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Preparation, Morphological and Thermal Study of Cysteine Amino acid Metal Complexes

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ABSTRACT

The Complexes of Mn (II) and Cr (II) with amino acid cysteine were synthesized and Characterized by elemental analysis, SEM, TGA. In these complexes the amino acid coordinated to 1:2 with metal and they exhibits octahedral geometry. The catalytic activity of these complexes was studied in olefins using eco-friendly nontoxic molecular oxygen as oxidant.

Keywords: Amino acid, Metal complexes, cysteine, Molecular Oxygen.

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INTRODUCTION

Amino acids are molecules containing an amine group, a carboxylic acid group and a side chain that varies between different amino acids. These molecules are particularly important in biochemistry, where this term refers to α -amino acids with the general formula $H_2NCHRCOOH$, where R is an organic substituent. Amino acids containing uncharged amino groups, at physiological pH values, may also undergo Schiff base formation (i.e. condensation with aldehydes), which presents another potential mechanism for metal complexes. Lysine is an α -amino acid with the chemical formula $HO_2CCH(NH_2)(CH_2)_4NH_2$. This amino acid is an essential amino acid, which means that humans cannot synthesize it. Lysine is a base, as are arginine and histidine. DL-2, 3-Diaminopropionic acid (DAP) is a common plant metabolite, which may occur free but also as the β -acetyl- or β -N-oxalyl derivatives in some plants ¹⁻⁵.

Copper:

Copper plays an important role in bone formation in skin pigment synthesis, eyes, and hairs, wound healing, participate in the synthesis of red blood cells, are important for psycho-emotional balance and influence the function of glands with internal secretion. The body that represents more accurately the concentration of copper in the body is the liver; as a result, some authors give greater importance than other methods dosage hepatitis to assess the state of deficiency, or toxicity sufficient. Stored mainly in parenchymal cells, copper may occur in greater quantity and Kupffer cells in case of poisoning.

Biological role of Copper amino acid in biological systems

Copper is found in the form of Cu (II), rarely Cu (I) in deoxyhemocyanine, and rarely Cu (III). Function of copper in biological systems can be found in redox reactions associated with reducing. O_2 to water, O_2 transfer to the substrate, respectively mono oxygen insert oxygenase to transform phenol to diphenols and insertion dioxygen - dioxygenase, the transformation of catechol to a quinone. Copper ion complexation with various α -amino acids is similar, except that histidine formation of connections to the nitrogen atoms and oxygen atoms aminic group of carboxylate moiety, respectively glycine- $NNOO$ coordination type ⁶.

Cobalt

Cobalt metal is relatively less common in nature plays a very important technical importance is due to its value as a component of hard alloys (cermets) and steliçior type casting alloys and special alloys with specific properties, magnetic, refractory and antacids Cobalt is a transition metal of

Group IB, is the 27th element of the periodic table, atomic mass 58.933 amu, Density: 8.90 g/cm³ Melting point: 14950C 29270C boiling point has electronic configuration.

Biological role of Cobalt

Cobalt is an essential trace mineral whose biological activity is manifested through its role in the series of coenzymes and vitamin B₁₂. Vitamin B₁₂ is important in the hematopoietic indispensable in the synthesis of hemoglobin, is also anemic and antipernicious factor. Cobalt absence of living organisms might result in severe nervous system dysfunction, anemia and unnatural developments in cell growth. To treat these symptoms, it takes the whole molecule and not just the Cobalt.

Biological role of Copper amino acid Recent studies on the formation of complexes of cobalt (II) with different ratio amino acids such as cysteine and methionine, due to their bacteriostatic action ⁷. Also, the literature presents a series of studies on the action of divalent cobalt complexes with lysine, arginine, histidine Manuscript with changes highlighted and serine on HSV-1 virus ⁸. Complexes with arginine and histidine had no effect on virus replication but inhibits virus replication complex with lysine and serine at the very best inhibitory effect (90%).

