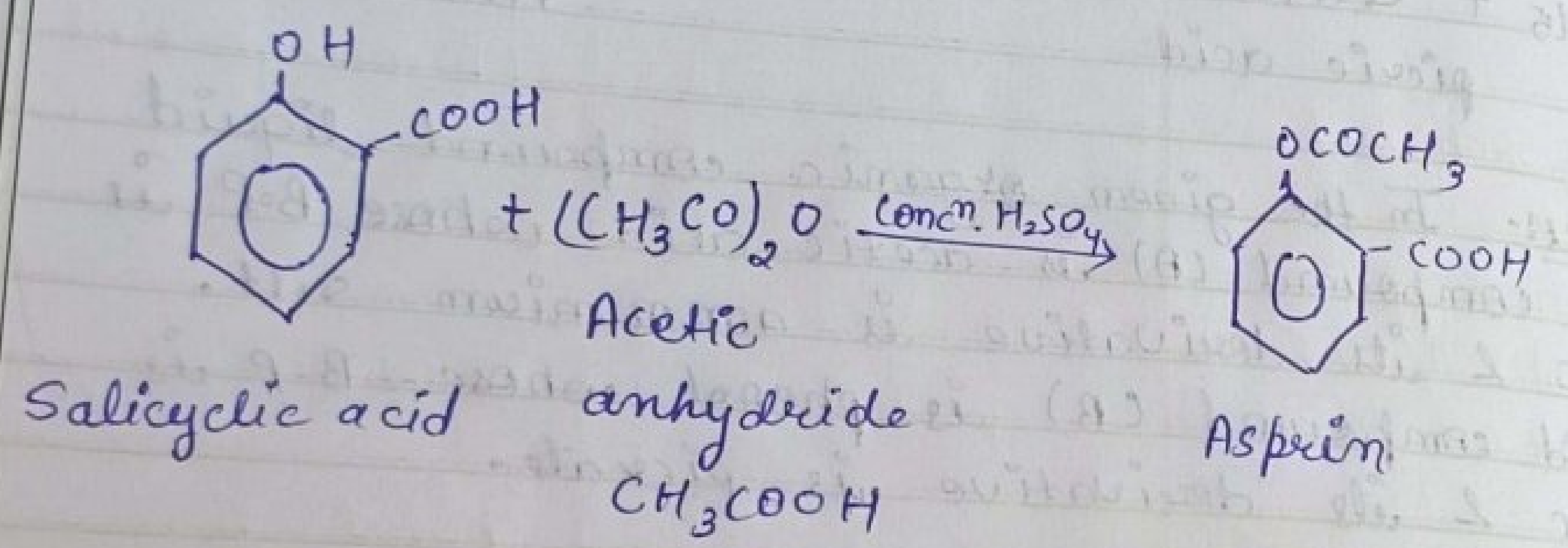
Solid compound (B) -

In a test tube take 0.5 gm compound & dissolve in 1ml benzene then 2ml of picric acid, solid obtained is picrate.

$$C_6H_5 + C_6H_5(OH)(NOH_2)_3 \longrightarrow C_6H_5OH \cdot C_6H_2(OH)(NO_2)_3$$

picric acid Picrate.

Results:- In the given organic compound liquid compound (A) is acetic acid whose B.P is 118°C & its derivative is ammonium salt. Solid compound (B) is phenol whose B.P is 182°C & its derivative is picrate.



Aim :-

Synthesis asprin by ~~acy~~ acetylation of salicylic acid and compared it with the ingradient of an aspirin tablet by TLC.

Step 1 :- Preparation of aspirin :-

Aspirin is prepared in the laboratatory by acetylation of salicylic acid with acetic anhydride in the presence of concentrated sulphuric acid or syrupy phosphoric acid.

The reaction involved is given as under -

Requirement :-

Salicyclic Acid - 5g
Acetic anhydride - 5g
Conc. H_2SO_4 - 5g

Procedure :-

Take 5g of Salicyclic acid in a small round bottomed flask. Add 6-7 ml of acetic anhydride and 5/6 drops of concentrated sulphuric acid to it. Shake well so that the reagents get mixed throughly.
Fix an air condenser into the mouth of

flask and warm the contents to about 50°c in a water bath for 5-10 minutes with occassional shaking.

To the warms mixture add 10-15 ml of ice cold water to decompose excess of acetic anhydride.

Pour the contents of the flask with stirring into crushed ice contained in a beaker, stir well by means of a glass rod. White Crystal of aspirin separate out. If a white Solid does not appear (due to the presence of excess of acetic anhydride), Scratch the walls of the beaker with a glass rod. Filter the crude product and wash it with cold water. Dry by pressing between folds of fitter paper.

