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SYNTHESIS AND CHARACTERIZATION OF TWO COMPLEXES OF GLYCINE WITH LANTHANUM HEXACYANOFERRATE(III) AND HEXACYANOCOBALTATE(III)

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Abstract—The synthesis and analytical characterization of two new glycine complexes, $La[Fe(CN)_6]3Gly \cdot 2H_2O$ and $La[Co(CN)_6]3Gly \cdot 2H_2O$, are reported. Both compounds are isostructural, with similar XRD patterns corresponding to a triclinic crystal structure with almost equal cell parameters. Mössbauer and IR spectra indicated a very asymmetrical environment for the hexacyano anion. Not all CN ligands are coordinated to the lanthanum cation, which is also attached to glycine molecules in the zwitterion form and to one of the water molecules. The second water molecule is labile and does not affect the Mössbauer spectra of the iron cation.

Numerous complexes of glycine with transition, lanthanide and heavy metal cations have been reported in the literature. Many of them are mixed salts with the glycinate and inorganic anions in the coordination sphere of the cation.[1] However, no complexes of this amino acid with hexacyanometallates have been reported. In this paper we present the synthesis and characterization of two novel glycine complexes with lanthanum ferricyanide and cobalticyanide in which the amino acid is in the neutral zwitterion form.

EXPERIMENTAL

The reagents used were analytical grade commercial products ($K_3[Fe(CN)_6]$, $K_3[Co(CN)_6]$, $LaCl_3 \cdot 7H_2O$ and glycine). The crystal density was determined by picnometry. Water content was measured by thermogravimetric analysis (TGA) using MOM Q-1500 equipment. The iron, cobalt and potassium contents were measured by atomic absorption spectrophotometry (AAS) in a Pye-Unicam 9000 spectrophometer. Lanthanum content was determined gravimetrically by the oxalate method. IR spectra were run in Nujol mulls and KBr disks using a UR-20 spectrometer (Carl Zeiss). Mössbauer spectra were recorded at room temperature with a ^{57}Co in rhodium source using a constant acceleration spectrometer (MS 1101 from MossTech) in the transmission mode. The Mössbauer parameters, isomer shift (δ), quadrupole splitting (Δ), linewidth (Γ) and absorption line area (A), were taken from the multiparameter fitting of Mössbauer spectra using an iterative least-square minimization algorithm and Lorentzian line shapes. The δ values are reported relative to sodium nitroprusside.

The X-ray diffraction (XRD) data for single crys-

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