Coordination chemistry and bioactivity of some metal complexes containing two isomeric bidentate NS Schiff bases derived from S-benzyl dithiocarbazate and the x-ray crystal structures of S-benzyl-β-N-(5-methyl-2-furylmethylene)dithiocarbazate and bis[S-benzyl-β-N-(2-furylmethylketone)dithiocarbazato]cadmium(II).

Abstract

Some bidentate ligands having nitrogen–sulfur donor sequence were prepared by condensing S-benzyl dithiocarbazate (SBDTC) with 5-methyl-2-furylaldehyde (NS) and 2-furylmethylketone (NS'). Complexes of these ligands with lead, tin, iron, cobalt and cadmium gave complexes of [M(L)2] (M=Pb, Fe and Cd) and [M(L)2]Cln (M=Sn, n=2 and Co, n=1) (L=NS and NS'). The compounds have been characterized by spectroscopic studies (infrared, 1H NMR and electronic spectra). X-ray crystallographic analysis of S-benzyl-β-N-(5-methyl-2-furylmethylene)dithiocarbazate shows the presence of two independent molecules in the asymmetric unit. The molecule adopts a trans–cis configuration, as was observed in other analogues, such as SBDTC where the furylmethylene and benzyl groups are trans and cis about the N-C and C-S bonds, respectively. The molecular structure of bis[S-benzyl-β-N-(2-furylmethylketone)dithiocarbazato]cadmium(II) shows a tetrahedral geometry about the central cadmium atom with the bidentate ligand coordinating through the thioketo sulfur and the azomethine nitrogen atoms. The lead(II) complex of the NS ligand was highly cytotoxic against leukemic cells (CEM-SS) with a CD50 of 3.25 μg cm⁻³ while antimicrobial screening showed that the [Fe(NS)2]Cl₂·H₂O complex was effective against Aspergillus achraceous.

Keyword: Bioactivity; Cadmium(II) complexes; Crystal structures; Dithiocarbazate Schiff base crystal structures; Metal complexes; Schiff base ligands.