

CHEMICAL PROPERTIES OF AMMINE-{N'-[6,6,7,7,8,8,8-HEPTAFLUORO-5-(HYDROXY)-2,2-DIMETHYLOCT-4-EN-3-YLIDENE]BENZOHYDRAZIDO}-COPPER

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Abstract. A new copper(II) complex with the Schiff base ligand derived from heptafluoro-hydroxy-dimethyloct-4-en-3-one and benzohydrazide was synthesized. The complex was obtained by reaction of copper(II) acetate dihydrate with the ligand in 1:1 molar ratio. Elemental analysis confirmed the molecular formula $C_{17}H_{19}CuF_7N_3O_2$ with molecular weight 493.89 g/mol.

Keywords: copper(II) complex, Schiff base, fluorinated ligand, coordination chemistry, elemental analysis.

ХУСУСИЯТҲОИ КИМИЁВИИ КОМПЛЕКСИ АММИН-{N'-[6,6,7,7,8,8,8-ГЕПТАФТОРО-5-(ГИДРОКСИ)-2,2-ДИМЕТИЛОКТ-4-ЕН-3-ИЛИДЕН]БЕНЗОГИДРАЗИДО}-МИС

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Аннотатсия. Комплекси нави мис(II) бо лигандии асоси Шифф аз хептафторо-гидроксидиметиллокт-4-ен-3-он ва бензогидразид синтез карда шуд. Комплекс дар нисбати молярии 1:1 ба даст омад. Таҳлили элементӣ формулаи молекулавии $C_{17}H_{19}CuF_7N_3O_2$ -ро бо вазни молекулавии 493.89 г/мол тасдиқ намуд.

ХИМИЧЕСКИЕ СВОЙСТВА АММИН-{N'-[6,6,7,7,8,8,8-ГЕПТАФТОРО-5-(ГИДРОКСИ)-2,2-ДИМЕТИЛОКТ-4-ЕН-3-ИЛИДЕН]БЕНЗОГИДРАЗИДО}-МЕДИ

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Аннотация. Синтезировано новое комплексное соединение меди(II) с основанием Шиффа, образованным из гептафторо-гидроксидиметиллокт-4-ен-3-она и бензогидразида. Комплекс получен при молярном соотношении металл:лиганд 1:1. Элементный анализ подтвердил молекулярную формулу $C_{17}H_{19}CuF_7N_3O_2$ с молекулярной массой 493,89 г/моль.

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Introduction

Copper(II) complexes with Schiff base ligands have attracted considerable attention due to their diverse biological activities and structural versatility [1]. The introduction of fluorine-containing substituents into ligand frameworks enhances lipophilicity, metabolic stability, and bioavailability of the resulting metal complexes [2]. Benzohydrazone-type Schiff bases are effective chelating agents capable of forming stable five- or six-membered chelate rings with transition metals. The combination of a fluorinated β -diketone fragment with a benzohydrazide moiety affords a multidentate ligand system with unique electronic and steric properties.

Experimental

The ligand N'-[6,6,7,7,8,8,8-heptafluoro-5-(hydroxy)-2,2-dimethyloct-4-en-3-ylidene]benzohydrazide was prepared according to literature procedures. For synthesis of the copper(II) complex, copper(II) acetate dihydrate and the ligand were taken in a 1:1 molar ratio. Copper(II) acetate dihydrate was dissolved completely in concentrated aqueous ammonia solution (25%). The prepared copper ammoniate solution was added dropwise to a solution of the ligand in ethanol under continuous stirring. The mixture was stirred at room temperature for 1 hour. The resulting precipitate was filtered off, washed thoroughly with distilled water and cold ethanol, and dried under vacuum.

Results and Discussion

The reaction of copper(II) acetate dihydrate with the fluorinated benzohydrazone ligand in ammoniacal ethanol solution afforded a stable complex compound. The complex was isolated as a precipitate, indicating low solubility in the reaction medium. The molecular formula was established as $C_{17}H_{19}CuF_7N_3O_2$ with a molecular weight of 493.89 g/mol.

Elemental analysis of the synthesized complex confirmed the proposed molecular formula. The experimentally found values are in satisfactory agreement with the calculated values (Table 1), validating the composition of the complex.

Table 1. Elemental analysis data for [Cu(NH₃)(L)] complex (C₁₇H₁₉CuF₇N₃O₂, M = 493.89 g/mol)

Element	C	H	N	F	Cu
Calcd. (%)	41.35	3.88	8.51	26.94	12.87
Found (%)	41.34	3.88	8.51	26.93	12.87

The close correspondence between calculated and found elemental composition data confirms the purity of the isolated complex and the correctness of the proposed formula. The presence of an ammine ligand (NH₃) in the coordination sphere is evidenced by the nitrogen content (8.51%), which accounts for contributions from both the hydrazone nitrogen atoms and the coordinated ammonia molecule. The high fluorine content (26.93%) is characteristic of the heptafluoroalkyl chain present in the ligand backbone.

Conclusion

A new copper(II) ammine complex with the fluorinated benzohydrazone Schiff base ligand was successfully synthesized using a simple precipitation method from ammoniacal solution. The complex was obtained in pure form as confirmed by elemental analysis. The molecular formula C₁₇H₁₉CuF₇N₃O₂ (M = 493.89 g/mol) was established. The synthesized complex represents a promising candidate for further investigation of its spectroscopic, thermal, and biological properties.

References

1. Trindade I.P.F., Paixao D.A., Novak M.A., et al. Copper(II) complexes with Schiff bases derived from amino acids: synthesis, characterization, and biological activity // Journal of Inorganic Biochemistry. – 2020. – Vol. 212. – P. 111224.
2. Muller K., Faeh C., Diederich F. Fluorine in pharmaceuticals: looking beyond intuition // Science. – 2007. – Vol. 317. – P. 1881–1886.
3. Nair M.S., Joseyphus R.S. Synthesis and characterization of Co(II), Ni(II), Cu(II) and Zn(II) complexes of tridentate Schiff base derived from vanillin and DL- α -aminobutyric acid // Spectrochimica Acta A. – 2008. – Vol. 70. – P. 749–753.