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LEARNING ABOUT THE METHOD OF CONNECTING THE ELECTRONIC MICROSCOPE OF COMPLEXATION OF Co (II) SALT WITH OXADIAZOLE DERIVATIVE

Abstract. The oxadiazole derivative 5–4-pyridyl-1,3,4-oxadiazolin-2-thione (Hpot) was used as a ligand in reactions to form complexes of Co(II) ions. The composition and structure of the selected ligand were studied by means of elemental, thermal and X-ray phase analysis, IR spectroscopy, and absorption electronic microscope analysis. Based on the research, it was found that the ligand has individuality, characteristic composition and cyclic structure. According to the data of IR spectroscopy, it was found that the ligand exists in tautomeric forms in the solid state and in solution.

Keywords: oxadiazole, cyanoactive electronic microscope, electronic light, cobalt ions.

Currently, a powerful technique is used in the analysis of material – the scanning electron microscope (SEM). In this case, a modern cell phone is passed through a thin electronic circuit board. The resulting electron is bombarded and leads to the release of a secondary electron, the collision of a double electron with a low energy, and the formation of a pentogen nucleus opposite to the element itself. The SEM detector only collects low-energy secondary electrons from the thin nanometer surface of the sample. This eca paints very good peaks with a perfect color version.

A portable electronic microscope has many advantages over other devices. For example: when attached to the tip of a conventional optical microscope, the optical microscope is characterized by high accuracy and high reproducibility, as well as the clarity of the image obtained and the speed of analysis.

The percent concentration of Co, C, N, O, and S elements in the composition of the complex based on $Co(Cl)_2$ is Co-13.2%, C-37.4%, N-9.5%, O-21, 5% and S-14.6%. This results in a formula with the composition $CoC_{14}N_6N_{18}O_6S_2$. According to the given formula, the composition of the complex can be represented by the formula $[Co_2(H_2O)_4]$*$2H_2O$.

The results of the thermal analysis were analyzed in order to determine the thermal stability of the complex bipicmalap of the Co (II) salt with 5-(4-pyridyl)-1,3,4 oxadiazol-2-thione and the presence of a new molecule.

The thermal analysis is carried out in a thermal analytical device – deviator, and simultaneously the rate of reduction of the mass of the sample, the mass of the complex and the thermal stability are determined. As a result of the thermal analysis, the folding and folding of the complex, the coordination quality and coordination of the ligand, and the complex product are determined.

Dehydration is assumed to occur at significantly lower temperatures when dehydrating. Because the Van-Der-Vals circuit requires a low-energy capacitor when it closes to a coordination bond break. The separation of the water in the crystalhydrate and the internal shpere is in a very wide range of temperature, so it is not possible to determine the temperature of the beginning of the water in practice. For the

studied complex, the peak of the coagulation curve appears at 120–134 °C, which is due to the crystallizing water molecule in the complex.

The thermal analysis of the synthesized complex compounds can be summarized as follows: complex compounds is decomposed in an oven at an temperature of 50–700 °C. For the studied complex, the observation of the endothermic effect at the temperature of 120–134 °C is caused by the dissociation of the water molecule in the complex. This is explained by the fact that the complex compounds has a crystallization curve.

In order to determine the nature of the ligand and the electronic transitions of the synthesized complex compounds, as well as the degree of oxidation of Co (II) ions and the spatial structure of the complex compounds, the electronic spectrum of the powder complexes was studied.

It is known from the literature that the Rak-B parameter, which describes the inter-electron repulsion and is related to the size of the metal and the effective charge of its nucleus, provides information on the degree of covalency of the metal-ligand bond; in this case, the greater the covalency of the bond (the greater the polarizability of the ligand and the polarizing effect of the cation, the greater the effective charge of the cation nucleus and the level of covalency of the bond) Rak parameter B. Dq parameter is a metal ion with a complex increase in the metal charge and the strength of the ligand field, and depending on the nature of the ligand. The Rak parameter tends to increase with an increase in the number of electrons in the d-shell due to the increase in interelectron repulsion B.

Thus, as a result of the analysis of the electronic spectrum of the diffusion reduction of Co (II) nitrate complex in the form of powder, it can be said that the absorption lines of the ligands, determined in the strong field, shift to the side of high frequencies. Accordingly, the degree of compression of the coordination polyhedron in the direction of the planar structure corresponds to the skewed octahedral structure of the Co (II) complex.

In the calculation analysis of the obtained results, it should be noted that the calculated values of the Rak B parameters increase with an increase in the number of d-electrons in the 2+ charged ions of Co (II) complexes, which means a decrease in the level of covalency of the M–L bond with the return of electrons and a change in the nature of the metal.

