

ABSTRACT

The researchers investigated the reactions between different metal pseudohalide complexes and hexamethylenetetramine, Glycine, D, L Alanine, D, L Valine, and L Leucine. We succeeded to isolate 10 novel complexes in solid state from these reactions: $[Co_2(HMTA)(N_3)_4(H_2O)]_n$ (1), $[Co(HMTA)(OCN)_2(H_2O)_2]_n$ (3), $[Cd_2(HMTA)(N_3)_4(H_2O)]_n$ (4), $[Cd(HMTA)(NCO)_2(H_2O)_2]_n$ (6), $[Cd(Gly)(N_3)]_n$ (7), $[Cu(D,L-Ala)(SCN)(H_2O)]_n$ (8), $[Cd(D,L-Ala)(N_3)]_n$ (9), $[Cd(D,L val)(N_3)]_n$ (10), $[Cd(D,L val)(SCN)_2]_n \cdot nH_2O$ (11), $[Cd(D,L leu)(N_3)]_n$ (12).

The overall physical measurements suggest that all these isolated complexes are polymeric, containing either bridging azido/ cyanato/ thiocyanato groups or bridging glycinato/ alaninato/ valinato/ leucinato/ HMTA ligand. Both Cadmium and Cobalt attain six-coordination environment while Copper attains five-coordination environment in $[Cu(D,L-Ala)(SCN)(H_2O)]_n$ (8).

The X ray crystal structure determinations have been done for 6 of these complexes. It revealed some fascinating and novel structural features with HMTA acting as tridentate bridging not chelating ligand in $[Co_2(HMTA)(N_3)_4(H_2O)]_n$ (1), leading to very complicated structure. While it behaves as a bridging N,N'-bidentate ligand leading to 1D infinite polymeric chain in $[Co(HMTA)(OCN)_2(H_2O)_2]_n$ (3).

The complex (6) was proved to be isostructural to complex (3) while complex (4) appeared to be isostructural to complex (1) according to powder XRD measurements.

The structures of Cadmium aminoacidato azido complexes $[\text{CdXN}_3]$ was proved to be the same with the amino acidato anion behaving as an N,O,O,O'-tetra dentate chelating bridging ligand in these complexes. The azide bridges and glycinato ligands connect the Cd polyhedra to a 2D layers oriented along the b-axis and c- axis of the monoclinic unit cell.

The Cu(II) centre of $[\text{Cu}(\text{D,L-Ala})(\text{SCN})(\text{H}_2\text{O})]_n$ (**8**) complex is pentacoordinated by chelating alaninato anion, μ -N,S-bridging isothiocyanato anion, and aqua ligand, resulting in $\text{CuN}_2\text{O}_2\text{S}$ chromophore.

The structure of complex (**11**) consists of a zigzag one-dimensional chain of di- μ (N,S)-bridging NCS^- ligands connecting the Cd^{II} centers. The amino acid is neutral (i.e.: zwitterion). An additional lattice water molecule exists.

The thermal decomposition of some complexes in nitrogen atmosphere has been investigated revealing that decomposition occurs with different processes.