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A Short Review on Biological Importance of Schiff Base and their Transition Metal Complexes Derived from 3-formylchromone and its Derivatives

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Abstract: *Coordination compounds contributed their enhancing prevalence in biology and chemistry. To sustain normal functioning of living body biologically active molecules such as coordination compounds play a key role in investigating the bodily process. Due to various applications of such metal complexes, coordination becomes emerging field in recent years. Chemists have remarkable attention towards Schiff base and their metal complexes for their synthetic and effective biological role. Metal complexes have biological origin to perform various metabolic processes.*

Keywords: Schiff Bases, Ligand, Antibacterial activity, Metal complexes

I. INTRODUCTION

The chemistry of coordination compounds is an intrinsic field and foundation of modern inorganic chemistry. Accretion of coordination chemistry revealed new way regarding the concept of chemical bonding. Coordination chemistry has variety of applications in many branches of sciences. The study of schiff bases and metal complexes is most focused and interested research area of inorganic chemistry. Schiff bases employed by coordination compounds acquired prime importance in this era. Coordination compounds carried out ample of vital role in human physiology. Alfred Werner got Noble prize in 1913 for his precious contribution in the field of coordination chemistry. Werner theory of coordination compound depends on stereochemistry and mechanism of isomerism etc. The emphasis to know geometry of the complexes through metal ligand bonding. Research and development in the area of coordination chemistry has been came from time of Werner is the milestone in the progress of modern inorganic chemistry. Coordination chemistry carried a leading role in distinct fields as bioinorganic chemistry, dyes metallurgy, nuclear fuel, material science, electronics, catalysis, toxicology, medicine etc. The Schiff bases contain imine or azomethine functional moiety. Their existence may be natural or synthetic. Schiff Bases named after Hugo Schiff in 1864, in which the carbonyl group is replaced by an imine and azomethine group[1].

II. RESULT AND DISCUSSION

In modern coordination chemistry, the Schiff base and its metal complexes deal a vital role. The ability of Schiff base to link by coordinate bond with many metal ions through both azomethine group and phenolic group[2-5]. Chemists have attention for Schiff base and its metal complexes due to biological vitality including anti-tumor, antibacterial, fungicidal, and anti-carcinogenic properties[6-11] and catalytic activity[12-17].

P. Kavitha and K. Laxma Reddy[18] synthesized Pd(II) complexes from 3-formylchromone and 2-aminophenol, 2-amino benzoic acid, 2-amino-3-hydroxy pyridine, 2-amino thiol and 2-amino pyridine Figure 1 and 2. All Pd(II) complexes are coloured, non-hygroscopic, stable in air, insoluble in water and many common organic solvents but soluble in DMF and DMSO. Complexes were characterized by physico analytical techniques. Electronic and magnetic data suggest the square-planar geometry for all Pd(II) complexes. Powder XRD data revealed the crystalline nature of the complexes. Pd(II) complexes exhibit less to moderate antimicrobial activity.

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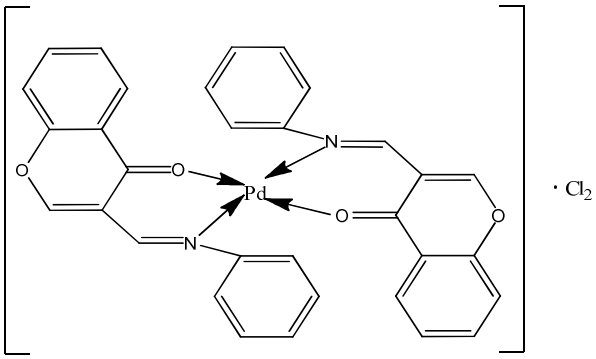