Purification :-

Recrystallise the crude products aspirin from equal volume of water and glacial acetic acid. Pure white products is obtained.

Result:-

Yield - 5-8 g

melting point - 136 - 137°c (with dicomposition)

Experiment - 3

Object :- To find out the distribution coefficient of iodine in water and organic chloride, carbon monoxide or chloroform, carbon disulphide etc.

Principle :- Iodine remains in the same intrinsic state in water and organic solvent carbon data sulphur. Hence the value of distribution coefficient does not depend on the Solidity of the solution. Hence the coefficient is calculated using the following formula

$$K = \frac{C_{ccl_4}}{C_{H_2O}}$$

where the solubility of iodine in organic Solvent is C_{ccl_a} and in water is C_{H_2O}.

Equipment :- Burette, pipette, conical flask in four bottles, sterilising funnel, conical flask

Chemicals :-

(i) Iodine (ii) Potassium Iodide KI
(iii) Starch (iv) Sodium thiosulphate Na_2S_2
(v) organic Solvent (carbon data)

Observation Table :-

B. No.	Titration of aqueous layer Initial Reading	final reading	N/100 Hypo Solution value	Titration of the CCl_4 layer B. No.	Initial Reading	final reading	N/10 Hypo Solution val
I	1	2.9	1.8	I	1	4.5	10.5
II	2.2	3.7	1.5	II	1	4	8
III	3	9	1	III	3	10	7
IV	1.5	2.5	0.8	IV	2	8	6

Calculation -

→ Concentration of iodine in the aqueous layer

- Calculation battle - I

$N_1V_1 = N_2V_2$ $\qquad N_2 = \frac{N}{100}$

$N_1 \times 5 = \frac{1}{100} \times V_2$ $\qquad [V_2 = 1.8]$

$N_1 = \frac{V_2}{500}$

$N_1 = \frac{1.8}{500} = 0.0036$

- Calculation Battle - II

$N_1V_1 = N_2V_2$ $\qquad [V_2 = 1.5]$

$N_2 = \frac{1.5}{500} = 0.003$

- Calculation Battle - III → $N_3 = \frac{1}{500} = 0.002$ $\quad [V_2 = 1]$

- Calculation Battle - IV -

$N_4 = \frac{0.8}{500} = 0.0016$ $\quad [V_2 = 0.8]$

Required Solution :- (i) 10% dissolution of Iodine in carbon data chloride
meaning - 100 ml of total iodine in CCl_4

(ii) Solution - 100 gm of 10 modolued is dissolved in 100 ml water.

(iii) N/20 Sodium gramosulfate (Hyo Solution) N/20 for Bio sulfate solⁿ, wgt 3.1 gm it in the biosulfate and prepare a 250 ml graduated sodium flask. Dissolve.

(iv) $\frac{N}{200}$ sodium bisulphate (hypo) solⁿ - above solⁿ is prepared by dilution method in 400.

method :-

1. first of all, prepare the following four mixture with 1% iodine solⁿ and make the total volume of all the mixture equal by mixing puzzles, four mixture can be made as per the table.

S. No of Bottle or plastic	Volume of iodine solⁿ (ml)	Volume of pure CCl_4 (ml)	Volume of distilled water (ml)	Total volume (ml)
1	50	0	100	150
2	40	10	100	150
3	30	20	100	150
4	20	30	100	150

→ what is the concentration of iodine in carbon dioxide chlori sal^n ?

$$N_1 V_1 = N_2 V_2 \qquad \left[V_2 = \frac{N}{20} \right]$$

$$N_1 = \frac{N \times V_2}{20 \times V_1}$$

- Calculation Battle - I

$$N_1 = \frac{10.5}{20 \times 5} = 0.10 \qquad \left[\begin{matrix} V_1 = 5 \\ V_2 = 10.5 \end{matrix} \right]$$

- Calculation Battle - II

$$N_{II} = \frac{8}{100} = 0.08 \qquad \left[\begin{matrix} V_1 = 5 \\ V_2 = 8 \end{matrix} \right]$$

