

MAH/MUL/ 03051/2012

ISSN :2319 9318



**Government College of Education, Akola (CTE)**

Near Akola Netra Hospital, Ramdas Peth, Akola

National Conference  
on

***Research in Interdisciplinary Studies***

**Date : 18 March, 2020**

**Editor**

**Dr. Vasudha V. Deo  
Principal**

**Co-Editor**

**Dr. Asha Dharaskar (Bhavsar)  
IQAC Coordinator**



Reg.No.U74120 MH2013 PTC 251205

**Harshwardhan Publication Pvt.Ltd.**

At.Post.Limbaganesh,Tq.Dist.Beed

Pin-431126 (Maharashtra) Cell:07588057695,09850203295

harshwardhanpubli@gmail.com, vidyawarta@gmail.com

All Types Educational & Reference Book Publisher & Distributors / [www.vidyawarta.com](http://www.vidyawarta.com)

## Literature Review as a Research Methodology

: Experimental and Theoretical Approach  
Towards Schiff's Base Metal Complexes.

S. R. Khandekar

Department of Chemistry,  
Indira Mahavidyalaya, Kalamb, Dist. Yavatmal

\*\*\*\*\*

### Abstract

Research methodology in chemical sciences provides specific survey of equivalent problems in experimental, theoretical, and applied chemistry. For improving the quality of research, pay attention towards designing and adhering to the appropriate methodology. The present paper is for developing the most appropriate methodology for research studies and to get familiar with the art of using different research methods and techniques. In the context of present scenario Schiff base metal complexes are extensively studied for their antibacterial, antifungal, antiviral, anti-inflammatory, and antitumor activities. Besides these, they also bear strong catalytic activity in various chemical reactions in chemistry and surfactant activities and as memory storage devices in electronics. Its wide applications in agro-industry and as pharmaceutical ingredients in drug discovery are the key points for these research investigations. In the present review article, we have focused on the various steps of research methodology which can be applied to the different aspects of the Schiff base ligands getting coordinate to metal to form a metal complex.

**Keywords:** Schiff Bases, metal complexes, Planning a research study, Conducting a research study.

### Introduction

Ever since the Italian chemist, Hugo Schiff used imines to make several "metallo-imines", numbers of variants of the condensation products of imines and aldehydes or ketones such as  $RCH=NR_2$ —where R & R<sub>2</sub> are alkyl and/or aryl substituent's, are popularized. They are also known as Schiff bases (SBs), anils, imines or azomethines. They are also known as anils, imines, or azomethines. These have several applications in organic studies, such as for building new heterocyclic systems, for identification, detection, and determination of aldehydes and ketones, for purification of carbonyl or amino compounds, or for the protection of these groups during the complex formation or such sensitive reactions<sup>1</sup>. They have other side applications in various other fields, coordination chemistry<sup>2</sup>, analytical chemistry<sup>3</sup>, pigments and dyes, and polymer industries<sup>4</sup>, in vitamins and enzymes for model biomolecules. There is a special mention of these complexes in agriculture as fungicides, pesticides, and bacteriocides.

Survey of the literature for SB metal complexes and their applications showed excellent review articles<sup>5-6</sup> for the detailed understanding of this class of compounds in all respects and one more especially dedicated to copper complexes<sup>7</sup>. They provide several details on number of metal complexes derived from SBs used widely for applications in food and dye industry, analytical chemistry, catalysis, polymers, antifertility, agrochemical, anti-inflammatory activity, antiradical activities, and biological systems as enzymatic agents. Several have reviewed them in light of their antimicrobial, antibacterial, antifungal, antitumor, and cytotoxic activities. There are some individual articles too not mentioned in them with studies on the above mentioned types of activities with some metals ions.

Research methodology is a highly intellectual human activity used in the

investigation of nature and matter and deals specifically with the manner in which data is collected, analyzed and interpreted. Research is undertaken within most professions. More than a set of skills, research is a way of thinking: examining critically the various aspects of your day-to-day professional work; understanding and formulating guiding principles that govern a particular procedure; and developing and testing new theories that contribute to the advancement of your practice and profession. It is a habit of questioning what you do, and a systematic examination of clinical observations to explain and find answers for what you perceive, with a view to instituting appropriate changes for a more effective professional service<sup>8-9-10</sup>.

