Novel metal complexes derived from N_2S_2 donor sets; synthesis, structural characterisation and biological activities

Baidaa K. Al-Rubaye[a], Riyadh M. Ahmed[a], Enaam I. Yousif [a], Mohamad J. Al-Jeboori[a*] and Herman Potgieter[b]

[a]Department of Chemistry, College of Education for Pure Science (Ibn Al-Haitham), University of Baghdad, Baghdad, Iraq
[b]Division of Chemistry and Environmental Science, Manchester Metropolitan University, Manchester, M1 5GD, UK
E. mail: mohamadaljeboori@yahoo.com

Abstract

The synthesis of ligand systems with N_2S_2 donor sets that include imine, an amide, thioether and thiolate moieties and their metal complexes are achieved. The new Schiff-base ligands; N-(2-((2,4-diphenyl-3-azabicyclo[3.3.1]nonan-9-ylidene)amino)ethyl)-2-((2-mercapto ethyl)thio)acetamide (H_2L^1) and N-(2-((2,4-di-p-tolyl-3-azabicyclo[3.3.1]nonan-9-ylidene) amino)ethyl)-2-((2-mercaptoethyl)thio)acetamide (H_2L^2) were synthesised from the reaction of amine precursors with 1,4-dithian-2-one in the presence of triethylamine as a base in the $CHCl_3$ medium. Complexes of the general formula $K_2[M(L^n)Cl_2]$, (where: M = Mn (II), Co(II) and Ni(II)) and $[M(L^n)]$, (where: M = Cu(II), Zn(II) and Cd(II); n =1-2, expect $[Cu(HL^2)Cl]$) were reported. The entity of ligands and complexes including their purity were confirmed using elemental microanalysis (C.H.N.S), atomic absorption (A.A), chloride content, molar conductance, melting point and thermal analysis technique. while the molecular structures were elucidated with FT-IR, UV-Vis, magnetic susceptibility, ^1H, ^{13}C and DEPT $^{13}CNMR$ and mass spectroscopy. The prepared ligands and their complexes were tested against a range of bacterial strains (G^+ and G^-) and fungi species. The tested compounds indicated that; the ligands have not shown any antimicrobial activity against *Escherichia coli*. The Cd(II) complex for ligands H_2L^1 and H_2L^2 display the higher antimicrobial activity, compared with the other complexes. The H_2L^1 and H_2L^2 ligands have not shown any activity against *Candida albican*s. All complexes for ligands (H_2L^1 and H_2L^2) exhibited less activity against *Candida albicans*, compared with other types of fungi. These results are quite comparable with some commercial drugs that used for bacterial and fungi species.