Amine-rich Silver Complexes of rac-trans-1,2-Diaminocyclohexane

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The use of the diamine rac-trans-1,2-diaminocyclohexane (LL) as a major component of the solvent system allows the isolation of crystalline silver complexes with higher ratios of LL to silver (up to 4:1, compared to the previously obtained 1:1 in ethanolic solution). The complexes obtained and crystallographically characterized were \((LL)_2AgNO_3\) (1), \((LL)_3Ag(OAc)(H_2O)_2\) (2) and \((LL)_4AgBr(H_2O)_3\) (3). Additionally, the silver-free compounds \((LL)_2(H_2O)\) (4) and \((LL)_3\cdot HCl\) (5) were obtained as by-products. Complex 1 is a chain polymer with one bridging and one terminal LL ligand; the chains are homochiral. Complex 2 contains isolated \([LL_3Ag]^+\) cations with one chelating and two monodentate ligands. Complex 3 contains dimeric \([LL_2AgBr]_2\) units; the additional LL molecules are not coordinated to the metal. Compound 5 consists of one diamine with imposed twofold symmetry, one half-protonated diamine in which the acidic hydrogen site is half-occupied (it is involved in a disordered hydrogen bond N–H···N across a twofold axis) and a chloride anion on a twofold axis. In all five structures, the components pack so as to form clearly defined hydrophilic and hydrophobic areas. In the former, classical hydrogen bonds are formed. Except for a few borderline cases of three-center bonds, these are all two-center systems. The appreciable number of these (e.g. 20 for compound 3) renders the layer structures quite complex, but in most cases they can be analyzed in terms of smaller units.

Key words: Silver, Hydrogen Bonds, Chiral Ligands, Amines