Let us take some disciplines as examples. In Chemical sciences there are many topics on which can go for research. For carrying research in Schiff base many question arises from where we can get the information regarding this upto how it will be put in the research report with more validity and reliability.

While starting for the research in the field of Schiff base metal complexes, eight-step model is to be considered<sup>11-12-13</sup>.

Phase I-Deciding what to research

Step I-Formulating a research problem

Phase II- Planning a research study

Step II - Conceptualizing a research

design

Step III- Constructing an instrument for data collection

Step IV-Selecting a sample

Step V -Writing a Research proposal

Phase III- Conducting a research study

Step VI - Collecting data

Step VII - Processing and displaying data

Step VIII- Writing a research report

While deciding the research topic, formulating a research problem is the prior and important step. Formulating a research problem helps to identify the scope of research. It enhances the study design of the metal

complexes, chemicals measurement procedures, making sampling strategy for synthesis of ligands and metal complexes, frame of analysis on basis of various analytical processes and the style of writing of Schiff base metal complexes thesis. During formulating a research problem, reviewing the literature plays an important role. Literature review of Schiff base ligand containing metal complexes helps to find the area which not yet reveal or is suppressed. Reviewing the literature is continues until the report is finished. Literature review provides theoretical background for the thesis. Literature review forces to find 'Variable' for making the research clear and specific. Which instruments are going to use for synthesis of ligands and metal complexes , specific electronic gadgets required for the data analysis , interpretation of analytical data, and conclusion of the research that the Schiff base metal complexes is obtained can be made on basis of selection of the variables. Hypotheses, though important, are not essential for a study<sup>14-15</sup>.

After deciding to go for specific research problem, designing the research problem is the next step.

What procedures will you adopt to synthesize the Schiff base ligand? How will you carry out the tasks needed to complete the various characterization of the research process? What should you do and what should you not do in the process of undertaking the study? Basically, answers to these questions constitute the core of a research design. A research design is a plan, structure and strategy of investigation so operate to research questions or problems action research, feminist research, and participatory and collaborative enquiries, are the four different approaches<sup>16-17</sup>.

Schiff base metal complexes are categorized under quantitative research which involves the synthesis of ligand and metal complexes, generating, recording and analyzing the data. In quantitative research the information,



is collected by making characterization of the research problem on the basis of NMR, IR, UV-Visible, Mass spectroscopy, XRD, SEM, TEM, Molar conductivity, TGA. In quantitative research, attitudes are measured by different techniques. In Schiff base metal complexes, the analysis of collected data is then explores, measure and intensify to different aspects of an issue to arrive at conclusion. The one of the core part of the quantitative research involved sampling method which carried out inferences about the group from which distinct samples regarding research work has been collected. In quantitative research, randomization is used to avoid bias in the selection of a sample and is selected in such a way that it represents the study population. After sampling, a research proposal which details the operational plan for obtaining answers to research questions is to be submitted. It gives an idea about what you propose to do, how you plan to proceed and why this research problem has selected<sup>18-19</sup>.

Research proposal includes an introduction about coordinate complexes containing literature review, Theoretical framework or supporting information to the Schiff base metal complexes, conceptual framework which includes the basis of research problem, objectives, hypothesis, study design, setting, research instruments, sampling design and size, ethical issues involved, data processing procedures, proposed chapters pertaining to the Schiff base metal complexes in addition to this problems and limitations included in the said work and finally the proposed time frame for the research work<sup>20-21</sup>.

This awareness of the ethical issues which has to be considered while conducting proposed research work. As per as the research participants is concerned, the following areas could pose ethical issues if not dealt with properly: collecting information; seeking consent; providing incentives; seeking sensitive information; the possibility of causing harm to

participants; and maintaining confidentiality. The processing of data which includes synthesis of Schiff base metal complexes which involved relevant characterization of samples undertaken from a set of data which is collected until it is ready to be analyzed<sup>22</sup>.

After synthesis of ligands, precursors and metal complexes, characterization process has to be carried out for confirmation of samples which has been prepared by various synthesis techniques. All the research work findings including synthesis and characterization in both quantitative and qualitative research are usually conveyed with text in addition with tables, graphs and statistical measurement. These can make our research work better, clearer, more effective and easier to understand<sup>23</sup>.

