



Cori Ester as the Ligand for Monovalent Cations

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Streszczenie

Gerty T. and Carl F. Cori discovered, during research on the metabolism of sugars in organisms, the important role of the phosphate ester of a simple sugar. Glucose molecules are released from glycogen—the glucose stored in the liver—in the presence of phosphates and enter the blood as α -D-glucose-1-phosphate (Glc-1PH₂). Currently, the crystal structure of three phosphates, Glc-1PNa₂·3.5·H₂O, Glc-1PK₂·2H₂O, and Glc-1PHK, is known. Research has shown that reactions of Glc-1PH₂ with carbonates produce new complexes with ammonium ions [Glc-1P(NH₄)₂·3H₂O] and mixed complexes: potassium–sodium and ammonium–sodium [Glc-1P(X)_{1.5}Na_{0.5}·4H₂O; X = K or NH₄]. The crystallization of dicationic complexes has been carried out in aqueous systems containing equimolar amounts of cations (1:1; X–Na). It was found that the first fractions of crystalline complexes always had cations in the ratio 3/2:1/2. The second batch of crystals obtained from the remaining mother liquid consisted either of the previously studied Na⁺, K⁺ or NH₄⁺ complexes, or it was a new sodium hydrate—Glc-1PNa₂·5·H₂O. The isolated ammonium–potassium complex shows an isomorphic cation substitution and a completely unique composition: Glc-1PH(NH₄)_xK_{1–x} (x = 0.67). The Glc-1P₂[–] ligand has chelating fragments and/or bridging atoms, and complexes containing one type of cation show different modes of coordinating oxygen atoms with cations. However, in the case of the potassium–sodium and ammonium–sodium structures, high structural similarities are observed. The 1D and 2D NMR spectra showed that the conformation of Glc-1P₂[–] is rigid in solution as in the solid state, where only rotations of the phosphate group around the C–O–P bonds are observed.

Słowa kluczowe

Cori ester, α -D-glucose-1-phosphate, sodium complex, potassium complex, ammonium complex, potassium sodium complex, ammonium sodium complex, crystal structure, NMR spectra

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