

# Application of Metal Complexes of Schiff Bases- A Review

<sup>1</sup>Chaitanya Atmaram Datal, <sup>2</sup>Aakash Sanjeev Singare, <sup>1</sup>Nanda Sheshrao Korde\*

<sup>1</sup>Department of Chemistry, Dayanand Science College, Latur, Maharashtra, India.

<sup>2</sup>School of Chemical Science, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India.

Email. id : nandineekorde0@gmail.com

## Abstract:-

Transition metal complexes are adaptable compound prepared from the precipitation of an amino compound along carbonyl compound and broadly used for industrial applications and besides shows the wide scope of biological activities including antifungal, anti-bacterial, anti-malarial, anti-inflammatory, anti-diabetic properties. Transition metal have an powerful place inside medicinal biochemistry. Research has exhibited dominant progress in applications of transition metal complexes as drug to cure numerous human disease such as carcinomas, lymphomas, infection control and neurological disorder. Metal complexes illustrate significant part in agriculture pharmaceutical and industrial chemistry. Transition metals reveal that oxidation states can interconnected with a number of anion categories. The character of the complexes established studied the continuous variation method and molecular ratio.

**Key Words:-** Transition metal, biological activity, applications, therapeutic metal.

## Introduction:-

Transition metal complexes are prepared from the Schiff bases. Transition metal has an esteemed place in medicinal chemistry. Transition metal represents the d block component incorporate group 3-12 on the periodic table. Their d Block shell is in process of filling. Transition metal complexes are beside said to be co-ordination compound. Metal complexes are a structure consisting of a ion bonded with anions. Mixtures that carry a coordination complex are called co-ordination compounds. Central metal ions play and significant function in wide range of biotic activities. In various field transition metal complexes are recycled such as medicine, agriculture and industries. Metal complexes play much critical function in human. The transition

metal ions are accountable for proper functioning of dissimilar enzymes.

## Importance of transition metal complexes:-

Transition metal complexes are cationic, neutral or negative charged species. And it is coordinated by ligand<sup>[1]</sup> Transition metal complexes present the midway of periodic table. Transition metal complexes are the class of metal .d-block elements are known as transition element. <sup>[2-3]</sup>Medicinal applications of metals can be traced back almost 5000 years. <sup>[4]</sup>Transition metals such as copper iron and manganese, among others, are participate in multiple biological processes, from electron move to catalysis to structural roles and commonly analogous with active site of proteins enzymes.<sup>[5]</sup>The progress in inorganic chemistry gives better chance to utilize the metal

complexes as therapeutic agents.<sup>[6]</sup>The use of transition metal complexes as therapeutic compound has become more and more pronounced. These complexes offer a great diversity in their action such as anti-inflammatory, anti-infective and anti-diabetic compound.<sup>[7]</sup>Transition metal complexes of Schiff bases are one of the most adaptable and thoroughly studied system. These complexes have also application in clinical analytical and industrial in addition to their important roles in catalysis and organic synthesis.<sup>[8]</sup>own health, aging, physiological disorders and infection are connected to the state of the metal ions and their complexes with biomolecules in the body.<sup>[9-10]</sup>Transition metal complexes can aggregate to a broad range of co-ordination geometries that give them unique shape. Bond length, bond angle, and co-ordination site vary depending on the metal and its oxidation state.<sup>[11-13]</sup> A wide arrangement of medicinal employment of metal complexes have been analysis and many freshly reviews summarize advances in these fields.<sup>[14-18]</sup>The metal based drug are also being used for the cure of variety of ailments viz. diabetes, rheumatoid arthritis, inflammatory and cardiovascular diseases as well as diagnostic agents.<sup>[19-21]</sup>

#### **Transition metal complexes as anti-diabetic agents:-**

Power of the glucose level in the blood plasma has been realize by management of vanadium and zinc in form of inorganic salts. It has been indicate that element are efficiently consume in there inorganic forms and appropriate high doses, which have been connected with undesirable side effect.<sup>[22-24]</sup>More than 2-8% of world's population is suffering from diabetes.<sup>[25]</sup>