### Conclusions

Quantitative research, in addition to being descriptive, it is also analytical and every assertion is supported by empirical evidence gathered through the investigation. All research reports must be written clearly and concisely work related to synthesized materials. Furthermore, scientific writing requires intellectual rigour and there are certain obligations in terms of accuracy and objectivity. The conclusion of the said research work should be written around the main themes of the study and for this sub-objectives are of immense help. When providing specific information about a variable, the writeup should integrate the rationale for studying the variable; the literature review; the hypothesis, if any; findings; conclusions drawn; and possible explanations for the findings.

### References

1. S. Patai, "The chemistry of carbon-nitrogen double bond," in General and Theoretical Aspects, C. Sandorfy, Ed., chapter 1, pp. 1-60, Interscience, William Clowes and Sons, London, UK, 1970.
2. N. F. Curtis, "Macrocyclic coordination compounds formed by condensation of metal-

- amine complexes with aliphatic carbonyl compounds," *Coordination Chemistry Reviews*, vol. 3, no. 1, pp. 3–47, 1968.
3. E. Bayer, "Structure and specificity of organic chelating agents," *Angewandte Chemie International Edition*, vol. 3, no. 5, pp. 325–332, 1964.
  4. C. S. Marvell and N. Tarkoy, "Heat stability studies on chelates from schiff bases of salicylaldehyde derivatives. II," *Journal of the American Chemical Society*, vol. 80, no. 4, pp. 832–835, 1958.
  5. W. Qin, S. Long, M. Panunzio, and B. Stefano, "Schiff bases: a short survey on an evergreen chemistry tool," *Molecules*, vol. 18, no. 10, pp. 12264–12289, 2013.
  6. S. Kumar, D. N. Dhar, and P. N. Saxena, "Applications of metal complexes of Schiff bases—a review," *Journal of Scientific and Industrial Research*, vol. 68, no. 3, pp. 181–187, 2009.
  7. R. Katwal, H. Kaura, and B. K. Kapur, "Applications of copper—Schiff's base complexes: a review," *Scientific Reviews & Chemical Communications*, vol. 3, no. 1, pp. 1–15, 2013.
  8. Ranjit Kumar, *Research Methodology a step by step guide for beginners*, SAGE publication Ltd., 2011
  9. Marshall, Catherine & Gretchen B. Rossman, *Designing Qualitative Research*, Thousand Oaks, CA, Sage 2006.
  10. Rutman, Leonard (eds), 1977, *Evaluation Research Methods: A Basic Guide*, Beverly Hills, CA, Sage.
  11. Dawson, Catherine, 2002, *Practical Research Methods*, New Delhi, UBS Publishers' Distributors
  12. Kothari, C.R., 1985, *Research Methodology- Methods and Techniques*, New Delhi, Wiley Eastern Limited.
  13. Marshall, Catherine & Gretchen B. Rossman, 2006, *Designing Qualitative Research*, Thousand Oaks, CA, Sage.
  14. Denzin, Norman K., Ed.; Lincoln, Yvonna, Ed., *The Landscape of Qualitative Research*. Third Edition, SAGE Publications (CA)
  15. Kvale, Steinar & Svend Brinkmann, 2009, *Interviews (2nd edn)*, Thousand Oaks, CA, Sage.
  16. Krueger, Richard & Mary Anne Casey, 2000, *Focus Groups: A Practical Guide for Applied Research (4th edn)*, Thousand Oaks, CA, Sage.
  17. Denzin, Norman K. & Yvonna S. Lincoln (eds), 2005, *The Sage Handbook of Qualitative Research (3rd edn)*, Thousand Oaks, CA, Sage.
  18. Creswell, John W., 2007, *Qualitative Inquiry and Research Design: Choosing among Five Approaches (2nd edn)*, Thousand Oaks, CA, Sage.
  19. Creswell, John W., 2003, *Research Design: Qualitative, Quantitative and Mixed Methods Approaches (2nd edn)*, Thousand Oaks, CA, Sage.
  20. Commonwealth of Australia, 2002, *Style Manual (6th edn)*, Milton, Wiley Australia.
  21. Cherry, Nita, 2002, *Action Research: A Pathway to Action, Knowledge and Learning*, Melbourne, RMIT Publishing.
  22. Webster's Third New International Dictionary, 1976, G. & C. Company, Springfield, MA.
  23. Elaine Diane D. Idano, *The research problem and the importance of the hypotheses*, Individual Report No. 2 November 26, 2011.

