EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 3
Issue: 12
229-231
Year: 2016

BIOLOGICAL AND CATALYTIC APPLICATIONS OF SCHIFF BASE METAL COMPLEXES- A REVIEW

Peer Irfan Rashid*[1] and Ab. Rashid Wani[2]

[1]Department of Chemistry, Govt. SP College Srinagar J&K (India).
[2]Department of Chemistry, Govt. Degree College Dooru Anantnag J&K (India).

***Corresponding Author: Peer Irfan Rashid**
Department of Chemistry, Govt. SP College Srinagar J&K (India).

Article Received on 04/10/2016 **Article Revised on 25/10/2016** **Article Accepted on 14/11/2016**

ABSTRACT
A large number of Schiff bases and their coordination compounds have been extensively studied for their important properties e.g. their ability to bind reversibly with oxygen, catalytic activity in hydrogenation of olefin , transfer of an amino group and complexing ability towards some toxic metals . Schiff base derived from aromatic aldehydes or their metal coordination compounds catalyze reactions like oxygenation, hydrolysis, electro reduction and decomposition. Schiff bases and their transition metal complexes have gained remarkable importance because of their applications in biological, biochemical, analytical, antimicrobial system, antibacterial, antifungal, anticancer activities. The chemotherapeutic Schiff bases are attracted the attention of biochemists.

KEYWORDS: Schiff bases, coordination compounds, oxygenation, hydrolysis, electro reduction, decomposition.

INTRODUCTION
Cancer is one of the most dreaded diseases of mankind. It is a leading cause of death throughout the world, and currently, one in 4 deaths in the United States is due to cancer.[1] More than ten million new cancer cases occur annually, roughly half of which is in the developed countries, and the disease causes over six million deaths a year.[2,3] Unlimited and uncontrolled cell proliferation is obviously characteristics of tumor cells.[4] Despite several decades of intensive research, the long-term outlook for patients with aggressive cancer remains discouraging, and there is a need for innovative approaches to design anticancer drugs with reduced toxicity and improved therapeutic indices.[5,6] In recent years, compounds containing hydrazide or hydrazone moieties are attractive target compounds for new drug development because of their potentially versatile biological activities involving antiproliferative activities.[7,8] Several studies have been devoted to the antiproliferative activity of aroylhydrazone derivatives.[7,9,10,11,12] It was suggested that the antiproliferative activity of these hydrazones may be attributed to inhibition of kinases[13,14,15], or through generation of radicals and dissipation of the mitochondrial membrane potential.[16]

Aromatic Schiff bases or their metal complexes catalyze reactions on oxygenation2,3, hydrolysis4 electro-reduction , and decomposition Four coordinated Co(II) Schiff base chelate complexes show catalytic activity in oxygenation of alkene. Metalloporphyrins oxidize phenols (naphthol). Some copper complexes, derived with amino acids, enhance (10-50 times) hydrolysis rate4more than simple copper (II) ion. Synthetic iron (II) Schiff base complex exhibits catalytic activity towards electro-reduction of oxygen.[17] Some metal complexes of a polymer bound Schiff base show catalytic activity on decomposition of hydrogen peroxide and oxidation of ascorbic acid. Schiff base derived from furylglyoxal and p-toluidene show antibacterial activity against Escherichia coli, Staphylococcus aureus, Bacillus subtilis, and Proteusvulgaris. Complexes of thallium (I) with benzothiazolines show antibacterial activity againstpathogenic bacteria.[18] Various metal complexes in IInd and IVth oxidation state derived with aniline show different behaviour with different types of bacteria. Metal complexes of Mo (IV) and Mn (II) with ligands hydrazine carboxamide and hydrazine carbothiamide show antibacterial activity against S. aureus and Xanthomonas compestris[19-21] Tridentate Schiff bases and their metal complexes show antibacterial activities against E. coli S. aureus, B. subtilis and B. pumpilis. Some aldimines (E & Z forms), pyrazine, amino acid derived Schiff bases and heterocylic-ketone derived Schiff bases show antibacterial activity. Some heterocyclic Schiff bases can act as an antibacterial agent[22-25] Isatin derived Schiff bases possess anti-HIV activity and antibacterial activity. Schiff bases (benzimidazole, toluidinones, quin-azolinones, furaldehyde, thiazole, pyridine and benzyl