#### **Transition metal complexes as anti-cancer agents:-**

Platinum(II) complexes has been used as anticancer drug since long, among them cisplatin has proven to be a highly effective chemotherapeutic agent for treating various type of cancer.<sup>[26]</sup> the binding of HMG protein to cisplatin DNA adduct has been suggested to enhance anticancer effect of the drugs. Titanium complexes has been recognized as active anticancer drug against breast and gastrointestinal carcinomas. Gold complexes also shown anticancer activity, these complexes act through a different mechanism as compared to cisplatin.<sup>[27]</sup>Platinum is not only used in the metal it is used in the treatment of cancer and many other transition metal are used in the anti-cancer drug.<sup>[28]</sup>Five ternary complexes of the rare earth ions with o-phenanthroline and Schiff base salicylaldehyde L – phenylalanine were tested as anticancer.<sup>[29]</sup>

#### **Transition metal complexes as antimicrobial agents :-**

Transition metal complexes for example silver was utilized for years as antimicrobial agents. Silver has less noxious as differentiate to further transition metal. One of the more frequently utilized compounds of silver is silver sulfazine; it is utilize to cure severe burns to stop the bacterial infections. Chlorohexidine- silver Sulfadiazine is an anti-infective metal complexes adverse catheter infections in vivo.<sup>[30]</sup>Antimicrobial activity of organotin(IV) complexes along isatin and N-alkylisatin bithiocarbonohydrazones has besides reported in these paper.<sup>[31]</sup>

#### **Transition metal complexes as a anti- oxidant activity:-**

Anti-oxidant activity are classical since they are essential and inexpensive than natural antioxidants.<sup>[32]</sup>The developing of well organized , less poisonous, purpose individual metal drugs and assess their anticancer character in terms of oxidation states and co- ligands sphere, a sequence of Ru(III) complexes bearing 4 hydroxy- pyridine -2-6- dicarboxylic acid and pph<sub>3</sub>/ Asph<sub>3</sub> were synthesized and structurally characterized.<sup>[33]</sup>

#### **Transition metal complexes as anti-inflammatory activity:-**

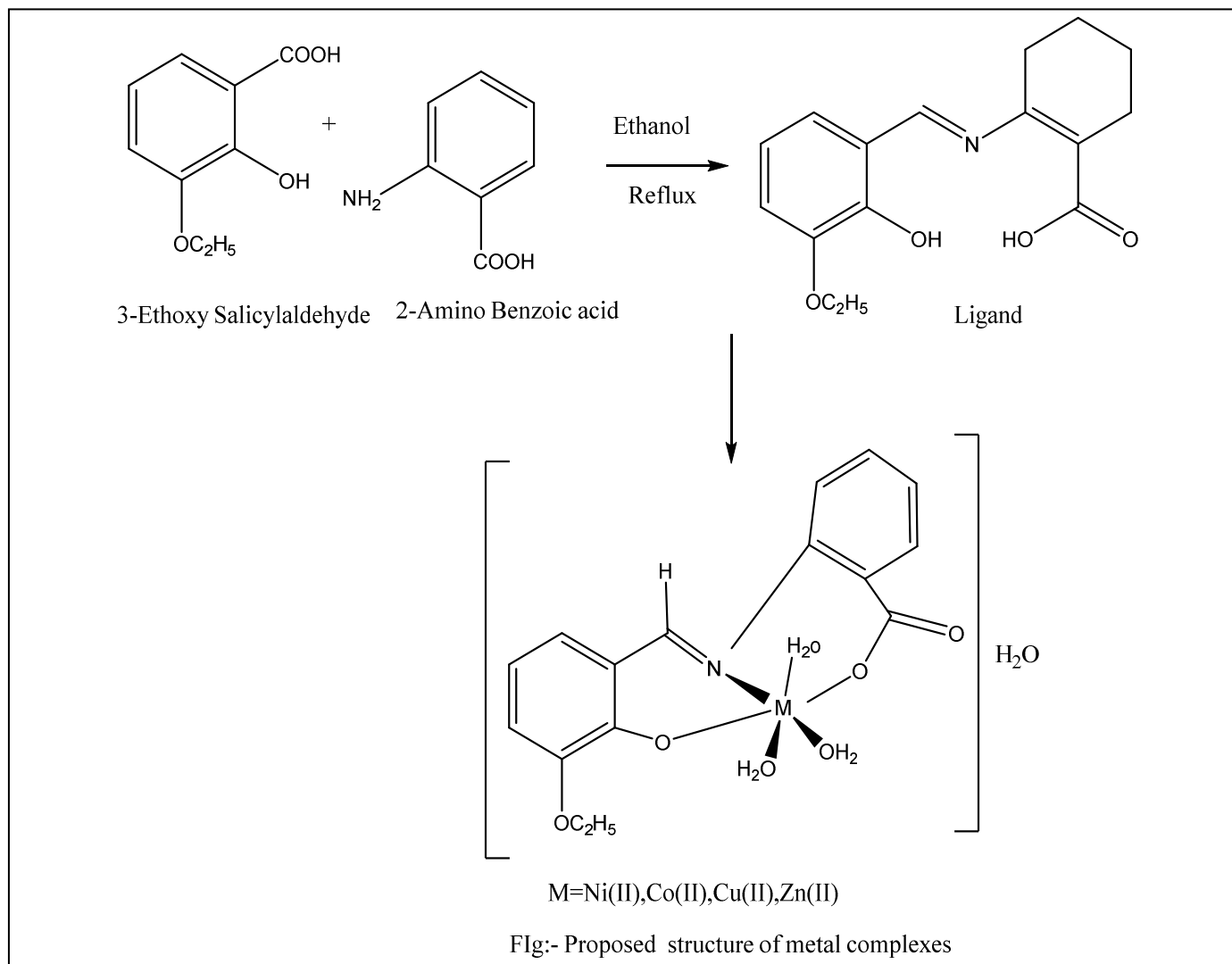
To cure the cell and tissue manganese complexes have beside used. Oxidative injuries by acting as superoxide anion scavenge.<sup>[34]</sup>Cure of asthma in children magnesium is used. A few Cu complexes are besides working against inflammation but there advantages is finite.<sup>[35]</sup>Anti-inflammatory, anti-proliferative and radical scavenging agents should be studied as Tolfenamic acid and their complexes.<sup>[36]</sup>

