

PRELIMINARY STUDIES ON A NEW SCHIFF BASE AND ITS COPPER(II) COMPLEX: SYNTHESIS, CHARACTERIZATION, AND SINGLE CRYSTAL X-RAY STRUCTURES

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Thiophene-based Schiff bases and their metal complexes have recently attracted considerable interest as potential antimicrobial and anticancer agents, owing to their significant biological activities. [1] Notably, metal complexes often display enhanced efficacy compared to the free ligands. This improvement is attributed to chelation, which lowers the polarity of the metal ion, facilitates membrane penetration, and interferes with microbial enzymatic functions. [2]

In this work, we describe the synthesis of a new thiophene-derived Schiff base ligand, ethyl (E)-2-((2-hydroxy-3-methoxybenzylidene)amino)-6-methyl-4,5,6,7-tetrahydrothieno[2,3-c]pyridine-3-carboxylate (HL), together with its copper(II) complex. The compounds were characterized using a combination of spectroscopic methods, including ¹H NMR, FT-IR, UV–Vis, and single-crystal X-ray diffraction. Crystallographic analysis revealed that the ligand crystallizes in the orthorhombic space group and forms an intramolecular hydrogen bond between the phenolic oxygen and the imino nitrogen.

The copper(II) complex features a binuclear unit, [Cu₂LCl₄H₂O]·1.5H₂O, in the asymmetric unit of the crystal lattice. One copper center adopts a distorted square-pyramidal geometry, with the basal plane defined by a tridentate NOO donor set and a coordinated water molecule, while a bridging chloride ion occupies the apical position, linking two Cu(II) centers. The second copper atom is coordinated in a distorted tetrahedral fashion by four chloride ligands. Further studies will be conducted to assess the potential biological properties of the ligand and copper(II) complex.

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References

- [1] R. Shah, P. Kumar Verma, BMC Chem. 13 (2019) 54;
- [2] S. Nayab, A. Alam, N. Ahmad, S.W. Khan, W. Khan, D.F. Shams, M.I. Ali Shah, M. Ateeq, S.K. Shah, H. Lee, ACS Omega 8 (2023) 17620.