dithiocarbazate, glucosamine, pyrazolone, hydrazide, furfuraldiamine, halogenated, thiazolidiones orazetidiones, indole, p-fluorobenzaldehyde, p-anisidiene, thio-semi-carbazone, thiadiazo-lines and imidazolinones) show antibacterial activity. Schiff bases, ligands containing cyclo-butane and thiazole rings, show antimicrobial activity. Schiff bases of pyrolidione, pyridone with o-phenylenediamine and their metal complexes show anti-bacterial activity. N-5 chloro-salicylidiene tauriene Schiff base and its Cu, Ni complexes show antibacterial activities to Coli bacillus and Pseudomonas aeruginosa. Schiff base conjugates of p-amino salicylic acid enhance ant mycobacterium activity against Mycobacterium smegmatis and M. lovis BCG.[26-28] Schiff base with thiophene carboxaldehyde and aminobenzoic acid show antibacterial activity. Lysine based Schiff bases and their complexes with La, Co, Fe, show bacteriostatic activity to B. subtilis, E. coliand S. aureus. Zn (II), Cd (II), Ni (II) and Cu (II) complexes with furfural and semicarbazide, and with furfurylidene diamine Schiff bases show antibacterial activities. Salicylidene derivatives, neutral tetra-dentate ligand and metal-complexes show antibacterial activities against S. typhi, S. aureus, Kelbsiella pneumoniae, B. subtlis and S. flexneri. Organo-silicon (IV) complexes with bi-dentate Schiff base and organo-silicon (IV) complexes and organo- lead (IV) complexes with nitrogen donar ligands of sulpha drugs possess antibacterial activities[29-32] Using microcalorimetery, antibacterial activities against E. Coli of Schiff bases and their metal complexes can be studied.[33-34]

REFERENCES

1. Xi Z, Liu W, Cao G, Du W, Huang J, Cai K & Guo H, Catalytic oxidation of naphthol by metalloporphyrins, Cuihau Xuebao, 1986; 7: 357-63. Chem Abstr106(1987) 140082.184 J SCI IND RES VOL 68 MARCH 2009
2. S.Arulmurugan, H.P. Kavitha, B.R.Venkataraman, *Rasayan J. Chem*., 2010; 3: 385-410.
3. T. M. Bhagat, D.K.Swamy, M.N. Deshpande,. *J.Chem and pharm. Research*, 2012; 4: 100-104.
4. Chakraborty H, Paul N & Rahman M L, Catalytic activities ofSchiff bases aquo complexes of Cu(II) in the hydrolysis ofaminoacid esters, Trans Met Chem(Lond), 1994; 19: 524-526.
5. Zhao Y D, Pang D W, Zong Z, Cheng J K, Luo Z F, Feng C J, Shen H Y& Zhung X C, Electochemical studies of antitumordrugs, fundamental electrochemical characteristics of an iron(III)Schiff base complex and its interaction with DNA, HuaxeXuebao56 (1988)178-183; Chem Abstr, 1998; 128: 252661.
6. Sreekala R, Yusuff K K & Mohammed, Catalytic activity of mixed ligand five coordinate Co (II) complexes of a polymer bound Schiff base, Catal(Pap Natl Symp), 1994; 507-510; Chem Abstr, 1999; 130: 115551.
7. Beokon Y N, Bulychev A G, Maleev V I, North M, Malfanov I L & Nikolai S, Asymmetric synthesis of cyanohydrins catalyzed by a potassium bis [N-salicylidene-(R) tryptophanato] cobaltate complex, Mendeleev Comm, 2004; 249-250; Chem Abstr1, 2005; 43: 277534.
8. Saxena C G, & Shrivastava S V, Mn(II), Co(II), Ni(II) and Cu(II)complexes with p-toly-2-furylgloxalimine, J Ind Chem. Soc, 1987; 64: 685-686.
9. Bhardwaj C N & Singh V R, Synthesis and characterization of thallium(I) complexes of biologically active benzothiazolines, Indian J Chem., 1994; 33A: 423-425.
10. Bharamagouclar T D, Pujar M A & Alagawadi A R, Biologicalactivity of Schiff base and their metal complexes,Curr Sci., 1987; 56: 889-890.
11. Grumus, F, Gurkah P, Gunduz. N, & Abbasoglu U, In vitroantibacterial activities of Schiff bases and Ni (II) complexes,(FABAD)Farm Bilmer Derg, 1994; 19: 5-8; Chem Abstr, 1994; 121: 153127.
12. Deshmukh M D & Doshi A G, Synthesis of Schiff bases andtheir applications,Orient J Chem, 1995; 11: 86-96;Chem Abstr123 (1995) 256269.
13. Tumer M, Koksal H, Serin S & Digrak M, Antimicrobial studyof mononuclear and binuclear mixed ligand Cu(II) complexes, derived from 1,10-phenanthroline, Trans Met Chem (DordrechtNeth.), 1999; 24: 13-17.
14. Dholakiya P P & Patel M N, Synthesis and antimicrobial activity of Mn(II),Co(II),Ni(II),Cu(I) and Cd(II) complexes withbidentate Schiff base and 2,2'bipyridylamine,Synth react Inorg Met Org Chem, 2002; 32: 753-762;Chem Abstr, 2002; 137: 178002.
15. Singh R, Gupta N & Fahmi N, Biochemical aspects ofdioxomolybdenum(VI) and manganese (II) complexes,Indian J Chem., 1999; 38A: 1150-1158.
16. Ranga S P, Sharma S, Chowdhary V, Parihar M, & Mehta R K,Spectral and antibacterial investigation on tridentate Schiff bases and their Co(II), Cu(II) and Ni(II) complexes, J Curr Bio Sci., 1988; 5: 98-100.
17. Chohan & Zahid H, Biologically active transition metal complexes of Ni(II),Cu(II) and Zn(II) with2-aminothiazole Schiff bases,Met-Based Drugs, 6 (1999)187-192;Chem Abstr, 1999; 131: 294750.
18. Chohan & Zahid H, Ni(II), Cu(II) and Zn(II) metal chelates with thiazole Schiff bases synthesis ,characterization and bactericidal properties,Met-Based Drug , 6 (1999) 75-80; Chem Abstr, 1999; 131: 96444.
19. Cohan, Zahid H & Kausar S, Synthesis, characterization and biological effect of anions on Co(II) and Ni(II) chelates oftridentate Schiff base, J Chem Soc Pak, 23 (2001) 163-167;Chem Abstr, 2002; 136: 410591.
20. Nakamoto O & Hidaka A, Synthesis and resolution of some Schiff bases of biological interest, Delta J Sci,15 (1991) 47-56;Chem Abstr, 1993; 118: 16875.
21. Chohan, Hussain Z, Pervez & Humayun, Biologically active complexes of Ni(II) , Cu(II) and

