SUBMISSION OF

FINAL PROJECT REPORT

ENTITLED

"SYNTHESIS, CHARACTERIZATION AND COMPARATIVE STUDIES OF NOVEL MIXED LIGAND COMPLEXES OF 4f AND 5f ORBITAL ELEMENTS WITH O-O, N-O, N-N, S-O CHELATION"

TO

UNIVERSITY GRANTS COMMISSION

By

Dr. D.S.PABREJA

(M.Sc., Ph.D.)

Department of Chemistry

Smt. S. M. Panchal Science College, Talod -383 215

(Gujarat-India)

To,

Joint Secretary,

Western Regional Office,
Ganeshkhind,
Pune.

Sub.: Submission of the Minor Research Project along with Income expenditure statement and utilization certificate

Respected Sir,

I, herewith, enclose the final minor research project sanctioned to Dr. D. S. Pabreja, Associate Professor in Chemistry in our college along with Utilization certificate and Income -expenditure statement.

The total amount sanctioned to the project is Rs. 1,60,000/- of which Rs. 1,02,500/- was released by UGC as a first installment. The actual expenditure so far made is Rs. 1,60,471/-.

I, therefore, request you to kindly release the second installment of Rs. 57,971/- which is personal contribution.

Thanking you

Dr. S.C. Parikh
Principal

Encl.:

1. Utilization certificate (Annexure- I)
2. Audited statement expenditure with recurring items . (Annexure- II)
3. Audited Statement of Expenditure (Annexure- III)
4. Audited Statement of Expenditure incurred on Field Work (Annexure-IV)
5. Assets Certificate .(Annexure –V)
6. Accession Certificate. (Annexure-V I)
7. Acceptance Certificate. (Annexure-VII)
8. A copy of Final Report of Minor Research Project (Annexure- VIII)
9. Certificate of Project Completion Certificate . (Annexure- I X)
10. Summary of work done after 1st year (Annexure- X)
11. Certificate of unspent balance. (Annexure-X I)

UNIVERSITY GRANTS COMMISSION

Final Report of the work done on the Minor Research Project

1. Project report : **Final**

2. UGC Reference No. : **F. No. 47-910/09(WRO), Dt. 22nd Sept. 2009**

3. Period of report from : **22/09/2009 to 15/09/2015**

4. Title of research project : "**Synthesis ,Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O, N-O ,N-N, S-O Chelation**

5. (a) Name of the Principal Investigator : **Dr. D.S.PABREJA**

(b) Deptt. and University/College where work has progressed

: **SMT.S.M.Panchal Science College, Talod, Dist. Sabarkantha [Gujarat]**

6. Effective date of starting of the project : **22/09/09**

7. Grant approved and expenditure incurred during the period of the report :

8. Total amount approved Rs. : **1,60,000/-**

9. Total expenditure Rs. : **1,60,471/-**

Report of the work done: ; **Completed**

(i) Brief objective of the project : **Final Report submitted**

(ii) Work done so far and results achieved and publications, if any, resulting from the work : **1 research paper accepted in International Journal of Chemtech Application ,INTJCA& second research paper Communicated and third research paper under progress**

(iii) Has the progress been according to original plan of work and towards achieving the objective if not, state reasons : **Yes**

(iv) Please indicate the difficulties, if any, experienced in implementing the project : **Nil**

(v) If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the Commission on a separate sheet : **NA**

(vi) If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the annual report of work done may also be sent to the Commission.

(vii) Any other information which would help in evaluation of work done on the project. At the completion of the project, the first report should indicate the output, such as (a) Manpower trained (b) Ph. D. awarded (c) Publication of results (d) other impact, if any. 2 research paper published

Signature of the Principal **Principal College Investigator**

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110 002

Minor Research Project

UTILIZATION CERTIFICATE FOR TOTAL UTILIZED GRANT

It is certified that the grant of Rs. 1,60,000/- (Rupees one lac sixty thousand only) sanctioned to Dr.D.S. Pabreja by University Grants Commission vide their letter No. F. No. 47-910/2009(WRO), dated 22nd Sept. 2009 towards 1,60,471/ has been fully utilized for the purpose for which it has been sanctioned and in accordance with terms and conditions laid down by the commission.

If as a result of check or audit objection, some irregularity is noticed at a later stage action will be taken to refund or regularize the objected amount.