A selected ligand has multiple donor competing atoms to coordinate into a complex structure. To determine the approximate coordination centers in the heterocyclic ligand, we carried out a chemical calculation of the reactivity of the donor centers in the polyfunctional ligand by the quantum chemical DFT method. The analysis of the calculated data showed that the most probable centers of coordination in (Hpot) ligand molecules are nitrogen atoms of oxadiazole and pyridyl rings. The data of physicochemical analysis of some intermediate metal complexes obtained confirmed the results of quantum chemical calculation of the selected ligand molecule. Methods of synthesis of 8 new complex compounds with Co (II), Ni (II) chlorides, nitrates and acetates based on (Hpot) ligand were developed and mastered.

The composition of the synthesized complex compounds was studied by the methods of elemental, X-ray phase and thermal analysis, IR spectroscopy, scanning electron microscope, diffusion reduction electron spectrum analysis methods. According to the results of thermal analysis, it was found that the synthesized complex compounds contain water of crystallization and coordination.

According to the results of IR spectroscopy, the coordination centers of the metal ions of the ligand were determined, the heterocyclic ligand (Hpot) can be monodentate and bidentate, it was shown that the molecule is bound by the donor atom when the quantum chemical theory of the ligand is calculated. It was found that, depending on the reaction conditions, complexes can have M : L=1:2 or 1 : 4 composition.

For all complex compounds formed from metal chlorides and 5–4-pyridyl-1,3,4-oxadiazol-2-thione/thiol in C_2H_5OH, a two-state octahedral struc-

ture in the coordination compound was proposed on the basis of physicochemical analysis. The polygons are covered by monodentately coordinated molecules with the nitrogen atom of the pyridyl ring, the ligand, and the four bound water molecules.

References:

1. Pattan S., Musmade D., Muluk R., Pawar S., Daithankar A. Synthesis, antimicrobial and antitubercular activity of somenovel[3-isonicotinoyl-5-(4-substituted)-2,3-dihydro-1,3,4-oxadiazole-2-yl] and substituted 5-(pyridin-4-yl)-1,3,4-oxadiazole-2-thiolderivatives// Indian Journal of Chemistry,– Vol. 52B. 2013.– P. 293–299.
2. Bostrem J., Hogner A., Llinas A., Wellner E., Plright A. T. Oxadiazoles inmedicinal chemistry // Journal of Medicinal Chemistry,–Vol. 55. 2012.– P. 1817–1830.
3. Pitasse-Santos P., Sueth-Santiago V., Lima M. F. 1,2,4-and 1,3,4-oxadiazoles asabasis for the development of antiparasiticagents // Journal of the Brazilian Chemical Society, – Vol. 29. 2018.– P. 435–456.
4. Pace A., Pierrot P. Anewera of 1,2,4-oxadiazoles // Organic & Biomolecular Chemistry – Vol. 7. 2009.– P. 4337–4348.
5. Vaidya A., Jain S., Jain P., Jain P., Tiwari N., Jain R., Jain R., Jain A. K., Agrawal R. K. Synthesis and biological activity of oxadiazole derivatives: areview // Mini-Reviewsin Medicinal Chemistry – Vol. 16. 2016.– P. 825–845.
6. Khan I., Ibrar A., Abbas N. Oxadiazoles promising anticancer drugs: recent advances and future prospects // Archivder Pharmazie – Vol. 347. 2014.– P. 1–20.
7. Pace A., Buscemi S., Picchonello A. P., Pibiri I. Recent advances in thechemistry of 1,2,4-oxadiazoles // Advances in Heterocyclic Chemistry – Vol. 116. 2015.– P. 85–136.
8. Khan J. Liquid crystals based on 1,3,4-oxadiazole // Journal of Materials Chemistry C – Vol. 1. 2013.– P. 7779–7797.
9. Salahuddin Mazumder A., Yar M. S., Mazumder R., Chakraborty G. S., Akhsan M. J., Rahman M. Yu. An update on the synthesis and biologicalactivity of 1,3,4-oxadiazole: a review // Synthetic Communications – Vol. 47. 2017.– P. 1805–1847.
10. Du M., Bu X. H., Guo Y. M., Liu H., Batten S. R., Ribas J., Mak T. First CuIID iamon doid Netwith 2-Fold Interpenetrating Frame works. The Role of Anionsin the Construction of the Supramolecular Arrays // Inorganic Chemistry – Vol. 41. 2002.– P. 4904–4908.
11. Du M., Zhao X. J., Guo J. H., Batten S. R. Direction of topological isomers of silver (I) coordination polymers inducedby solvent, andselective anion-exchangeofaclass of PtS-typehostframe works// Chemical Communications journal 2005.– P. 4.– P. 4836–4838.
12. Du M., Li C. P., Guo J. H. Separatethiocyanate coordination complexes of Cd II and Co II with 2,5-bis(pyrazinyl)-1,3,4-oxadiazole: metal-directed assembly of the 1-D polymer chain and 3-D supramolecular network // Inorganica Chimica Acta – Vol. 359. 2006.– P. 2575–2582.