

# Co(II) AND Cu(II) COMPLEXES BASED ON CAPH TYPE LIGAND N, N'-DIBENZYL -N''-TRICHLORACETYLPHOSPHORTRIAMIDE

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Carbacylamidophosphates (CAPH) – compounds containing the functional fragment  $-C(O)N(H)P(O)=$  belong to the broad class of the powerful amphoteric ligands. Due to the presence of phosphoryl group in the composition of CAPH ligands they have high affinity for the majority of metal ions. The possibility to be involved in the coordination sphere both in molecular and acidic forms, makes the coordination chemistry of these ligands extremely diverse and interesting [1].

On the basis of one representative of CAPH ligands - N, N'-dibenzyl-N''-trichloroacetylphosphortri- amide (HL), di- and tetrameric complexes of the composition  $Co_2L_4(CH_3OH)_2$  and  $Cu_4L_4(OCH_3)_4$  were synthesized and obtained in the crystalline state. Obtained compounds were investigated by means of IR spectroscopy, thermogravimetric, magnetochemical and X-ray diffraction analysis.

The bidentate-cyclic coordination of CAPH ligand through oxygen atoms of the phosphoryl and carbonyl groups was established for both complexes under consideration.

In the  $Co_2L_4(CH_3OH)_2$  structure cobalt ions are connected in the centrosymmetric dimers due to the bridging function of the phosphoryl groups (Fig. 1). The coordination sphere of each cobalt ions includes also methanol molecule, coordinated by oxygen atom and additionally linked to the carbonyl group by hydrogen bond. Last one can be considered as an additional stabilizing factor in the formation of the dimeric structure.

Complex  $Cu_4L_4(OCH_3)_4$  contains methylate ions which due to  $\mu^3$ -bridging function connect four copper ions in the tetramer (Fig. 1). According to results of thermogravimetric investigations, the first mass loss for the cobalt complex corresponds to missing of two methanol molecules (the range temperature from 80°C to 150°C). This process combines with the process of oxidative degradation of organic ligands.

Unlike the compound of cobalt, the tetrameric copper complex contains methylate ions, therefore it is resistant to the temperature of 110°C. Further rising of temperature leads to the destruction of the organic part of copper complex.

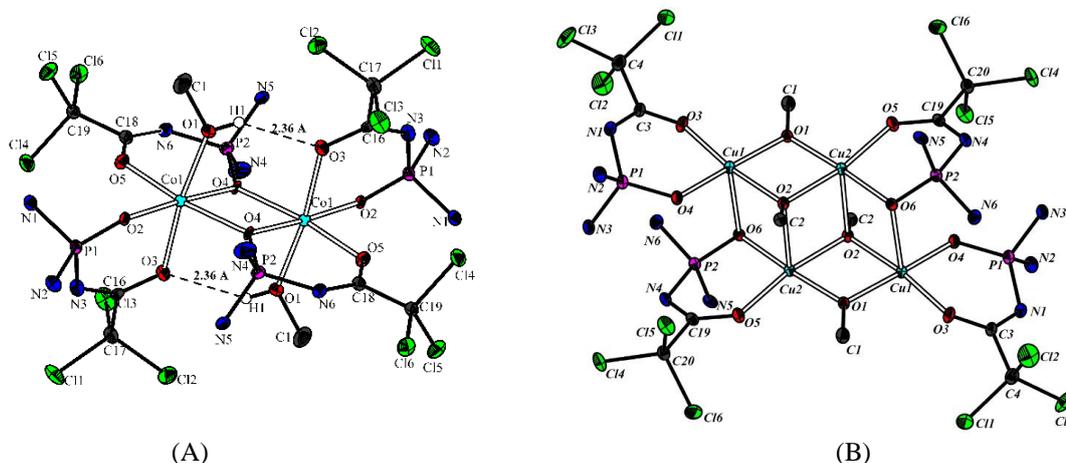


Fig. 1. The molecular structure of the dimer  $Co_2L_4(CH_3OH)_2$  (A) and the tetramer complex  $Cu_4L_4(OCH_3)_4$  (B) (protons and benzyl substituents are omitted for clarity).

[1] Powerful new ligand systems: carbacylamidophosphates (CAPH) and sulfonylamidophosphates (SAPH). Ligands. Synthesis, characterization and role in biotechnology. Amirkhanov V., Ovchynnikov V., Trush V., Gawryszewska P., Jerzykiewicz L.B., Nova Science Publishers Inc. 2014 – P. 199-248.