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Biological importance of copper (II) sesame soap-urea complex

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Abstract

The study of transition metal complexes containing macrocyclic nitrogen and sulphur donor ligands has been an attractive and fascinating area of modern research activity during last few decades, because of their synthetic investigations and for their usefulness. These ligands and their metal complexes are good complexing agents. The present research work reports fundamental chemical properties and new investigations of coordination compounds of some transition metal ions with an overview of medicinal applications. Transition metals appear in almost every facet of our day-to-day life, from industrial uses such as the manufacture of construction and building materials, tools, vehicles, up to cosmetics, paints and fertilizers. The present work deals with the study of synthesis and characterization of biological properties of novel copper (II) soap urea complex.

Keywords: Coordination compounds, transition metals, copper (II) sesame urea complex, biological properties, chemical properties

Introduction

From previous studies, it reveals that copper (II) soap complexes with nitrogen and sulphur containing ligands have special significance in the field of medicinal chemistry due to their remarkable pharmacological potentialities ^[1-2]. Research has shown significant progress in industrial utilization of these copper soap complexes as antimicrobial activities against *Staphylococcus aureus*. These results shows that nature of different nitrogen and sulphur containing ligands coordinated with metal ion play a significant role in the inhibition activity ^[3-6]. In recent times the coordination chemistry of nitrogen and sulphur containing ligands has reputed greater importance in view of the fact that several of these compounds have been found to be biologically active and have found use in medicine as well as in industry ^[7-8]. In microbiological influence of the copper (II) soap complexes against *Staphylococcus aureus* are investigated and reported. This review reveals that the pharmacologically interesting copper soap complexes could be a suitable strategy to develop novel therapeutic tools for the medical treatment ^[9-11].

Material and Methods

Copper (II) soaps were prepared by direct metathesis process. In this process, the oils were refluxed with 2N KOH solution and ethyl alcohol for about 3 hours. 1N HCl was used for neutralization of excess KOH. After initial drying in air oven at 100-105 °C, these copper soaps were further purified by recrystallization with hot benzene several times. The metal was analyzed by standard procedure ^[12]. These copper soaps were of green in colour are obtained. Care was taken to avoid traces of water which were found to hydrolyze the soap.



Scheme-1: Synthesis of copper (II) soap (where R represents the mixture of various long chain segments as per composition of the oil).

The copper (II) soap complexes were prepared by reacting ethanolic solution of ligand (Urea) with copper (II) soap in 1:1 molar ratio. In 25-30 ml of ethyl alcohol, 0.001 moles of ligand molecule was dissolved and in 10-15 ml of benzene, 0.001 moles of copper (II) soap

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derived from sesame oil was dissolved and then ethanolic solution of ligand was added in it. After this reaction mixture was refluxed for about two hours with constant stirring.

Results and Discussion

IR spectral analysis: In order to study the structure of copper (II) sesame soap complex, the Infra-red spectra of compound was obtained on a spectrophotometer (Fig 1).