Experimental:

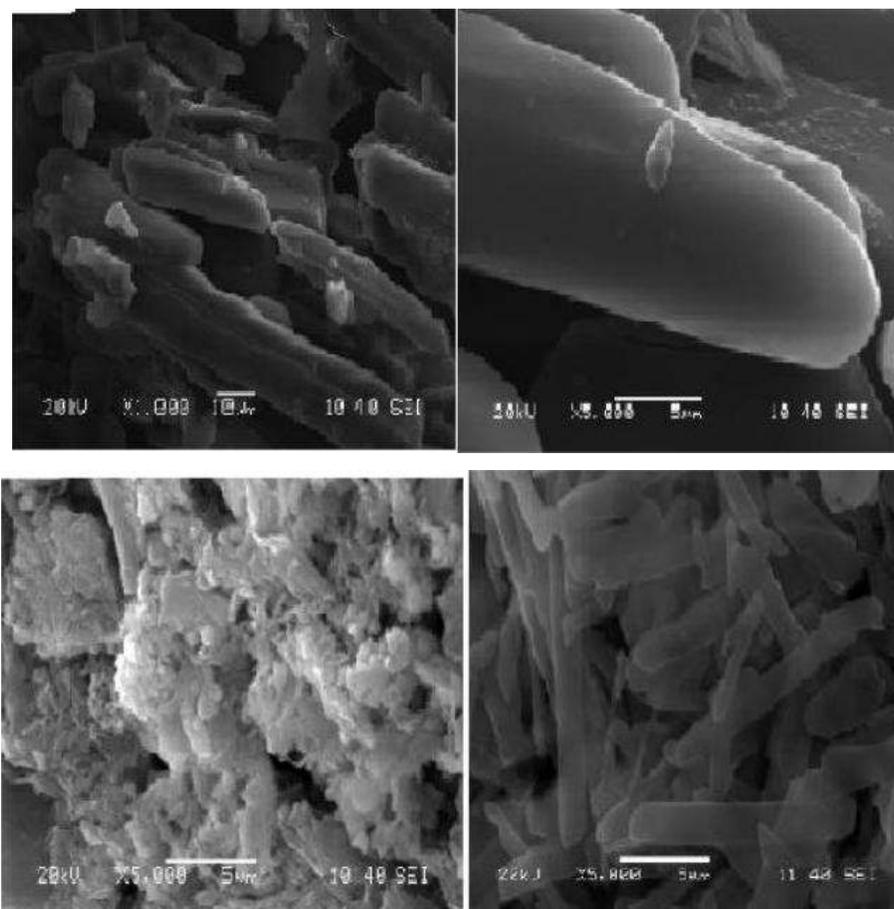


Figure 2: SEM-micrographs

Amino acid Cysteine 5gm were treated with 2.5gm of transition metal in presence of ethanol at temperature 50°C at 24 hr. greenish and a light yellow color indicates the formation of copper and nickel amino acid complex is formed. The power crystals were cooled filtered a then dried.⁹ Yield 1.2gm.

The SEM-micrographs for the M-cys (Metal) The morphology, texture and shape of the synthesized complexes with varying thickness in the range of 2 µm to 8 µm are shown Figure 2 A,B,C,D. The Cu-cys complex has shown the structure possessing layered crystallite. The Co-cys complex was showing the structure possessing rods with trigonal geometry. The flakes and the tubular structures were also seen in Ni-Ala. High magnification samples were used to observe the detailed surface structures of the complex.⁹

Thermo gravimetric analysis

TGA curves of cysteine metal complex shows the absence of water molecule, as sudden weight lost occurs at 300°C. The next weight loss occurs at 400°C which is due to the loss of 160 mass units. Similarly in the second molecule the mass loss occurs at 270°C due to the loss of water molecules. The second loss occurs at 455 which corresponds to the loss of 179 molecular mass units. The thermo gravimetric analysis provides authentic information regarding the loss of water molecules in the coordination sphere of metal complex.⁹

CONCLUSION

Two complexes of Mn (II), Cr (II) with amino acid cysteine were prepared by refluxing the amino acid and metals. The complexes were characterized by elemental analysis, Scanning electron microscope and Thermo gravimeter analysis. In these complexes the amino acid coordinated 1:2 ratios with metals and they exhibited different geometries. The SEM diagram of the metal complex shows that the metal complex gets attached on the surface of metal complex.

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