Self-assembly of transition metal ion complexes of a hybrid pyrazine-terpyridine ligand.

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Streszczenie

A new hybrid pyrazine-terpyridine ligand (C(34)H(22)N(8)) and its complexes with different transition metal ions, M (M = Mn(ii) , Zn(ii) , Fe(ii) , Co(ii) , Cu(ii) and Cd(ii)), have been synthesised. In the presence of a nitrate counter-anion, both Cu(ii) and Cd(ii) give complexes in which the ratio M : is 2 : 1, whereas with perchlorate, trifluoromethanesulfonate or tetrafluoroborate, the other metal ions provide solids in which this ratio is 1 : 1. From mass spectral measurements and a single crystal, X-ray structure determination for the Fe(ii) complex , however, all the latter species are concluded to be 2 : 2 complexes. Both the Fe(ii) complex and the Co(ii) complex , generated from tetrafluoroborate reactant salts, have the composition [M(2)(2)F(2)(H(2)O)](BF(4))(2), the presence of fluoride ligands being presumed to reflect the abstraction of fluoride ions from tetrafluoroborate by the metal ions under the preparative conditions. The crystal structure of complex shows the Fe(ii) centres to be inequivalent, one being high-spin and heptacoordinate with a FeN(4)F(2)O coordination sphere, the other low-spin and octahedral with a FeN(6) sphere. The two ligand molecules differ markedly, one being heptadentate, the other clearly "hypodentate", with only three N-donor atoms of a terpyridine-like arm coordinated, although their conformations are similar, showing significant differences from that of C(2) symmetry found for the free ligand by a crystal structure determination. Mass spectra are consistent with the Cu(ii) and Cd(ii) complexes having the composition [M(2)(H(2)O)(n)(NO(3))(4-n)](NO(3))(4-n), and the weak antiferromagnetic coupling observed for the Cu(ii) complex is consistent with a preliminary crystal structure determination which indicates that the two Cu(ii) centres are not bridged by a pyrazine unit.

Adres publiczny

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