Total actual expenditure incurred for the project is of Rs.1,60,471/- (Rupees One lac sixty thousand four hundred seventy one only)

Grant Sanctioned	**:**	**1,60,000/-**
Grant Received	**:**	**1,02,500/-**
Grant Utilized	**:**	**1,60,471/-**
Grant Receivable	**:**	**57,971/-**

Signature of Principal Investigator **Signature of Principal** **Signature of Chartered Accountant**

Annexure - IX

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI - 110 002

PROFORMA FOR SUBMISSION OF INFORMATION AT THE TIME OF SENDING

THE FINAL REPORT OF THE WORK DONE ON THE PROJECT

1. NAME AND ADDRESS OF THE PRINCIPAL INVESTIGATOR : **Dr. Dilip S. Pabreja**
2. NAME AND ADDRESS OF THE INSTITUTION : **SMT.S.M.Panchal Science College, Talod, Dist. Sabarkantha [Gujarat]**
3. U.G.C. APPROVAL NO. AND DATE : **F.47-910/2009 WRO Dated 22 Sep. 2009**
4. DATE OF IMPLEMENTATION : **22/09/2009**
5. TENURE OF THE PROJECT : **Two Years**
6. TOTAL GRANT ALLOCATED : **1,60,000/-**
7. TOTAL GRANT RECEIVED : **1,02,500/-**
8. FINAL EXPENDITURE : **57,971/-**
9. TITLE OF THE PROJECT : "**Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O,N-O,N-N, S-O Chelation**
10. OBJECTIVES OF THE PROJECT : Annexure-I
11. WHETHER OBJECTIVES WERE ACHIEVED : Annexure-II
12. ACHIEVEMENTS FROM THE PROJECT : Annexure-III
13. SUMMARY OF THE FINDINGS :
14. CONTRIBUTION TO THE SOCIETY (GIVE DETAILS) : Annexure-IV
15. WHETHER ANY PH-D. ENROLLED/PRODUCED OUT OF THE PROJECT - Nil

16NO. OF PUBLICATIONS OUT OF THE PROJECT: **2 Research Paper &1Uprogress**

(PRINCIPAL INVESTIGATOR) (PRINCIPAL)

Annexure - VIII

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI- 110 002

ACCEPTANCE CERTIFICATE FOR RESEARCH PROJECT

Name	:	Dr. Dilip S. Pabreja
No.	:	F.47-910/2009 WRO 22 Sep. 2009
Dated	:	22/09/2009
Title of the Project	:	**"Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O, N-O, N-N, S-O Chelation**

The research project is not being supported by any other funding agency.

1. The terms and conditions related to the grant are acceptable to the Principal Investigator and University/College/Institution.
2. At present, I have no research project approved by UGC and the accounts for the previous project, if any have been settled.
3. The College/University is fit to receive financial assistance from UGC and is included In the list prepared by the UGC.
4. The Principal Investigator is a retired teacher and eligible to receive honorarium as he/she is neither getting any honorarium from any agency nor is he/she gainfully employed anywhere.
5. His date of birth is : 04/04/1969
6. The date of Implementation of the project is 22/09/2009

Investigator Principal

Dated

SMT.S.M.PANCHAL SCIENCE COLLEGE,TALOD

DISTRICT. SABARKANTHA

NAME OF THE SCHEME : Financial Assistance to College Teachers for undertaking Minor Research Project

STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT

1. **Name of Principal Investigator : Dr. Dilip S. Pabreja**
2. **Deptt. of University/College : Smt.S.M.Panchal Science College, Talod, Dist. Sabarkantha [Gujarat]**
3. **UGC approval No. and Date : F.47-910/2009 WRO 22 Sep. 2009**

Title of the Research Project : "Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O,N-O,N-N, S-O Chelation

Effective date of starting the project : 22/09/2009

4. **(a) Period of Expenditure: From to : 22 Sep 2009 to 15 Sep. 2015**

h. Details of Expenditure :

Heads	Sanctioned amount	Received amount	Actual Expenditure
Books & Journals	20,000/-	20,000/	20,617
Equipments	25,000/	25,000/	25,023
Contingencies	30,000/-	15,000/-	30,175
Special needs	-------	-----	-----
Travels	15,000/	7500/	14,600
Chemicals	70,000/	35,000/-	70,056
Others Stationary expanses)	------	----	
Total	1,60,000	1,02,500/-	1,60,471

c. Staff Date of Appointment : Nil

1. **It is certified has the appointments) have been made in accordance with the terms and conditions laid down by the Commission. NA**
2. **It as a result of check or audit objective. Some irregularly is noticed, later dale, action will be taken lo refund, adjust or regularize the objected amounts.**
3. **Payment @ revised rates shall be made with arrears on the availability of additional funds.**

