

## Synthesis, characterization and biological evaluation of transition metal complexes derived from N, S bidentate ligands

### ABSTRACT

Two bidentate NS ligands were synthesized by the condensation reaction of S-2-methylbenzylthiocarbamate (S2MBDTC) with 2-methoxybenzaldehyde (2MB) and 3-methoxybenzaldehyde (3MB). The ligands were reacted separately with acetates of Cu(II), Ni(II) and Zn(II) yielding 1:2 (metal:ligand) complexes. The metal complexes formed were expected to have a general formula of  $[M(NS)_2]$  where  $M = Cu^{2+}$ ,  $Ni^{2+}$ , and  $Zn^{2+}$ . These compounds were characterized by elemental analysis, molar conductivity, magnetic susceptibility and various spectroscopic techniques. The magnetic susceptibility measurements and spectral results supported the predicted coordination geometry in which the Schiff bases behaved as bidentate NS donor ligands coordinating via the azomethine nitrogen and thiolate sulfur. The molecular structures of the isomeric S2M2MBH (1) and S2M3MBH (2) were established by X-ray crystallography to have very similar 1-shaped structures. The Schiff bases and their metal complexes were evaluated for their biological activities against estrogen receptor-positive (MCF-7) and estrogen receptor-negative (MDA-MB-231) breast cancer cell lines. Only the Cu(II) complexes showed marked cytotoxicity against the cancer cell lines. Both Schiff bases and other metal complexes were found to be inactive. In concordance with the cytotoxicity studies, the DNA binding studies indicated that Cu(II) complexes have a strong DNA binding affinity.

**Keyword:** Bidentate NS ligands; Crystal structure analysis; Hydrogen bonding; Cytotoxic activity; DNA binding