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CU(II) COMPLEXES WITH 4-ALLYLTHIOSEMICARBAZONE AS POSSIBLE ANTIOXIDANT AGENTS

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Oxidation is an essential part of aerobic metabolism in living organisms. In this process, free radicals are constantly generated. It is widely known that free radicals play a dual role *in vivo* as both beneficial and adverse compounds. In order to maintain the balance of the activity of the free radicals in living cells, the organism has evolved antioxidant defense systems, protecting against free radical damage. However, when our endogenous defense system has incomplete efficiency, or a rise in free radicals under special conditions like smoking, chemical air pollutants, radiation, and inflammation, the imbalance between free radicals and antioxidants results in oxidative stress, which is now believed to be one of the important factors in the occurrence of certain human diseases including atherosclerosis, rheumatoid arthritis, cancer, and neurodegenerative diseases. So, the search of possible antioxidants agents is of interest, because they protect the body against damage by harmful free radicals. For this purpose two copper(II) coordination compounds of 1-(morpholin-4-yl) propane-1,2-dione 4-allylthiosemicarbazone (HL) with 1,10-phenantroline (1,10-Phen) and 2,2'-bipyridyl (2,2'-Bpy) were synthesized. On the first stage of the experiment the ethanolic solution of $Cu(NO_3)_2 \cdot 3H_2O$ reacts with 4-allylthiosemicarbazone HL and on the second stage the ethanolic solution of the prepared precursor $Cu(L)NO_3$ reacts with bidentate amines forming crystalline coordination compounds. The composition of these compounds was determined using

elemental analysis for copper: $Cu(1,10\text{-}Phen)(L)NO_3$, $Cu(2,2'\text{-}Bpy)(L)NO_3$. The molar conductivity values of the synthesized coordination compounds are in the range 82-98 $\Omega^{-1} \cdot cm^2 \cdot mol^{-1}$ that indicates that these complexes are 1:1 electrolytes. A standard $ABTS^{\bullet+}$ method has been used to determine the antioxidant properties of synthesized compounds and trolox was used as a reference. The pro-ligand HL is less active than trolox, its coordination to copper(II) atom decreases antioxidant activity. The introduction of bidentate amines into the internal sphere of precursor increases the activity of complexes, that become 4 times more active than pro-ligand HL, 6 times more active than precursor, and also more active than trolox.

Table 1. IC_{50} values of the synthesized substances toward $ABTS^{\bullet+}$ radical cation.

Compound	IC_{50}, μM
HL	94.44
$Cu(L)NO_3$	140.30
$Cu(1,10\text{-}Phen)(L)NO_3$	23.04
$Cu(2,2'\text{-}Bpy)(L)NO_3$	22.31
Trolox	33.00

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