16 **If is certified that the grant of Rs1,60,471/- (Rupees one lacs sixty thousand four hundred seventy one only) received from the University Grants Commission under the scheme of support for Minor Research Project entitled ""Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O, N-O,N-N, S-O Chelation**

4. **Vide UGC letter No. F.47-910/2009 WRO dated 22 Sep. 2009 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by the University Grants Commission.**

PRINCIPAL INVESTIGATOR **PRINCIPAL**

CHARTERED ACCOUNTANT

CERTIFICATE OF STARTING AND COMPLITION OF PROJECT

It is certified that **Dr. Dilip S. Pabreja** has started his project work on 22/09/2009 and completed on 15/09/2015 funded by the university Grants Commission vide its sanctioned letter F. 47-910/2009 (WRO) dated 22nd Sep. 2009

Investigator Principal

Annexure

CERTIFICATE OF UNSPENT BALANCE

It is certified that **Dr Dilip S. Pabreja** received MRP funded by the University Grants Commission vide its sanctioned letter F. 47-910/2009 (WRO) dated 22nd Sep. 2009. He has utilized his all sanction amount and there is no unspent balance with him.

Investigator Principal

Annexure – VI

UNIVERSITY GRANTS COMMISSION

BAHADUR SHAH ZAFAR MARG

NEW DELHI-110 002

STATEMENT OF EXPENDITURE INCURRED ON FIELD WORK/TRAVELLING

Name of the principal investigator: Dr. D.S.Pabreja

Name of the place visited	Duration of the visit		Mode of journey	Expenditure Incurred (Rs.)
	From	To		
Patan for Paper Presentation 7th-10th Nov.2009	Talod	Patan	Car(GJ-5AR 1473)	2000/
Hansa Mehta Library,Baroda9/10/2010	Talod	Baroda	Car(GJ-5AR 1473)	2200/-
M.N. Sc. College, Patan For testing 7/6/2012	Talod	Patan	Car(GJ-5AR 1473)	2000/
M.N. Sc. College, Patan for result 9/6/2012	Talod	Patan	Car(GJ-5AR 1473)	2000/
Ahmedabad for books 11/09/2013	Talod	Ahmedabad	car(GJ-5AR 1473)	1200/
Ahmedabad for chemical 31/3/2014	Talod	Ahmedabad	car(GJ-5AR 1473)	1200/
Dept.of chem..HNGU for testing 18/10/2014	Talod	Patan	car(GJ-5AR 1473)	2000/
Dept. of chem..HNGU for result 25/10/2014	Talod	Patan	car(GJ-5AR 1473)	2000/
			Total	14600/

Certified that the above expenditure is in accordance with the UGC norms for minor research project

SIGNATURE OF PRINCIPAL INVESTIGATOR **PRINCIPAL**

Smt. S.M.Panchal Science College, Talod-383215

Dist.: Sabarkantha, Gujarat

Name of the scheme: Financial assistance to college teachers for undertaking Minor Research Projects

Sanctioned letter No.: File No.: 47-910/09(WRO) Date: 22/09/2009

Income	Rs.	Expenditure	Rs.
Grant received from UGC(WRO), Pune	**1,02,500**	Non-recurring books and journals Equipments	 **20,617** **25,023**
Loan from **Dr. D.S.Pabreja**	**57,971**	Recurring	
		Contingency	**30,175**
		Travel/Field work	**14,600**
		Chemicals	**70,056**
	1,60,471	Total	**1,60,471**

[One lac sixty thousand four hundred seventy one only]

Signature of Investigator

Signature of chartered accountant

Signature of Principal

Annexure VIII

Smt. S. M. Panchal Science College, Talod -383 215

District : SabarKantha, Gujarat

Final Report of Minor Research Project

1.Title of Project Work:	**"Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O,N-O,N-N, S-O Chelation**
2. Name of Research Scholar:	**Dr. Dilip S. Pabreja** **Associate Professor, Chemistry Dept.** **Smt. S.M. Panchal Science College** **Talod- 383 215, Gujarat**
3.Name of Co Investigator:	**Prof. J. J. Vora** **Head, Department of Chemistry** **Hemchandracharya** **North Gujarat University, Patan.**
4.College Affiliated to:	**Hemchandracharya** **North Gujarat University, Patan.**
5.Reference no. & Date:	**File-47-910/09, 22nd Sept,,2009**
6.Total Grant Allocated :	**Rs. 1,60,000**
7.Total Grant received :	**Rs.1,02,500**
8.Final Expenditure :	**Rs.1,60,471**