#### **Transition metal complexes as a antihypertensive activity :-**

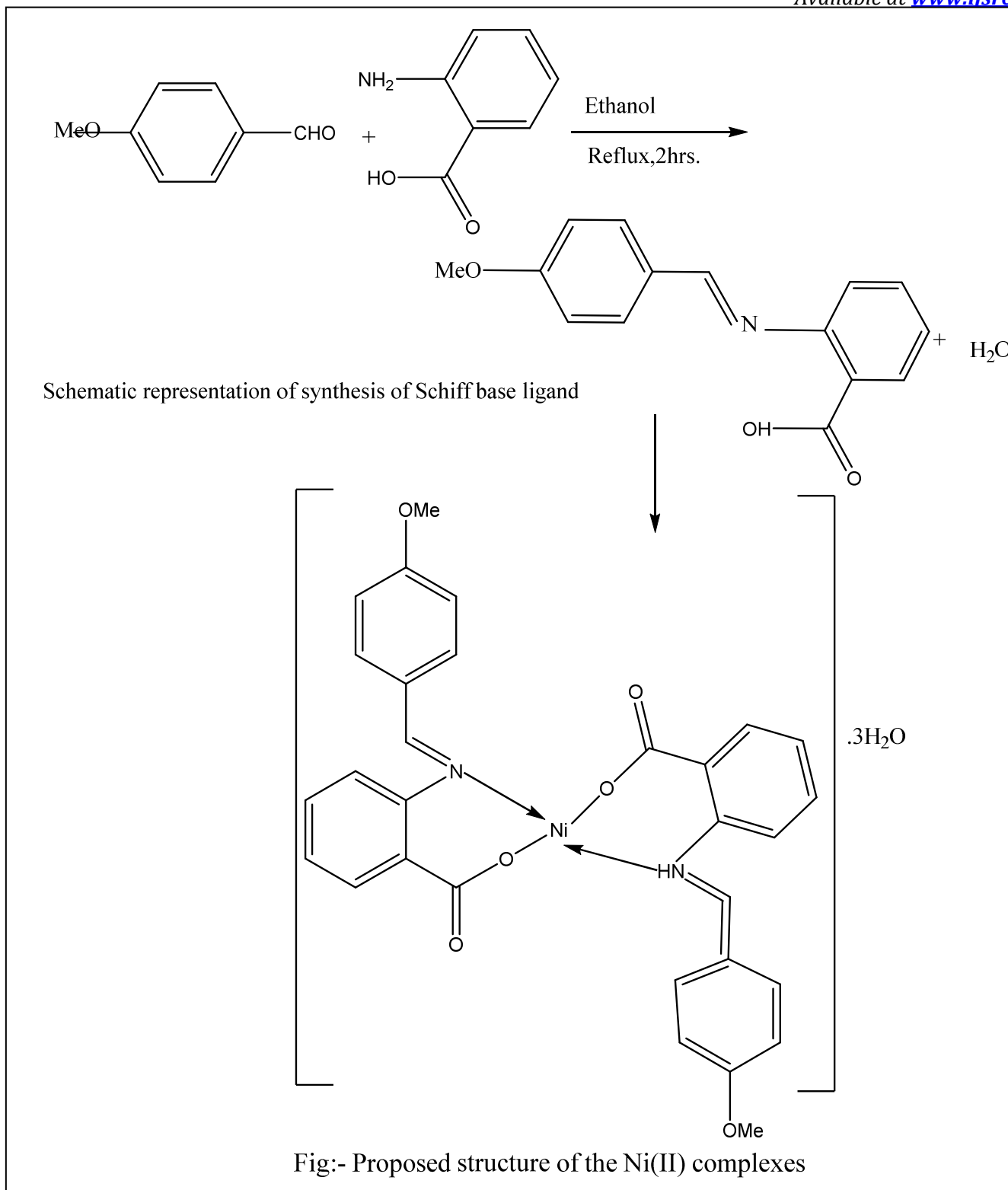
Sodium nitroprusside is utilize clinically to cure hypertensive patients in critical situation. Ruthenium complexes introduce comparable antihypertensive activity but reduced toxicity when correlated with sodium nitroprusside in animal studies.<sup>[37]</sup>It has shown prolonged antihypertensive activity within normotensive and acute hypertensive wistar rats.<sup>[38]</sup>

