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Preparation, Characterization, and Antibacterial Potential of Copper (II) Mixed Ligand Complexes Containing Salen-Type Ligands and Di thiocarbamates

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Abstract

Blended ligand edifices of Cu (II) with salen type ligands, in particular N, Nãšâ¹-bis(salicylidene)- 1,2-ethylenediamine (salen) and N, Nãšâ¹-bis(salicylidene)- 1,2-pheneylenediamine (salophen) as essential ligands and pyrrolidine dithiocarbamate (pdtc) as an optional ligand were ready. The primary portrayal of the blended buildings was done by means of insightful as well as different ghastly examinations. The got results support that stoichiometry of the mononuclear blended ligand edifices can be addressed as NH4[Cu (II)- Schiff base(L)- pdtc (B)] and both H2L and (B) ligands can go about as tetra and bidentates separately. Moreover, both the schiff bases and the optional pdtc ligands tie with copper (II) particle to fabricate a steady six, five, six and four membered chelate rings with an octahedral calculation. The mass spectral data confirms the monomeric structure of the metal complexes while the study of the conductivity measurement indicated the 1:1 electrolyte nature of the complexes. The free Salen type ligands and their mixed copper (II) complexes have been tested for their antibacterial activity by using disc diffusion method and the results discussed.

Keywords: Mixed Copper(II) complexes; Dithiocarbamate Ligand; Spectrophotometry; Antibacterial

An impressive consideration has been given on Salen-type ligands attributable to their straightforward union, underlying flexibility, and extensive variety of utilizations in many fields including catalysis , iridescence, attraction and material science [1]. Salen Schiff base ligands and their metal edifices have been accounted for to show different organic activities by impact of the azomethine linkage, which is answerable for different antibacterial, antifungal, herbicidal, and in the investigation of the collaboration with DNA . Salen schiff base ligands got from diamines and 2-hydroxybenzaldehyde commonly lose two protons and capability as quadridentate chelates with O, N, N, O particles. This gives adequate coordination circle, as per the length of carbon-chain linkage that permit metal particles to track down a simple way to deal with tie to the N2O2 ligand. For the most part, these N2O2 tetradentate benefactors direction to d-block change metals to manage the cost of stable mononuclear edifices . Moreover, there are various reports on homometallic as well as heterometallic di-and trinuclear edifices with d-block metals comprising of two salen atoms [2,3]. In these buildings, μ2-phenoxo crossing over assumes a significant part in gathering metal particles and the two salen ligands. Dithiocarbamate ligands have gotten extraordinary thought, their little chomp point and the delicate idea of the dithiocarbamate moiety makes them fit for balancing out extensive variety of metal particles in various oxidation states. Dithiocarbamate ligands are mono anionic chelating ligands and can tie to metal particles in different coordination modes with the monodentate and anisobidentate modes. Dithiocarbamates edifices have been accounted for to acquire wide applications in medication, agribusiness, industry, in logical and natural science.

The coordination science of copper has drawn in expanding interest among the change metal edifices, since copper is biocompatible and displays numerous critical jobs in organic frame works [4]. Copper edifices of salen schiff base ligands have engaged extensive interest due to their variable holding properties, primary variety, and pharmacological properties. A few copper Salen buildings and their blended edifices in with anionic co-ligands have been orchestrated and their primary variety was explored. Biswas and Ghosh have orchestrated trinuclear copper (II) salen buildings and have found that the state of the trinuclear species might fluctuate from direct to three-sided relying on coordination method of the anionic coligand, coordination capacity of the dissolvable atoms and the idea of the focal metal particle [5]. have announced two novel Cu(II) buildings with Salen type ligands having different primary highlights and explored the different execution of the ligand . As of late, Asatkar and collaborators combined mononuclear cuprous buildings with Salen ligands that have solid restricting liking towards ct-DNA.

Thinking about the above realities, blended Cu(II) edifices of Schiff base (got from buildup of ethylenediamine or o-phenylenediamine with salicylaldehyde) and dithiocarbonate were combined. The integrated mixtures were described utilizing different ghastly methods and considered for their microbial examinations in contrast to Staphylococcus aureus, Streptococcus, Klebsiella pneumonia, Pseudomonas and Escherichia coli.

Exploratory segment

Materials and instruments

Ethylenediamine, o-phenylenediamine, salicylaldehyde and ammonium pyrrolidine dithiocarbonate were business items (from Alfa and Merck) and were utilized minus any additional cleaning. Solvents were of reagent grade and were purged by the

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typical techniques. Copper(II) acetic acid derivation monohydrate was acquired from Scharlau Chemise and utilized as gotten. The ligands N, N′-bis (salicylidene)ethylenediamine (H2L1) and N, N′-bis(salicylate)- o-phenylenediamine (H2L2) were ready as indicated by the distributed technique and their purities were really looked at by spectroscopic information. Essential investigation was completed with a Perkin Elmer model 2400 hardware. Conductivity estimations of 10-3 M arrangements in DMSO at room temperature were carried on a Jenway 470 conductivity meter. Infrared spectra were recorded on a PerkinElmer FT-IR Spectrometer (Wilderness)-USA. Attractive susceptibilities at room-temperature were finished by utilizing Sherwood Logical attractive equilibrium, Cambridge science, Britain Model no. MKI, Sequential no. MSBI/230/95/680. The UV-Vis spectra were kept in DMSO arrangement on Agilent Advancements Cary 60 UV-Vis spectrophotometer in 200-800 nm range. The FAB mass spectra were recorded utilizing a Micromass Autospec spectrometer. Combination of the Edifices, NH4 [CuLn(pdtc)], n=1,2. Cu(CH3COO)2. H2O (1mmol, 0.2g) arrangement in methanol (20 mL) was added to an answer of ammonium pyrrolidine dithiocarbamate (1mmol, 1.64g) in methanol (10 mL). The subsequent blend was refluxed for 1h. The relating Schiff base H2L1 (1 mmol, 0.268 g) or H2L2 (1 mmol, 0.316g) in 20 mL methanol was then included the response combination and refluxed for 4 h. The accelerates acquired were sifted, washed progressively with water and ethanol and afterward dried in air.

Antibacterial review

The ligands H2L1, H2L2 and their edifices were tried against the bacterial species Staphylococcus aureus, Streptococcus, Klebsiella pneumonia, Pseudomonas and Escherichia coli utilizing the normalized Agar-Well dissemination technique [6-9]. The anti-infection Ciprofloxacin was utilized as the standard reference. The antibacterial exercises were finished in DMSO dissolvable. The arrangements of ligands and the two buildings 1 and 2 were added to the agar plates. Hatching of the plates was finished at 37°C for 24 hours. Zones of restraint were kept in millimeters and the examination was rehashed multiple times.

Conclusion

Two new blended copper (II) buildings of Salen type ligands and dithiocarbamate were incorporated and described. The Salen directions to the Cu (II) particle as dibasic tetradentate ONNO chelating ligand though the dithiocarbamate limited to Cu (II) particle as uninegative anisobidentate ligand. From the scientific and ghastly information, it was seen that the pre-arranged copper (II) chelates embraced an octahedral math. The antibacterial review shows that the blended copper (II) buildings display great antibacterial property than that of free Salen ligands.

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