9. Executive Summary of the Project

To Satisfy the academic lust of the long deprived areas of our nation, the U.G.C. has provided various schemes of financial assistance for major and minor research work to university and college teachers to take up work on intensive andin depth study in specific subject area, In this regard, on 22nd September , 2009 the U.G.C sanctioned the financial assistance to Dr. Dilip S. Pabreja to carry out above said research project.

Oxine and Amino Salicylic Acids are known as a chelating agent. Both ligands has been used as a chelating agent with transition metal ions. N-N, N-O, O-O, S-O containing donor atom are an important class so there are many binary coordination compounds of Oxine and 4 amino salicylic acid has been synthesized with transition metal in coordination chemistry A large number of metal oxine complexes have been found to possess important biological activity. Due to their great flexibility and diverse structural aspects a wide range of metal oxine complexes have been synthesized and their behavior was studied, simultaneously the coordination complexes of 4 amino salicylic acid and 5 amino salicylic acid are of great interest due to their coordinating nature but nobody synthesized mixed ligand complex with inner transition metal . In the present work, a systematic investigation has been carried out as per the Project design mentioned in proposal.

The following salient features were studied:

(1) Literature Survey.

The project started with literature search and secondary data collection was carried out from library listed below:

(i) Library of Smt. S.M. Panchal Science College, Talod.

(ii) Library of Hemchandracharya North Gujarat University, Patan.

(iii) Library of Hansa Mehta , Baroda.

(iv) Internet Surfing

(2) Various Chemicals were purchased from the Piyush Chemicals and Nataraj Scientific Trading. They were of LR/AR grade. Their Purities were checked by Standard method. Inner transition metals are not freely available so it takes lot of time to supply. This is the one reason for late submission.

(3) Preparation of required solution:-

Various 'f' blocks metal solution and ligand solutions were prepared . All the metal nitrates are soluble in water while Ligands are soluble in ethanol.

(4) Instruments & Calibrations.

Instruments were purchased from Piyush Chemicals & Suntech Enterprise and Calibrated by standard method.

5) Standarization

The metal ion solution were standardization by Complexometry. The purity of ligands was checked by methods like M.P. & TLC.

6) Synthesis of chelates.

The Synthesis of Praseodymium(III), Samarium(III), Gadolinium(III) and Cerium(IV) in ethanolic solution of oxine primary ligand stirring for 10 to 15 minutes. Then adding slowly gradually ethanolic solution of 4-amino salicylic acid or 5-amino salicylic acid secondary ligand and refluxed for 5 to 7 hrs. In each case, then pH was maintained and the complexes were separated out. All the complexes were found in different in a colour.

PREPARATION SCHEME:

$$M(NO_3)_3(0.2mole)+Oxine(0.2mole)+4ASA(0.2mole)\downarrow$$

pH raised to 5-6 by $\downarrow$ 0.1MNaOH

$$\left[M(Oxine)(4ASA)(H_2O)_2\right]$$

Where M=Pr^{+3},Sm^{+3},Gd^{+3}

and

Ce^{+4}(0.2 mole) +Oxine(0.2mole) +4ASA(0.2mole)↓

pH raised to 5-6 by ↓ 0.1MNaOH

$$\left[Ce(Oxine)(4ASA)(H_2O)_2\right]NO_3$$

7) Checking of purity.

After synthesis the melting point of each complexes was checked. These M.P were quite different from the sharp melting points of the ligands. The purity of complexes was checked by thin layer chromatography. All complexes gave one single sharp spot on thin layer chromatography plate.

8) Characterization.

- Purified products then decomposed by acid mixture and make the exact molar solution then carried out EDTA titration.

- Purified products were sent to M.N. Science College, Patan for FTIR.

- For cross verification purified products were also sent to Department of Chemistry, Hemchandracharya North Gujarat University, Patan and carried out FTIR, TGA, DSC, Elemental analysis etc.

- Conductivity were checked by EQ-634.

