



# Synthesis and Antimicrobial Investigation of Transition Metal Complexes Having Tryptophan

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**Abstract** - A new family of four mixed ligand Cu(II), Ni(II), Co(II) and Zn(II) complexes of 2-amino-3-(1H-indol-3-yl)propanoic acid (L-tryptophan) incorporating benzaldehydes (Schiff base) and 2,2'-bipyridine have been synthesized and characterized. In view of *in vitro* biocidal activity observations of tryptophan derivative, there is an enhancement in the antimicrobial activity of the complexes when compared to that of ligand. A comparative study of the MIC values of the ligand and its complexes indicate that the copper(II) complex exhibits higher antibacterial/antifungal activity than the other compounds.

**Keywords:** Complex, Schiff base, Tryptophan, Antimicrobial activity.

## 1. INTRODUCTION

The chemistry of coordination compounds has always been a challenge to the inorganic chemists as it has more branches nowadays. Coordination compounds play a very significant role in our lives. The study of them has contributed to the highest degree of understanding the chemical bond in inorganic chemistry. Metals play an imperative role in an immense number of extensively differing biological processes<sup>1-9</sup>. Metal ion dependent processes are found throughout the life science and vary tremendously in their function and complexity. It is now appreciated that metal ions control a vast range of processes in biology. Many new and exciting developments in the field of biochemistry create interest out of inorganic chemists to court in the new area called "Bioinorganic Chemistry".

Schiff bases have been playing an important part in the development of coordination chemistry<sup>11</sup>. Schiff base metal complexes have been studied extensively because of their attractive chemical and physical properties and their wide range of applications in numerous scientific areas<sup>12</sup>. These types of complexes have been vigorously explored in recent years and such studies have

been the subject of many papers and reviews. The most popular metal analogues on the market today are those that contain platinum and ruthenium. Other metal analogues containing copper, nickel, cobalt and zinc are still under development.

Amino acids are key precursors for synthesis of hormones and low-molecular weight nitrogenous substances with each having enormous biological importance. The presence of amino acids also enables vitamins and minerals to perform all their important functions. Without these essential amino acids, the human body is unable to function normally and in some extreme cases, cause death. Tryptophan, a precursor of serotonin and melatonin, plays an important role in health and disease and its deficiency may underlie many types of brain disease such as quality of sleep and disturbance in sleep mediated by melatonin. It is a natural relaxant.

Antimicrobial resistance is fast becoming a global concern with rapid increase in multidrug-resistant bacteria<sup>13-15</sup>. Throughout history, there has been a continual battle between humans and the multitude of microorganisms that cause infection and disease. Many of the crude drugs, which are the sources of medicinal preparations, still originate from wild growing plants. However, the plant based drugs have shortened the life span of the source of material. There is a continuous search for more potent and cheaper raw materials to feed the industry. So, nowadays pharmaceutical industries are looking for synthesizing the alternative compounds which act as drugs. During the past decades, much attention has been given to the synthesis of new metal complexes and the