

Synthesis, characterization and bioactivity of mixed-ligand Cu(II) complexes containing S-methyldithiocarbazate derivatives and saccharinate complex containing S-methyl-β-N-(6-methylpyrid-2-yl)methylenedithiocarbazate

ABSTRACT

New mixed-ligand complexes of general empirical formula, [Cu(NNS)(sac)(H₂O)] (NNS' = S-methyl-β-N-(6-methylpyrid-2-yl)methylenedithiocarbazate, NNS'' = S-methyl-β-N-(2-acetylpyrid-2-yl)methylenedithiocarbazate and NNS''' = S-methyl-β-N-(2-benzoylpyrid-2-yl)methylenedithiocarbazate, sac = the saccharinate anion) have been synthesized by reacting [Cu(sac)₂(H₂O)₄] · 2H₂O with the appropriate ligands in water–ethanol mixtures and characterized by elemental analysis and conductance, magnetic, IR and electronic spectroscopic measurements. Magnetic and spectral evidence support a five-coordinate geometry for the complexes in which the Schiff bases coordinate as NNS tridentate ligands and the saccharinate anion coordinates as a unidentate N-donor ligand. An X-ray crystallographic structural analysis of [Cu(NNS')(sac)(H₂O)] shows that the complex has a distorted square-pyramidal structure in which the Schiff base is coordinated to the copper ion as a tridentate NNS chelating agent via the pyridine nitrogen atom, the azomethine nitrogen atom and the thiolate sulfur atom, the fourth and fifth coordination positions of the five-coordinate Cu(II) ion being occupied by the imino nitrogen of the saccharinate anion and oxygen atom of the aqua ligand. The complexes have been evaluated for their biological activities against eight pathogenic microbials and human T-lymphoblastic leukemia cell lines. The complexes exhibit marked cytotoxicity against leukemic cell lines and display moderate activity against pathogenic bacteria and fungi.

Keyword: Cu(II) complexes, Dithiocarbazate Schiff base, Saccharin complexes, S-Methyldithiocarbazate, Tridentate NNS Schiff base