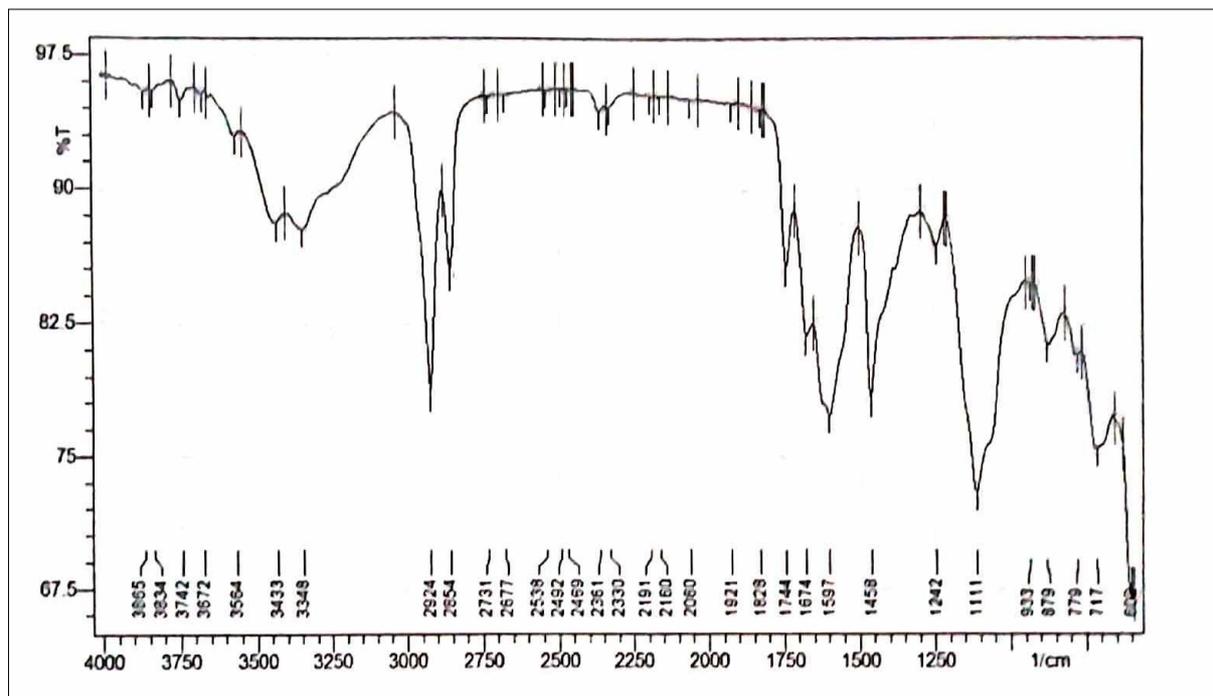


Fig 1: IR spectra of copper (II) sesame-urea complex

NMR spectral analysis

Nuclear Magnetic Resonance (NMR) spectroscopy is a non-

destructive analytical technique that is used to explore the nature and characteristic of molecular structure.

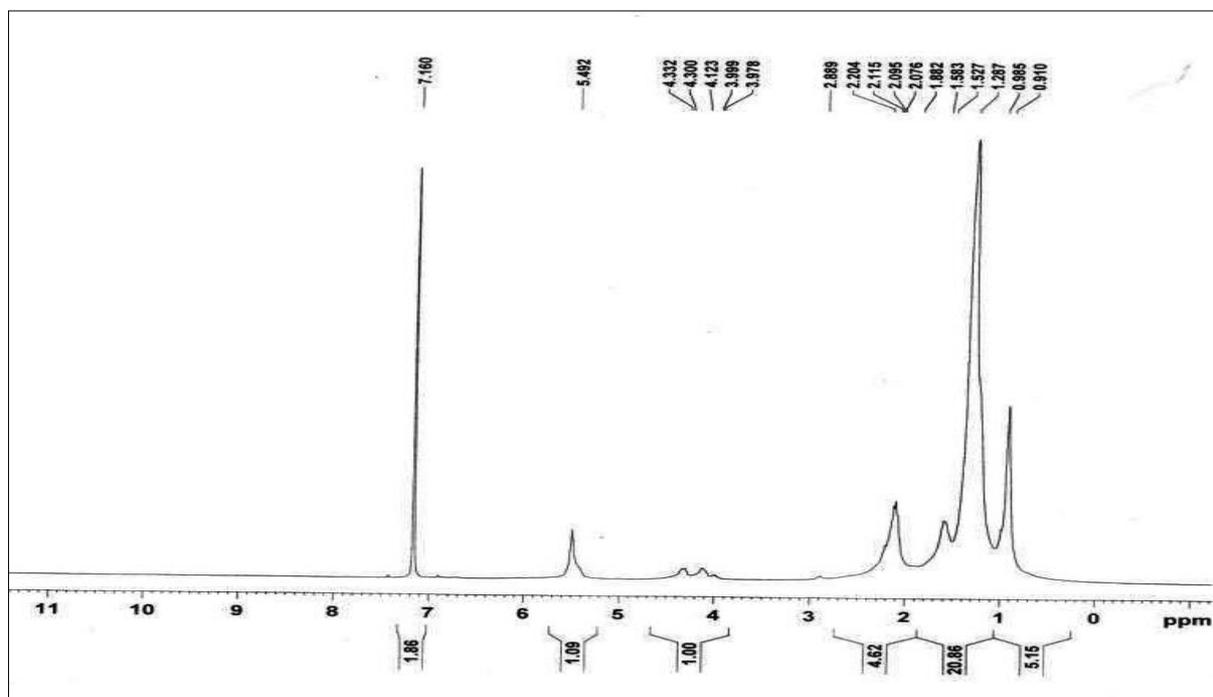


Fig 2: NMR spectra of copper (II) sesame-urea complex

Antimicrobial Studies

All the Copper (II) sesame soap complexes were screened for their antibacterial activity against *Staphylococcus aureus*. These complexes were tested at different concentrations after 24 and 48 hours incubation times and zone of inhibition have been measured in mm. The copper

(II) sesame soap complexes with ligand like urea were screened for their antibacterial activity against *Staphylococcus aureus*. These compounds were tested at different concentrations and zone of inhibition have been measured in mm [13-14].

Table 1: Zone of inhibition of copper (II) sesame soap complexes against *Staphylococcus aureus*.

Compound	C ₁ (50 mg/ml)		C ₂ (25 mg/ml)	
	24 hrs	48 hrs	24 hrs	48 hrs
CSU	17mm	19mm	11mm	14mm

In this study, It has been observed that the antibacterial activity increases with the increase in the concentration of the solution.

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