Figure: 1

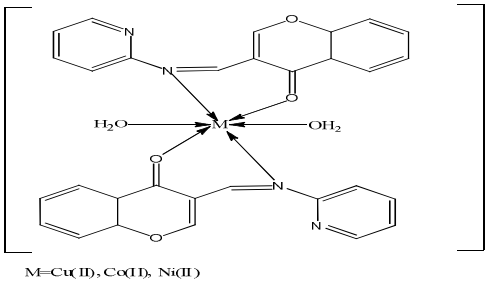

Figure: 2

P. Kavitha et.al.[19] synthesized Cu(II), Co(II), Ni(II) and Zn(II) complexes obtained from 3-formylchromone and 2-amino pyridine Figure 3. All the complexes were characterized by analytical, conductivity, IR, electronic, magnetic, ESR, thermal, powder XRD and SEM studies. The proposed octahedral structure of the complexes have revealed on the basis of magnetic and electronic spectral data. The X-ray diffraction studies indicate triclinic system for all the complexes. Thermal studies of the complexes shown the existence of coordinated and lattice water molecules. The homogeneous nature of the complexes has shown by the SEM studies. The metal complexes have superior antimicrobial and nematicidal activities than the Schiff bases. The DNA cleavage activity of ligand and its complexes has shown in the presence of H_2O_2.

Figure: 3

C. Anitha et.al.[20] synthesized azo complexes of VO(II), Co(ii), Ni(II), Cu(II) and Zn(II) of Schiff base derived from 5-(4-chloro-phenylazo)-2-hydroxy benzaldehyde, 3-formylchromone and p-phenylenediamine. The structural elucidation of the complexes were carried by the elemental analysis, IR, UV-Vis, ^{1}H NMR and mas spectra and further studied by molar conductance, magnetic susceptibity, electron spin resonance, cyclic voltammetry, nonlinear optical properties of ligand, fluorescence and SEM. The spectral data suggested octahedral geometry of the complexes. The Schiff base and its complexes were shown excellent antibacterial and antifungal activities. The proposed structure as shown in figure 4.

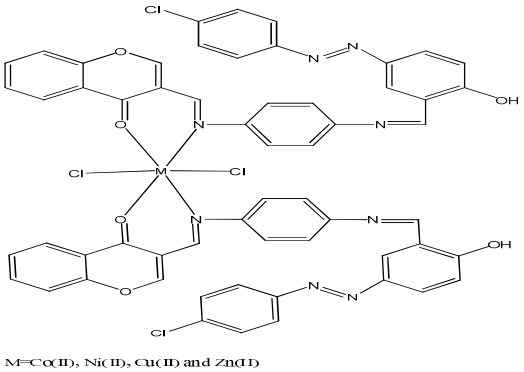

Figure: 4

T. Rosu et.al.[21] reported Cu(II), VO(II), Ni(II) and Mn(II) complexes of Schiff base derived from 4-amino-2,3-dimethyl-1-phenyl-3-pyrazolin-5-one with 3-formyl-6-methyl-chromone. The complexes were characterized by ^{1}H NMR, UV-Vis,

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IR, ESR spectroscopy, elemental analysis and molar conductivity. The single crystal X-ray structure of Schiff base was studied for its various weak H-bonding and dimeric association. The antibacterial studies shown that complexes have a better activity than the free ligand. The structure of Schiff base as shown in figure 5.

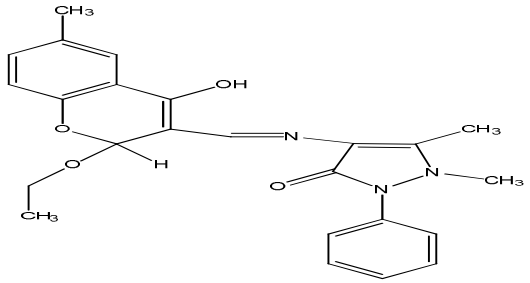

Figure: 5

III. CONCLUSION

The Schiff base metal complexes derived from oxygen heterocyclic compound 3-formylchromones and its derivatives have been center of attraction for many researchers in recent years. The chromone moiety form the vital role of the pharmacophores of a number of biologically active molecules of synthetic as well as natural origin and many of them have useful medicinal applications. 3-formylchromone occupies a unique position for two reasons. They are carrying a significant biological activity and they are attractive synthetic intermediates.

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