

Investigation of vanadium(III) and vanadium(IV) compounds supported by the linear diaminebis(phenolate) ligands : correlation between structures and magnetic properties.

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Streszczenie

A family of oxidovanadium(IV) compounds containing linear diaminebis(phenolate (salans) L^{1-5} ligands ($L^1 = [MeNCH_2CH_2NMe(CH_2-4-CMe_2CH_2CMe_3-C_6H_3O)_2]^{2-}$; $L^2 = [MeNCH_2CH_2NMe(CH_2-4-CH_3-C_6H_3O)_2]^{2-}$; $L^3 = [MeNCH_2CH_2NMe(CH_2-4-Cl-C_6H_3O)_2]^{2-}$; $L^4 = \{MeNCH_2CH_2NMe[CH_2-4,6-(CH_3)_2-C_6H_2O]_2\}^{2-}$; and $L^5 = \{MeNCH_2CH_2NMe[CH_2-4,6-(Br)_2-C_6H_2O]_2\}^{2-}$) and non-oxidovanadium(III) with $L^{2,4}$ and acac ligands has been prepared and characterized by chemical and physical techniques. Reactions of $[VO(acac)_2]$ with ligand precursors $H_2L^{2,4}$ in toluene or hexane afforded vanadium(III) compounds $[V(L-\kappa^4ONNO)(acac)]$ (**1**, L^2 ; **2**, L^4), while the use of acetonitrile or ethanol led to the formation of dimeric oxidovanadium(IV) $[(VO)_2(\mu-L-\kappa^4ONNO)_2]$ (**3**, L^1 ; **4**, L^2 ; **5**, L^3) and monomeric $[VO(L-\kappa^4ONNO)]$ (**6**, L^4 , **7**, L^5) compounds. As shown by X-ray crystallography, compounds **1** and **2** are monomeric, in which the chelating ligands afford octahedral *cis*- α geometry at the vanadium center. In the dimeric structures of **3–5**, the six-coordinate vanadium centers are bridged *via* two oxygen atoms of the L^{1-3} ligands while the $L^{4,5}$ ligands generate square pyramidal structures of the monomeric **6** and **7** compounds. HFEP studies allowed the determination of the spin Hamiltonian parameters of the $S = 1$ spin state of the monomeric V(III) and dimeric V(IV), and $S = \frac{1}{2}$ in monomeric V(IV) compounds. Magnetic measurements of **3–5** indicated weak ferromagnetic metal–metal exchange interactions. A reaction course for the deoxygenation and reduction of vanadyl-salan compounds is proposed.

Adres publiczny

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