Application of Schiff bases and their metal complexes-A Review

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Abstract:

Schiff bases are synthesized from the condensation of an amino compound with carbonyl compounds. These compounds and their metal complexes are having various applications in biological systems, polymers, dyes and medicinal and pharmaceutical fields. This review summarizes the applications of Schiff bases and their complexes.

Keywords:
Schiff bases, metal complexes, biological activity.

Introduction:

Metal complexes synthesized from Schiff bases plays an important role in various fields like agriculture, pharmaceutical, polymer, dyes etc. The Schiff base ligand is prepared by the condensation between the amine and carbonyl compounds (RCH=NR). This paper reviews the various applications of Schiff base complexes in the field of polymer, dyes, catalyst and biological activity of the Schiff base complexes.

Antitumor and Cytotoxic Activities

Metal complexes of Schiff base derived from 2-thiophenecarboxaldehyde and 2-aminobenzoic acid(HL) have been recommended and/ or established anew line for search to new antitumor particularly when one knows that many workers studied the possible antitumor action of many synthetic and semi syntheticcompounds e.g. Hodnett et al. and Hickman[25]. Such
Compounds may have a possible antitumor effect since Gram-negative bacteria are considered a quantitative microbiological method testing beneficial and important drugs in both clinical and experimental tumor chemotherapy [26]. A tridentate Schiff base inflammatory activity. Schiff base of chitosan and carboxymethyl-chitosan shows an antioxidant activity such as superoxide and hydroxyl scavenging. Furan semicarbzone metal complexes exhibit significant anthelmintic and analgesic activites[42].

Antiviral Activities

Schiff bases synthesized from gossypol show high antiviral activity[31]. Silver complexes in oxidation state I showed inhibition against Cucumber mosaic virus; Schiff base synthesized from glycine &salicylaldehyde and the complex with Ag (I) gave effective results up to 75% towards Cucumber mosaic virus [32].

Antibacterial Activities

Schiff base derived from indoline-2, 3-dione and 2-aminobenzoic acid and its Tin complex showed antibacterial activity against *Staphylococcus*

aureus.Theresults compared with standard drug (Imipinem) have indicated that compounds were active but activity was lesser than the standard drug. This activity might be due to the presence of a hydroxyl and phenyl group [7]. The increased activity in the organotin complexes may be due to the coordination and polarity of a tin(IV) atom with oxygen of the ligand.

Antifungal Activities

The microbial activity of the N-(2-hydroxy-1- naphthalidene) phenylglycine and its transition metal complexes was investigated. From the antifungal screening data it is concluded that the activity of the ligand has increased upon complexation. Cu(II), Ni(II) and Co(II) complexes have shown better antifungal activity compared to the ligand and the corresponding metal salts[18]. Two bidentate Schiff base ligands 2- (2-hydroxy-3, 5-dichloro/dibromo) benzaldehyde-[4-(3-methyl-3-mesitylcyclobutyl)-1, 3-thiazol-2- yl]hydrazone, L1H, L2H and their metal complexes were tested against a yeast-like fungus *C.albicans*[19].The fungicidal effect of salicylaldimine containing formaldehyde and piperazinemoity and its metal polychelates were determind against two yeast *Candida albicans, Aspergillus*. The Cu(II)-polychelate exhibited high activity against *Candida albicans*and the other show mild activity. The presence of N and O donor groups in the ligand and its metal polychelates inhibited enzyme production because enzymes that require free hydroxyl group for their activity appear to be especially susceptible to deactivation by the metal ion of polychelates. All the metal polychelates are more toxic than the ligand[20]. Neutral complexes of Co(II), Ni(II), Cu(II) and Zn(II) with Schiff bases derived from 3-nitrobenzylidene-4-aminoanttipyrine and aniline(L1)/p-nitroaniline(L2)/p-methoxyaniline(L3) showed antifungal activity. A comparative study of the MIC values for the ligands and their complexes indicates that the complexes exhibit higher antimicrobial activity. Such increased activity of the complexes can be explained on the basis of overtone's concept and Tweedy's chelation theory[21]. Inhibition is enhanced with the introduction of an electron withdrawing nitro group in the phenyl ring[22]. Semicarbazones and thiosemicarbazones complexes of Ni(II) metal showed antifungal activities against 11 pathogenic fungi. The complexes were moderate active against all pathogenic fungi and much lower than those of standard fungicide Nistatin[23]. Co(II),Ni(II) and Cu(II) complexes with Schiff base 3,3'-thiodipropionic acid bis(4-amino-5-ethylimino-2,3-dimethyl-1-phenyl- 3-pyrazoline showed antifungal activity against *Alternariabrassicae, Aspergillusniger*and *Fusariumoxysprum*and results indicate that the complexes show the enhanced activity in comparison to free ligand[24].

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