#### **Previous Related Studies :-**

K. Mounika, B. Anupama , J. Pragathi , and Gyanakumari studied about the Synthesis, characterization and biological activity of a Schiff base derived from 3- ethoxy salicylaldehyde and 2- amino benzoic acid and its transition metal complexes. The ETSAN ligand and there metal complexes of Ni(II), Co(II), Cu(II) , and Zn(II) have been distinguish. The analytical data show that the metal complexes stoichiometry in all these complexes is 1:1. Biotic accomplishment of these complexes discuss that they shows better activity when differentiate to that of the ligand.<sup>[39]</sup>



Abubakar Abdullahi Ahmed, Hassan Usman Ali, Abdullahi Idi Mohammed studied about the synthesis and physiochemical study on Ni(II) complexes of Schiff base derived from 4-methoxybenzaldehyde and o-aminobenzoic acid. Nickel(II) complexes of a Schiff base derived from 4 – methoxybenzaldehyde and 2-amino benzoic acid has been synthesized. The metal complexes is hydrated.<sup>[40]</sup>



Schiff Schiff bases and their metal complexes are correlated with various pharmacological and biological character thus discover importance in medicine. Biological importance of transition metal complexes were reported by Ahmed M, Abu-Dief, Ibrahim M.A Mohamed. Ahmed M, Abu-Dief, Ibrahim M.A Mohamed

reported about the A review on versatile application of transition metal complexes incorporating Schiff bases. They investigate catalytic activity of ligand complexes of Sm(II), Gd(II), Dy(III).<sup>[41]</sup>