- In a last trying to check antimicrobial activity of the complex.

Objectives:

Coordination compounds are of great importance for the medicinal chemists because of their diverse type pharmacological activities. They play vital role in biological field .N-O donor atom, O-O donor atom compounds and their metal complexes have gained importance for the past several years because of their application in biochemical, biological, analytical and antimicrobial system.

My work seems to be important especially in the case of Inner Transition metal mixed ligand complexes, for which there are less data in the literature compared to the d-electron metals.. Inner Transition metals have f block electrons and having a variety of oxidation state, valency , as a inorganic chemist I am quite interested to study the geometry , magnetic properties, hybridization of the rare earth complexes.

OUT COME OF THE MINOR RESEARCH PROJECT

(A) RESEARCH PUBLICATION :

- **Mixed Ligand Complexes of Praseodymium(III),Samarium (III),Gadolinium (III) and Cerium (IV) with N-O donor atom of Oxine and O-O donor atom of Parasalicil …….International Journal of Chemtech Application ,INTJCA**
- **Synthesis, Characterization and Spectral Studies of Mixed ligand complexes of Rare Earth Elements with N-O donor atoms as primary ligand and O-O donor atoms as secondary ligand …….E-Journal (communicated)**
- **Synthesis and Antimicrobial Studies of Rare Earth Complexes. ……(under progress)**

(B) Seminar /Conferences/workshop attended :

- **Two Research paper presented in international conference in Pittcon Florida-USA**
- **Presented research paper in 28th annual conference of Indian Council of Chemists at Patan**
- **Attended seminar on "The Role of Chemists in Industries and Research" at Pilvai.**

I want to express my sincerest gratitude to the authority and officials of U.G.C for providing me with this opportunity and grant to carry out the research work.

I also want to bring to your attention that I have spent the funds of the first installment, the details of which are furnished herewith. My Project is completed and thus I would like to request you to kindly disburse the remaining installment at the earliest

Signature of Investigator

(Dr. Dilip S. Pabreja)

Smt. S.M.Panchal Science College, Talod-383215

Dist.: Sabarkantha (Gujarat)

ACCESSION CERTIFICATE

(For Books of Minor Research Project Dr. Dilip S. Pabreja)

It is certified that Dr. Dilip S. Pabreja has purchased books from sanctioned MRP by the University Grants Commission vide its sanctioned letter No.F. 47-910/09 (WRO) dated 22nd September 2009 has been utilized.

Books are handed over to the college.

.

Sr.No.	Author	Title of the Book	Accession No.
1	Nakamoto	Infrared Spectroscopy of coordination compound	9233

Signature of Chartered Accountant with seal and Regd. No.

Signature of Librarian **Investigator** **Signature of the Principal With seal**

Smt. S.M. Panchal Science College, Talod-383 215

Dist.: Sabarkantha (Gujarat)

ASSET CERTIFICATE

(For Equipment of Minor Research Project Dr. Dilip S. Pabreja)

It is certified that the following equipments have been purchased under MRP sanctioned by the University Grants Commission vide its sanctioned letter NO F. 47-910/09 (WRO) dated 22nd September,2009. All the equipments are handed over to the college.

No	Name of Instruments	Quantity	College Instru. Code
1.	Magnetic stirrer with hot plate MLH (Remi)	01	UGC.MRP-XI plan dsp-01
2.	Magnetic stirrer with hot plate MLH(Remi)	01	-UGC.MRP-XI plan dsp-02
3	pH meter digital	01	UGC.MRP-XI plan dsp-03
4	Melting Point apparatus	01	UGC.MRP-XI plan dsp-04

Signature of the Principal with seal

Signature of Principal Investigator

Signature of Chartered accountant with seal & Regd.No.

CERTIFICATE

This is to certify that the Minor Research Project of Principal Investigator (P.I.) Dr. Dilip Shrichand Pabreja has uploaded the executive summary of the project on the college website , the URL link is

_____.This certificate is as per the requirement

under Minor Research Project guidelines.

