O‘ZBEKISTON RESPUBLIKASI OLIY VA O‘RTA MAXSUS TA’LIM VAZIRLIGI

BUXORO DAVLAT UNIVERSITETI

“KOORDINATSION BIRIKMALAR KIMYOSINING HOZIRGI ZAMON MUAMMOLARI” MAVZUSIDA XALQARO ILMIY-AMALIY KONFERENSIYA MATERIALLARI TO‘PLAMI

2022-yil 22-23-dekabr

Buxoro

13. Umarov B. B., Sulaymanova Z. A., Tillayeva D. M. COMPLEX TRANSITION METAL COMPOUNDS BASED ON THE CONDENSATION PRODUCTS OF FERROCENOYLACETONE WITH HYDRAZIDES OF CARBOXYLIC ACIDS //Scientific Bulletin of Namangan State University. – 2020. – T. 2. – №. 9. – C. 57-64.

INVESTIGATION OF COMPLEX COMPOUNDS OF TRANSITION METALS WITH DIHYDRAZONE OF SUCINIC ACID BASED ON FERROCENOLACETONE

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Annotation: *We obtained by Claisen condensation β-diketone - 1-ferrocenyl-butanedione-1,3. The dicarboxylic acid dihydrazone of 1-ferrocenylbutanedione-1,3 (H_4L) was synthesized by reacting succinic acid dihydrazide with ferrocenoylacetone in a 2:1 ratio. Based on them, homobinuclear complex compounds with copper(II), zinc(II), and nickel(II) ions were obtained. The IR spectra of the synthesized organic compounds have been studied. According to the results of spectroscopic studies, the complexes were assigned a square planar structure, where the four times deprotonated ligand residue is coordinated by each metal atom through two oxygen atoms and a nitrogen atom of the hydrazone fragment. The fourth position in the planar square of the trans-N2O2 coordination site is occupied by the ammonia molecule. Planar five- and six-membered metal cycles of synthesizers are practically coplanar with each other.*

Key words: *Claisen ester condensation, ferrocenoylacetone, succinic acid dihydrazone, tautomerism, spectroscopy*

We have synthesized the H_4L ligand by the condensation of 1-ferpocenylbutanedione-1,3 with succinic acid dihydrazide. It should be noted that such ligands are characterized by the formation of complexes of a homo- and heterobinuclear nature. We have synthesized complexes with a homobinuclear structure [1,2,3,4,5].

Using the data of elemental analysis and IR spectroscopy, we determined the composition and structure of the synthesized ligands in the solid state, and the structure in solutions was studied by the 1-speak method.

Using the data of elemental analysis and IR spectroscopy by us the composition and structure of the synthesized ligands in the solid state, and the structure in solution was studied by ^{1}H NMR spectroscopy.

The complexing ability of the H_4L ligand is due to the presence in the connection of several donor centers connected by a system of conjugated bonds, and in addition, a mobile hydrogen atom. Upon the interaction of an alcoholic solution of the H_4L ligand with aqueous ammonia solutions of Ni(II), Cu(II), and Zn(II) acetates in a molar ratio of 1:2, complex compounds were isolated. Based on the results of elemental analysis of the complexes, the general formula $M_2L{\cdot}2NH_3$ [6,7,8,9,10].

M = Ni(II) ($Ni_2L·2NH_3$), Cu(II) ($Cu_2L·2NH_3$), Zn(II) ($Zn_2L·2NH_3$)

The IR spectra of homobinuclear complexes of copper(II), nickel(II), and zinc(II) were recorded in the range 400–4000 cm^{-1}. A comparative analysis of the IR spectra of the H_4L ligand and its complexes showed that after the coordination of the ligand to the metal atom, the spectrum of complex compounds does not show absorption bands of the valence vibrations of the N–H bond and carbonyl groups hydrazone fragments. Valence vibrations $\nu_{(M–N)}$ and $\nu_{(M–O)}$ are registered at 456 and 525 $см^{-1}$, and $\nu_{(C=N)}$ shifts to the high-frequency region by 20 cm^{-1}, as compared with the spectrum of the free ligand (Fig. 1) [11,12,13,14,15]. This fact indicates the coordination of the hydrazone with the participation of the azomethine nitrogen atom in the coordination. After the coordination of donor atoms with metal ions, the electron density is redistributed, and a pseudoaromatic bond system appears in five- and six-membered metal cycles [16,17,18,19].

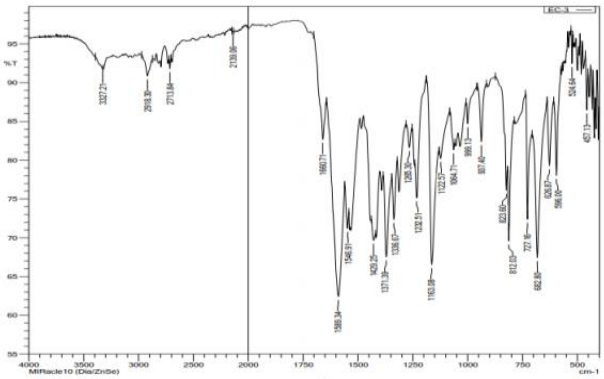

Fig.1. IR spectrum of the complex $Cu_2L·2NH_3$.

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