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Synthesis, characterization and cytotoxic activity study of Cu (II), Co (II), Mn (II), Ni (II) and Cr (III) Metal Complexes with new guanidine Schiff base against the hepatocellular Carcinoma (HCAM) cancer cell

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Abstract

In this research, a new guanidine ligand was synthesized from the condensation reaction of 1,2-hydrazinedicarboximidamide and indol-3-carboxaldehyde and its derived metal transition complexes of Co (II), Ni (II), Mn (II), Cu (II) and Cr (III) have been synthesized by reaction of metal chlorides with guanidine ligand in the molar ratio 2:1 (M: L). The guanidine ligand and its metal complexes were characterized by different spectroscopic and analytical techniques, these studies result suggests that the metal complexes have tetrahedral geometry. The cytotoxic activity of the guanidine Schiff base and its metal complexes were studied on hepatoma cellular carcinoma (HCAM) cell line.

Keywords: Guanidine-indole; Thioureas; Complexes; MTT assay

Introduction

Guanidine and its derivatives can be seen in many natural compounds that have a significant area of biological activities such as anti-inflammatory, anti-diabetic, anti-clotting agents, exhibit cytotoxic, antiviral, antibacterial, and anti-parasitic [1, 2]. Guanidine is an important class of compounds in organic and biochemistry that possesses the formula $HN{=}C(NH_2)_2$, where the carbon atom is bonded to three nitrogen atoms. Which is among the strongest known organic bases and it has very weak pKa that are difficult to accurately measure in water . There are several approaches for the synthesis of guanidine from different materials and reagents, one of these approaches is the diversion of thioureas to guanidine in the presence of a coupling reagent. Their conversion to guanidine regularly needs initial activation [3]. A number of reviewed articles had been reported on Schiff base compounds derived from guanidine are of prominence in organic synthesis, as they are used as intermediates to prepare a number of organic compounds [4-7]. Some Schiff base derivatives were prepared by the interaction of aminoguanidine with the different substituted benzaldehyde [8, 9], as these compounds proved to possess anti-bacterial and anti-cancer activities [10]. Also, various aminoguanidine derivatives exhibit anti-tumor activity by forming metal ion complexes [11, 12]. Three complexes of copper (II) were synthesized from 2-aminobenzimidazole and o-vanillin as primary ligand and N, N-donor heterocyclic bases (1,10-phenanthroline and 2,2'-bipyridyl) as co-ligand are the examples containing guanidine Schiff base ligand, and these complexes considered to have a first vision on their potential anti-cancer activity against MCF-7 (human breast cancer)cell lines as well as anti-inflammatory, antipyretic and analgesic activities [13].

In this paper, five new guanidine-indole complexes were synthesized from the Schiff base reaction of

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