

Synthesis and Antimicrobial Study of Novel Schiff Bases and Metal Complexes

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Abstract

Novel Schiff bases (E)-6-(benzylideneamino)-3,3-dimethyl-7-oxo-4-thia-1-aza-bicyclo heptane-2-carboxylic acid (L1) and (E)-6-(4-hydroxy benzylideneamino)-3,3-dimethyl-7-oxo-4-thia-1-aza-bicyclo heptane-2-carboxylic acid (L2) were synthesized. Further metal complexes of these Schiff bases were synthesized using various metal nitrates. Both Schiff bases and their metal complexes were screened for antibacterial activity against different bacterial species such as *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Some Schiff base and metal complexes showed moderate to excellent activity.

Keywords

Schiff Bases; Metal Complexes; Biological Activity

Introduction

Coordination chemistry is the field of most active research in inorganic chemistry which leads to new products showing a wide range of applications such as fungicides, paints, pigments, polymers, pharmaceuticals, catalysis, and photoconductors (1). The coordination compounds play an important role in colorimetric, spectrophotometric and polarographic analysis (2).

Coordination chemistry deals with metals and organic ligands. There are several classes of ligands such as organo, organo-metallic, cluster and bioinorganic. In complex formation a ligand (Werner complex) binds through the lone pair of main group atom to the metal. Many metal-ligand interactions seen in nature are classical ligands (3). Schiff-bases are unique ligands which can form complexes with metal ions. In our previous work we synthesized several Schiff bases derivatives; some of them were used as precursors for the synthesis of variety of heterocyclic compounds (4-7).

Schiff bases and their complexes are of high interest among the researchers because of their biological activity including anti-tumor, antibacterial, fungicidal, antidepressants, antiphlogogistic, nematocide, anti-carcinogenic and catalytic activity (8-9).

The microorganisms absorb metal ions on their cell walls and the respiration processes of cells gets disturbed and protein synthesis is blocked thus inhibiting the further growth of organisms. Membrane of Gram-negative bacteria is surrounded by an outer membrane containing lipopolysaccharides. Schiff base metal complexes are able to combine with the lipophilic layer in order to enhance the membrane permeability of the Gram-negative bacteria. A lipid membrane surrounding to the cell favors the passage of only lipid soluble materials; thus the lipophilicity is an important factor that controls the antimicrobial activity. An increase in lipophilicity, enhances the penetration of Schiff base and its metal complexes into the lipid membranes and thus restricts the growth of organism (10).

Synthesis of new coordination compounds for cobalt (II), nickel (II) and copper (II) with Schiff base ligand derived from 4-amino antipyrine, sulphadiazine and acetoacetanilide has been studied (11). Copper (II) complexes derived