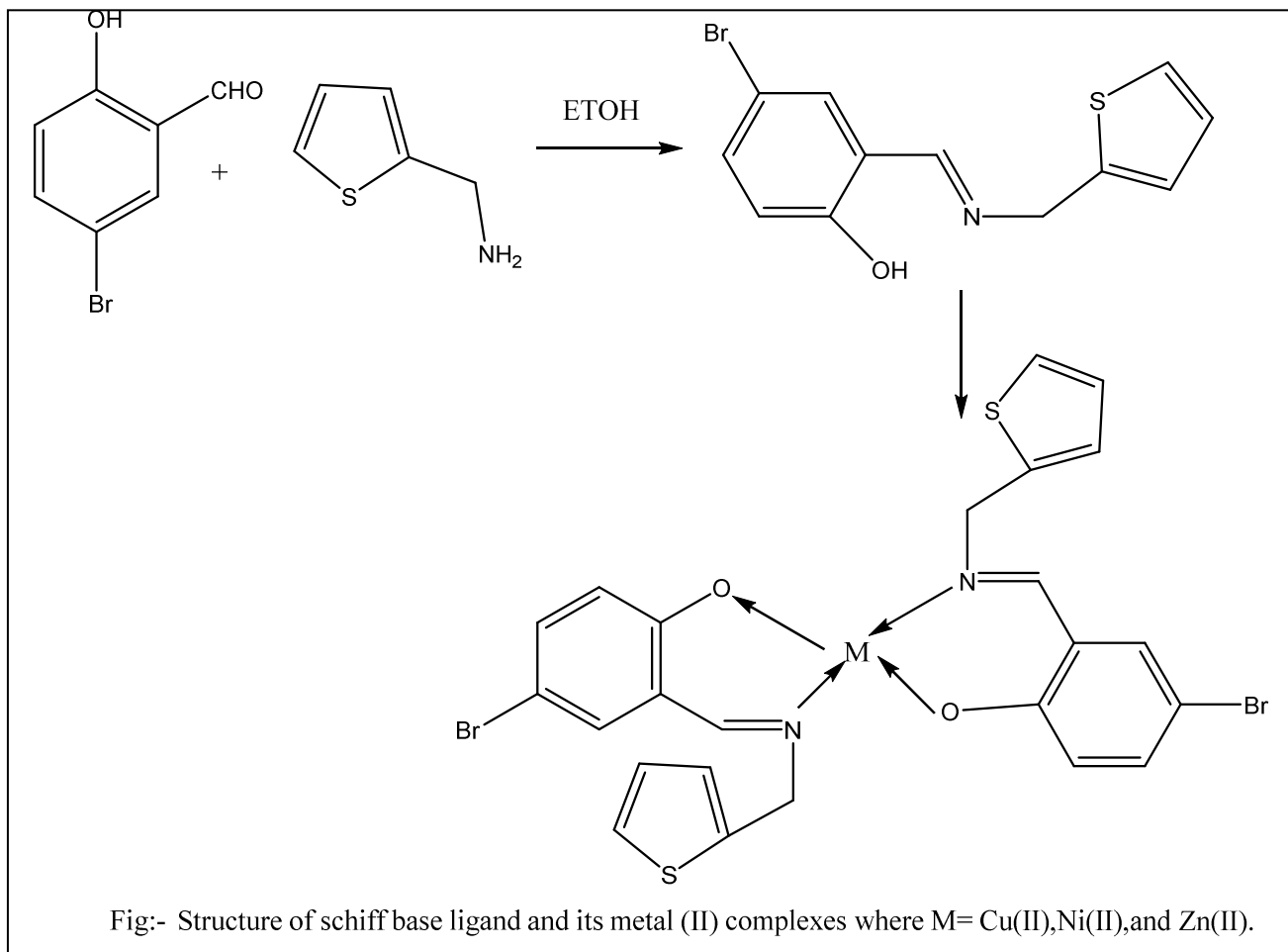
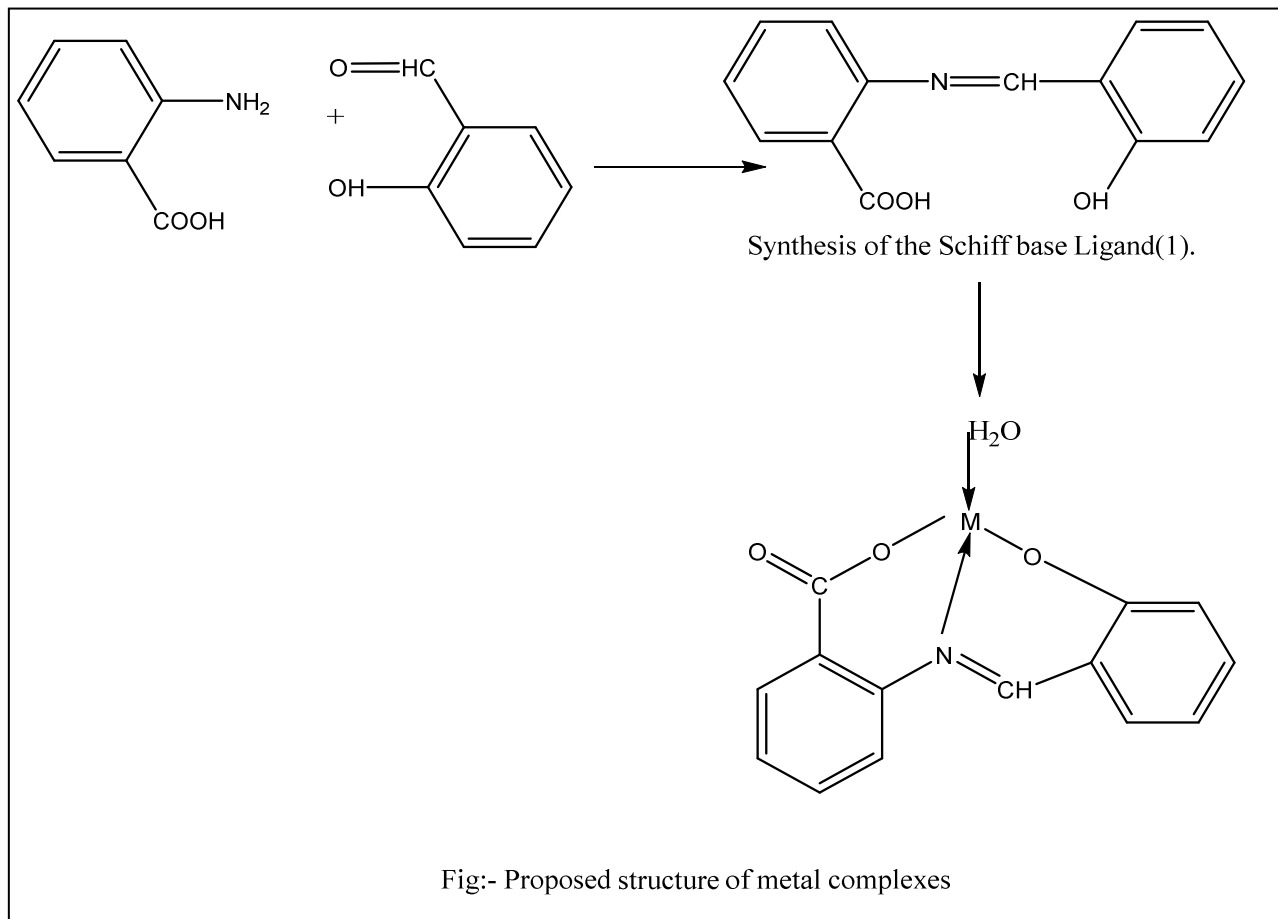


