

Versatile coordination of *N*-(diisopropoxyphosphoryl)-*p*-bromothiobenzamide towards Zn(II) and Cd(II).

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Reaction of the potassium salt of *N*-(diisopropoxyphosphoryl)-*p*-bromothiobenzamide $p\text{-BrC}_6\text{H}_4\text{C(S)NHP(O)(OiPr)}_2$ (**HL**) with Zn(II) and Cd(II) cations in aqueous EtOH leads to the three different complexes: $[\text{Zn(L-O,S)}_2]$ (**1**), $[\text{Cd}(p\text{-BrC}_6\text{H}_4\text{C(S)NH}_2\text{-S})(\text{L-O,S})_2]$ (**2**) and $[\text{Cd}(\text{HL-O})_2(\text{L-O,S})_2]$ (**3**). The structures of these compounds were investigated by single crystal X-ray diffraction analysis, IR, ^1H and ^{31}P NMR spectroscopy, MALDI TOF spectrometry, and microanalysis. The Zn(II) atom in complex **1** is in a distorted tetrahedral O_2S_2 environment formed by the CS sulfur atoms and the PO oxygen atoms of two deprotonated ligands. Complex **2** has a trigonal-bipyramidal coordination core, $\text{Cd}(\text{O}^{\text{ax}})_2(\text{S}^{\text{eq}})_3$, and two deprotonated ligand molecules **L** are coordinated in the axial positions through the oxygen atoms of the PO groups. The trigonal plane is formed by the sulfur atoms of two anionic ligands and one *p*-bromothiobenzamide. The Cd(II) cation in complex **3** has an octahedral environment, $(\text{O}^{\text{ax}})_2(\text{O}^{\text{eq}})_2(\text{S}^{\text{eq}})_2$, with two neutral ligand molecules coordinated in the axial positions through the oxygen atoms of the PO groups. The equatorial plane is formed by two anionic ligands in a typical 1,5-O,S-coordination mode. The corresponding neutral and deprotonated ligands are in a *trans* disposition.

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