Signature of Principal

Smt. S.M.Panchal Science College,Talod – 383 215
District : Sabar Kantha , Gujarat

Name of the Scheme : Financial Assistance to College Teachers for undertaking Minor Research Projects

Acceptance Certificate for Research Project

Name: **Dr. Dilip Shrichand Paberja**

UGC Letter No.F. No.: 47-910/09(WRO)

Title of the Project : "Synthesis, Characterization and Comparative Studies of novel mixed ligand complexes of 4f and 5f orbital elements with O-O,N-O,N-N, S-O Chelation

1. The research project is not being supported by any other funding agency
2. The terms and conditions related to the grant are acceptable to the Principal Investigator and University/College/Institution
3. At present ,I have no research project approved by UGC and the accounts for the previous project,if any have been settled
4. The college/Universityis fit to receive financial assistance from UGC and is included in the list of section 2(f) & 12(B)prepared by the UGC
5. The PrincipalInvestigator is a retired teacher and eligible to receive honorarium as he/she is neither getting any honorarium from any agency nor is he/she gainfully employed anywhere . NA
6. His date of Birth is 04/04/1969 and age is $6 years
7. The date of Implementation of the project is 2009

Principal **Principal Investigator**

Annexure X

SUMMARY OF THE WORKDONE ON MINOR RESEARCH PROJECT

During the past two decades considerable attention has been paid to the chemistry of the metal complexes of ligand containing N-N , N-O, O-O, S-O donor atoms. This ligand offer a versatile and flexible series of complexes because it is capable to bind with various metal ions to give complexes with suitable properties .Large number of polydentate ligand have been structurally characterized and extensively investigated. This may be attributed to their stability, biological activity and potential application in many field such as oxidation catalysis, electro chemistry . Various studies have shown a relationship between the metal ions and their metal complexes as anti tumors and anti bacterial agents. Which is subject of great interest .The inorganic pharmacology started to be an important field with more than 25 inorganic compounds being used in therapy as anti bacterial ,anti viral and anti cancer drugs.

When one type of ligand associate with metal is known as binary complexes while two type of ligand associate with metal is known as mixed ligand complexes or ternary complexes.

In the present work a systematic investigation of mixed ligand complexes have been synthesized and characterized by elemental analysis, spectral studies and thermal gravimetric analysis .

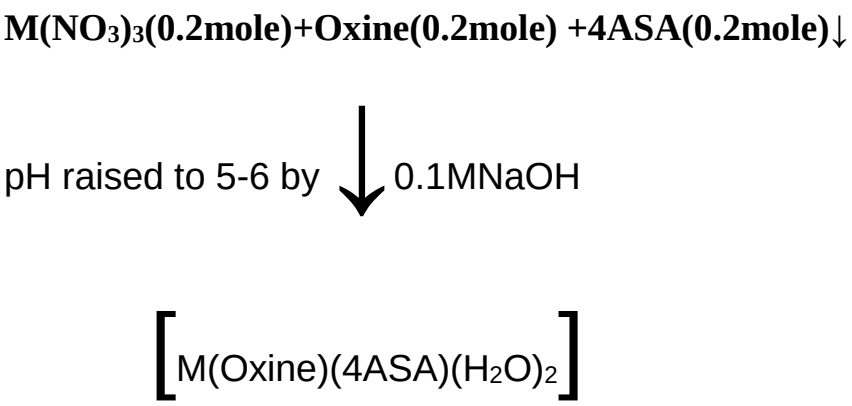
In the first step reference work has been done in different library after completion of library work , purity of metal and ligand were checked by different method likeM.P., T.L.C. method then synthesized complexes in following pattern.

SYNTHESIS

All the used chemical were of AR grade, the complexes were prepared by reacting respective metal nitrate of Praseodymium (III), Gadolinium (III), Samarium (III) and Cerium (IV) in ethanolic solution of oxine ligand stirring for 10-15 minutes. Then gradual addition of ethanolic solution of 4-amino salicylic acid in the above mixture was carried out and heated for reflux for 5-7 hours in each case, After cooling, the mixture pH was checked and maintained 5.0 by adding 0.1M NaOH solution. Complex mixture separated out which were filtered and washed several times with hot water and ethanol. Yield was 70-75% in each case.

All complexes were found in different colors and to be insoluble in water and also in the most of the organic solvents

PREPARATION SCHEME:



Where M=Pr^{+3},Sm^{+3},Gd^{+3}

and

Ce^{+4}(0.2 mole) +Oxine(0.2mole) +4ASA(0.2mole)↓

pH raised to 5-6 by ↓ 0.1MNaOH

$$\left[Ce(Oxine)(4ASA)(H_2O)_2\right]NO_3$$

In the second stage characterization of complexes were carried out by different method.