Zn(II) with tridentate NNO,NNS and NNN donor pyrazine derived ligands, Synth React Inorg Met Org Chem,23 (1993) 1061-1071.
22. Malik Z A & Alam S, Antimicrobial screening and synthesis ofaminoacid esters and their Schiff bases from indan-1,2,3,-trione,J Pure Appl Sci1, 1984; 7: 69-76.
23. Cohan Z H, Praveen M & Ghaffar A, Strucural and biologicalbehaviour of Co(II),Cu(II) and Ni(II) aminoacid derived Schiff bases, Met-Based Drugs, 1997; 4: 267-272; Chem Abstr, 1998; 128: 112790.
24. Sari N, Guerkan P & Arslan S, Synthesis, potentiometeric and antimicrobial activity studies on 2-pyridinylidene-DL-amino acids and their complexes, rans Met Chem (Dordrecht, Neth), 2003; 28: 468-474.
25. Singh H L, Sharma M & Varshney A K, Synthesis, characterization and antimicrobial studies of tin(II) complexes with Schiff base of sulpha drugs, A C G C Chem Res Commun 8 (1998) 35-40; Chem Abstr, 1999; 131: 110,367.
26. Joshi K T & Pancholi A M, Synthesis, characterization and antibacterial activity of complexes of Schiff base derived from 2-amino-5-methyl-4-phenyl thiazole and heterocyclic ketone diketone, Orient J Chem., 2000; 16: 287-290;Chem Abstr, 2001; 134: 80195.
27. Mishra V, Saksena D K & Jain M C, Synthesis and biocidal activity of iso thiocyanto chromium (III) complexes and some heterocyclic Schiff base, Synth React Inorg Met Org Chem, 1987; 17: 987-1002.
28. Bhusare S R, Pawar V G, Shinde S B, Pawar R P & Vibhute YB, Synthesis of some new heterocyclic Schiff bases, 4-thiazolidinones and 2-azetidinones as an antibacterial and Anti-fungal agent,Int J Chem Sci, 2003; 1: 31-36;Chem Abstr, 2004; 140: 357246.
29. Singh K, Barwa M S & Tyagi P, Synthesis characterization and biological studies of Co(II),Ni(II),Cu(II) and Zn(II) complexes with bidentate Schiff bases derived by heterocyclic ketones,u: Eur J Med Chem, 2006; 41: 147-153.
30. Pandeya S N, Sriram D, Nath G & De C E, Synthesis and antimicrobial activity of Schiff base and Mannich base of Istain and their derivatives with pyrimidine, Farmaco, 54 (1999) 624-628; Chem Abstr, 2000; 132 22931.
31. Kar D M, Sahu S K, Pradhan D, Dash G K & Misra P K, Synthesis,antimicrobial and anti-inflammatory activities of some novel isatinoid compounds, J Teach Res Chem,10(2003)20, 24; Chem Abstr, 2004; 141: 23376.
32. Song L, Xie Y & Wang H, Synthesis and antibacterial activity of benzimidazole Schiff base, Zhonggu Yaowu,Huaxue Zaah ,10 (2000) 92-94; Chem Abstr, 2001; 134: 222664.
33. Patel V K & Jejurkar C R, Mixed Schiff base complexes and their applications as pigments and antibacterial agent, Orient J Chem,10 (1994) 63-65; Chem Abstr, 1995; 122: 44857.
34. Mishra P, Gupta N P & Shakya K A, Synthesis of Schiff bases of 3-amino-2 methylquinazolin-4(3H) ones and their KUMAR et al (b) applications of metal complexes of schiff bases-a review charact-erization and biological activites of La(III) complexes With indole Schiff bases, Nat Acad Sci Lett (India), 2001; 24: 39-43. Chem Abstr.