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

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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.[9,10,11,12] It was suggested that the antiproliferative activity of these hydrazones may be attributed to inhibition of kinases[3,14,15], 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 rate more 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 Proteus vulgaris. Complexes of thallium (I) with benzothiazolines show antibacterial activity against pathogenic bacteria.[18] Various metal complexes in Hnf 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 campestris.[19-21] Tridentate Schiff bases and their metal complexes show antibacterial activities against E. coli S. aureus and B. subtilis and B. pumilis. Some aldimines (E & Z forms), pyrazine, amino acid derived Schiff bases and heterocyclic-ketone derived Schiff bases show antibacterial activity. Some heterocyclic Schiff bases can act as an antibacterial agent.[22-24] Isatin derived Schiff bases possess anti-HIV activity and antibacterial activity. Schiff bases (benzimidazole, toluidinones, quin-azolines, furaldehyde, thiazole, pyridine and benzyl...
dithiocarbazate, glucosamine, pyrazolone, hydrazide, furfuraldiamine, halogenated, thiazolidiones orazetidiones, indole, p-fluorobenzaldehyde, p-amisidine, thio-semi-carbazone, thiadiazoe-lines and imidazolinones) show antibacterial activity. Schiff bases, ligands containing cyclo-butane and thiazole rings, show antimicrobial activity. Schiff bases of pyridoline, pyridone with o-phenylenediamine and their metal complexes show anti-bacterial activity. N-5 chlorosalicylidene 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. liovis BCG. [26-28] Schiff base with thiophene carboxaldehyde and aminobenzoinic acid show antibacterial activity. Lysine based Schiff bases and their complexes with La, Co, Fe, show bacteriostatic activity to B. subtilis, E. coli and a tetra II) and Cu (II) metal complexes can be antibacterial activities against S. typhi, antibiotics of sulpha drugs possess antibacterial activities. [29-32] Using microcalorimetry, antibacterial activities against E. Coli of Schiff bases and their metal complexes can be studied. [33-34]

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