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Title

Interactions between metal ions and carbohydrates. Syntheses and spectroscopic studies of several lanthanide nitrate-D-galactitol complexes

Source

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Abstract

Two complexes of neutral D-galactitol ( $C(6)H(14)O(6)$ , G) with terbium nitrate, TbGN(I) and TbGN(II), and one complex with samarium nitrate SmGN were synthesized and characterized. From IR, FIR, THz and luminescence spectra the possible coordinations were suggested, and the single-crystal X-ray diffraction results confirm the spectroscopic conclusions. In TbGN(I) ( $Tb(NO_3)_3 \cdot C(6)H(14)O(6) \cdot 3H_2O$ ), the  $Tb(3+)$  is 9-coordinated with three water molecules and six OH groups from two D-galactitol molecules. Nitrate ions do not coordinate to metal ions, which is different from other reported lanthanide nitrate-D-galactitol complexes. In TbGN(II) and SmGN ( $Ln(NO_3)_3 \cdot C(6)H(14)O(6)$ ),  $Ln(3+)$  is 10-coordinated with six OH groups from two D-galactitol molecules and four oxygen from two bidentate nitrate ions, and one nitrate ion is hydrogen bonded. No water exists in the structures. D-Galactitol molecules provide their 1-, 2- and 3-hydroxyl groups to coordinate with one metal ion and their 4-, 5- and 6-hydroxyl groups to coordinate with another metal ion in the three structures. There is still a new topological structure that can be observed for lanthanide-D-galactitol complexes, which indicates that the coordinations between hydroxyl groups and metal ions are complicated. (C) 2011 Elsevier Ltd. All rights reserved.