

Coordination chemistry and bioactivity of Ni²⁺, Cu²⁺, Cd²⁺ and Zn²⁺ complexes containing bidentate schiff bases derived from S-benzylthiocarbamate and the X-ray crystal structure of bis[S-benzyl-β-N-(5-methyl-2-furylmethylene)dithiocarbato]cadmium(II).

Abstract

New bidentate isomeric NS and NS' Schiff bases were derived from the condensation of S-benzylthiocarbamate (SBDTC) with 5-methyl-2-furyldehyde and 2-furyl-methylketone. Reaction of NS ligand with Ni(II), Cu(II), Cd(II) and Zn(II) salts gave solid complexes. Only the Ni(II) complex of the NS' ligand was isolated. All complexes were characterized by a variety of physico-chemical techniques, viz. elemental analyses, molar conductivity, i.r. and electronic spectral studies. The Schiff bases behaved as uninegatively charged bidentate ligands. Square-planar structures have been proposed for the Cu(II) complex containing the NS Schiff base ligand and the Ni(II) complexes of the bidentate NS and NS' Schiff base ligands. Single crystal X-ray diffraction study of [Cd(NS)₂] showed that the complex was bis chelated with a distorted tetrahedral structure. The antimicrobial properties of the Schiff bases and their metal complexes indicate that the organic compounds are stronger antifungal agents than their complexes with the metals studied. However, the zinc complex of the Schiff base, S-benzyl-β-N-(5-methyl-2-furyl)methylenedithiocarbamate, (NS), was found to be highly active against CEM-SS (Human cell T-lymphoblastic leukemia) with a CD₅₀ value of 2.0 μg cm⁻³, while [Cd(NS)₂] was moderately active with a CD₅₀ value of 4.95 μg cm⁻³. None of the compounds were found to be active against HT-29 (Human colon adenocarcinoma cells). The bioactivity of a previously reported tridentate NNS Schiff base (SBD1) and its metal complexes with nickel(II) and copper(II) are also discussed.

Keyword: Bioactivity of metal complexes; Bioactivity of Schiff bases; Crystal structure of Cd(II) complexes; Metal complexes; S-Benzylthiocarbamate.