- Calculation Battle III

$$N_{III} = \frac{7}{100} = 0.07 \qquad \left[V_2 = 7 \right]$$

- Calculation Battle IV -

$$N_{IV} = \frac{6}{100} = 0.06 \qquad \left[V_2 = 6 \right]$$

Calculation of the distribution coefficient

S. No.	Consentration of iodine in the aqueous layer	Iodine conc.^{n} in carbon tetrachloride layer	The distribution coefficient K $K = \frac{C_{CCl_4}}{C_{H_2O}}$
I	0.0036	0.10	$K_1 = 27.7$
II	0.003	0.08	$K_2 = 26.6$
III	0.002	0.07	$K_3 = 35$
IV	0.0016	0.06	$K_4 = 37.5$

$$K_D = \frac{K_1 + K_2 + K_3 + K_4}{4} = \frac{27.7 + 26.6 + 35 + 37.5}{4} \Rightarrow \frac{126.}{4}$$

$$\Rightarrow 31.7\ g/l$$

(ii) Each bottle or flask is corked and shaken well with a cork or any other instrument for about 20-30 mint. After this, it keep 15-20 mint. so that equilibrium can be established in it

(iii) Two layers are separated in the battle. These are separated by a seperating layer of water.

(iv) Battle number (1) obtained from CCl_4 layer and add 10 ml of 10% Solution to it. Tirate this solution with $\frac{N}{20}$ $Na_2C_2O_3$. This is done with the help of an indicator. The blue colour disappears at the last paint. Repeat the reading corresponding action. Till 10 ml of the aqueous layer obtained from the battle is taken in a conical flask, 10 ml KI solution is added to it. $\frac{N}{100}$ $Na_2S_2O_3$ Solution and titration is done using starch as indicator from the Solution. The final paint is repeat till the blue colour disappears. also different from the layer of blue Colour are the corresponding readings. Titrate other battles in the same manner.

write the observation in the table.

Distribution Coefficient :- $K = \frac{C_{CCl_4}}{C_{H_2O}}$

And find the value of K by using C_{CCl_4} and C_{H_2O}

Result :- The distribution coefficient of iodine in the organic H_2O layer CCl_4 and 31.7 g equivalent / liter.

Experiment No.-18

Object :-

To determine heat of neutrilisation of weak acid (CH_3COOH) & strong base ($NaOH$)

Principle:- The value of heat of neutrilisation of weak acid & strong base is less than 13.7 Kcalorie. As such the neutrilisation takes place in two steps:-

i) In the first step ionisation of weak acid takes place.

ii) In the second step combination of H^+ & OH^- gives H_2O i.e. some amount of heat is absorbed during ionisation, lowering the value of heat of neutrilisation from 13.7 Kcal.

$$CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$$

$$\Delta H = -Q \text{ Kcal}$$

Heat of neutrilisation

$$= \frac{(V+w)(T_5 - T_4)}{N_1 V_1} \times 1000$$

where, w = equivalent weight of water in flask

V = volume of mixture of acid & base

T_4 = temprature of acid & base

T_5 = Final temprature of mixture

V_1 = volume of acid

N_1 = Normality of acid.

Calculation

(1) Equivalent weight of water in thermal flask

$$W = 100\left(\frac{t_2 - t_3}{t_3 - t_1}\right) - 100$$

$$W = 100\ \frac{74-48}{48-26} - 100$$

$$W = \frac{100 \times 26}{22} - 100$$

$$W = 118.18 - 100$$

W = 18.18 Calorie/degree

2) Calculation of heat of neutrilisation

$$= \frac{V+W\,(T_5 - T_4) \times 1000}{\text{Volume of acid \& base} \times \text{Normality of acid and base}}$$

$V = 100 + 100 = 200ml$

$T_4 = 19.2°C \quad T_5 = 25°C$

W = 78.18 calorie

$$= \frac{(200 + 18.18)(25 - 19.2) \times 1000}{100 \times 1}$$

$$= \frac{218.18 \times 5.8 \times 1000}{100} = 12654.44\ \text{Kcal}$$

Heat of neutrilisation = 12.65 Kcal.

Required apparatus- Thermos flask, two thermometer, beaker, burette

Required solution-

i) CH_3COOH solⁿ of N normality.
ii) NaOH solⁿ of N normality.
iii) Phenolphthalein.

Observation:-

1) Equivalent. weight of water in thermos flask.
Volume of cold water- 100 ml
Temprature of cold water- $t_1 = 26°C$
Temprature of warm water- $t_2 = 74°C$
Temprature of mixture- $t_3 = 48°C$

2) Heat of neutrilisation
Volume of N-CH_3COOH solⁿ- 100 ml
Volume of N-NaOH solⁿ = 100 ml
Volume of N-CH_3COOH solⁿ = 20.1°C
Temprature of N-NaOH solⁿ = 18.3°C
Temprature of N-CH_3COOH & N-NaOH solⁿ
$T_4 = 20.418$ $T_5 = 25°C$

Result :- Heat of neutrilisation of weak acid (CH_3COOH) and strong acid (NaOH) is 12.65 K.calorie.

Teacher's Signature........ 18/4/2021