Systematic coordination chemistry and cytotoxicity of copper(II) complexes with methyl substituted 4-nitropyridine N-oxides.

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Streszczenie

Three new nitrato copper(II) complexes of dimethyl substituted 4-nitropyridine N-oxide were synthesized and characterized by elemental analysis, magnetic, spectroscopic, thermal and X-ray methods, respectively. They were isolated as trans isomers, mononuclear (μ=1.70-1.88 BM), five (1-2) and four (3) coordinate species of general formula [Cu(NO3)2(H2O)L2] where L=2,3-dimethyl-, 2,5-dimethyl-4-nitropyridine N-oxide and [Cu (NO3)2L2], L=3,5-dimethyl-4-nitropyridine N-oxide, respectively. The X-ray crystal structure of (1) (L=2,3-dimethyl-4-nitropyridine N-oxide) was determined. The organic ligands, the complexes and copper hexaqua ion as a reference were tested in vitro on the cytotoxic activity against human cancer cell lines: MCF-7 (breast), SW-707 (colon) and P-388 (murine leukemia). The complexes are relatively strong cytotoxic agents towards P-388 cell line. Comparative analysis was performed for all known copper(II) complexes containing methyl derivatives of the 4-nitropyridine N-oxide on the basis of their composition, structure and cytotoxic activities. To obtain the typical structure for these species (i.e., 4-coordinate mononuclear of the type trans-[Cu(inorganic anion)2L2]), two methyl groups must be situated on both sides of nitrogen atom(s) (i.e., NO and NO2) in the ligand. The biological activity was found to be strongly dependent upon the number of the methyl groups and the type of cell line. The best cytotoxic results were found for the complexes without substituents or with one methyl group. Generally, for all cell lines, the complexation increased cytotoxicity when compared with the free ligands.

Słowa kluczowe

copper(II) complexes, Methyl derivatives of 4-Nitropyridine N-oxide, Cytotoxicity, crystal structure