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Mono-substituted cage-like silsesquioxanes bound by trifunctional acyl chloride as a multi-donor N,O-type ligand in copper(II) coordination chemistry: synthesis and structural properties.

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Streszczenie

The functionalized cage-like silsesquioxanes (POSSs) have attracted substantial interest because of their indisputable role in coordination chemistry as multi-donor ligands. In this paper, we report on the synthesis and structural properties of a novel POSS-based ligand created by the two mono-substituted cubic silsesquioxanes bound by trifunctional aromatic acyl chloride that may play the role of a multi-donor N,O-type ligand in copper(II) coordination chemistry. The solution absorption spectra of the obtained ligand with three different Cu^{2+} salts confirm the formation of coordination entities by the occurrence of characteristic d–d transition bands. The coordination mode depends on the pH of the environment and suggests oxygen donors at acidic pH and one or a maximum of two nitrogen atoms at higher pH values. Electron paramagnetic resonance (EPR) investigations are in agreement with UV-Vis studies, confirming possible coordination modes in solution. Direct current (DC) variable-temperature magnetic susceptibility measurements on polycrystalline samples of the resulting complexes were carried out in the temperature range of 1.8–300 K. The magnetic behavior of these complexes indicates a very weak antiferromagnetic interaction between copper(II) ions in the crystal lattice. From the magnetic point of view, the formed complexes can be considered as mononuclear species.

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