

Synthesis, Characterization and Antimicrobial Examination of Transition Metal Complexes from Curcumin Schiff Base and Chrysin as Co Ligands

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Abstract - A new series of transition mixed ligand complexes of Co(II), Ni(II), Cu(II) and Zn(II) were synthesized by incorporating curcumin Schiff base and flavonoid like chrysin as precursors. The structural features of the synthesized complexes had been explored by elemental analysis, UV-Vis, IR, mass and TGA spectral analyses and conductivity measurements. These spectral data support an octahedral geometry of the synthesized complexes. The low molar conductance value indicates the non-electrolytic nature of the synthesized complexes. All the synthesized complexes are examined for anti microbial activities using broth dilution method. MIC values of these synthesized complexes reveal that the complexes have better antimicrobial efficacy than the free ligand.

Keywords - Chrysin; Mixed ligand complexes; Schiff base; Antimicrobial efficacy.

1. INTRODUCTION

Molecules which are deployed from the biological active ingredients not only enhance their activity but also reduce their adverse effects. Innovation of peculiar and potential analogues from these ingredients plays a vital role in recent medicinal research fields. Among them, Curcumin, a diferuloylmethane yellow pigment extracted from turmeric (*Curcuma longa* L) exhibits potential against various dreadful diseases such as cancer, antitumoral, antimicrobial, anti-inflammatory, antioxidant, antihepatotoxic, antihyperlipidemic, antiviral, and anti-Alzheimer's diseases. Chrysin is present naturally in plants like passion flower, silver linden and also in honey (bee propolis (glue)) [1]. It is used for body building and for treating anxiety, inflammation, gout, HIV/AIDS, erectile dysfunction and baldness. It also exhibits antitumor effects [2,3]. Its solid metal complex needs much attention today because of its importance as a lead like molecule [4,5]. Over the past few decades on curcumin Schiff bases and its metal complexes

are extensively studied because of their enhanced biological activity [6]. Metal complexes with two different binding ligands are known as ternary complexes or mixed ligand complexes. These complexes with biologically significant ligands are extensively considered because they act as models for metalloenzyme-substrate complexes [7].

Based on the literature survey and the above facts, a few mixed ligand complexes using the above biologically active flavonoids (curcumin and chrysin) are synthesized. They have been characterized by UV-Vis, IR, mass and TGA analytical techniques. All the metal complexes are examined for antimicrobial activity using broth dilution method.

2. EXPERIMENTAL

2.1 Synthesis of mixed ligand metal complexes of flavonoids

Curcumin derived Schiff base was prepared as per our procedure reported previously in the literature [8]. About 1:1 ratio (5 mM) of the above synthesized curcumin derived Schiff base L_1 was stirred with metal(II) acetate [Cu(II)/Ni(II)/Co(II)/Zn(II)] in methanolic solution for ca 30 min. To this mixture, 5 mM of methanolic solution of chrysin (L_2) was added. The whole mixture was stirred for about 4 h. The obtained solid metal complexes was filtered, dried and recrystallized from hot ethanolic solution.

The obtained metal complexes were of type $[ML_1L_2H_2O]$, in 1:1:1 ratio (Ligand: metal: chrysin). The synthetic detail is presented in Scheme 1