Fig:- Structure of schiff base ligand and its metal (II) complexes where M= Cu(II),Ni(II),and Zn(II).

Amer J. Jarad, Zainab Nafea Jaafar, Nibras Abdul- AmeerAboud,Rana I.Omran studied about the synthesis and characterization of benzoic acid 2- salicylidene complexes with selected metal ions. Complexation of Schiff base ligand with Co(II), Ni(II), Cu(II),and Zn(II) metal ions in 1:1 M:L ratio in aqueous ethanol at optimum PH yielded a series of neutral complexes with the general formula of [M(L)H<sub>2</sub>O].<sup>[42]</sup>



### Conclusion:-

Metal complexes offer a platform for the design of novel therapeutic compounds. The basic ideas for the synthesis and develop the various process in metal complexes is under progress with the advancement in the field of inorganic chemistry. Biological studies of Co(II), Ni(II), Cu(II) complexes reveal that these complexes show better activity compared to the ligand. The action of metal complexes in the whole living organism are expected to different in general form the action of non metal containing agents may offer unique research , diagnostic or therapeutic opportunities. Present day approaches in inorganic chemistry have made achievable formation of number of transition metal

complexes with organic Schiff bases of interest, which can be utilized as therapeutic agent. Therapeutic employment of transition metal complexes is an under developed area of research and its full possibility for another progress.

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