

## Mono- and polynuclear heteroligand complexonates of cobalt(II) in the presence of $\beta$ -hydroxy- $\alpha$ -aminopropionic acid

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### Abstract

Equilibria studies in the systems containing cobalt(II) ion, ethylenediaminetetraacetic and  $\beta$ -hydroxy- $\alpha$ -aminopropionic (serine) acids were performed with spectrophotometric and pH-metric methods. The stoichiometry of the complexes formed, their pH ranges of existence, stability constants and accumulation fraction were calculated depending on the concentration of ligands and acidity of solution. Experimental data were processed using mathematical models which allowed to establish the presence in the solution of complex particles of general composition [ComSernEdtar]<sup>2m-n-4r</sup> (m = 1-3, n = 0-6, r = 0-1). Presents the possible structures of the complexes formed.

### References

- [1] N.N. Barhanova, A.Ya. Fridman, N.M. Dyatlov. Formation of mixed transition metal compounds with ethylenediamine, and ethylenediaminetetraacetic acid. *Journal of Inorganic Chemistry*. **1972**. Vol.17. No.11. P.2982-2988. (russian)
- [2] N.N. Barhanova, N.M. Dyatlov, A.Ya. Friedman. Formation of mixed transition metal compounds with ethylenediamine, and ethylenediaminetetraacetic acid. *Journal of Inorganic Chemistry*. **1973**. Vol.18. No.6. P.1489-1494. (russian)
- [3] N.N. Barhanova, A.Ya. Fridman, N.M. Dyatlov. Mono- and binuclear compounds of nickel, cobalt and copper ethylenediaminetetraacetates with glycine and oxalate ions in solution. *Journal of Inorganic Chemistry*. **1973**. Vol.18. No.2. P.432-435. (russian)
- [4] A.Ya. Friedman, N.N. Barhanova, O.E. Vshivtseva. Formation of mixed binuclear cadmium compounds of ethylenediaminetetraacetic acid and ethylenediamine, glycine and oxalate in solution. *Journal of Inorganic Chemistry*. **1974**. Vol.19. No.7. P.1741-1745. (russian)
- [5] A.Ya. Friedman, N.N. Barhanova, O.E. Vshivtseva. Formation of mixed polynuclear complex compounds of nickel (II) and copper (II) ion with EDTA and bidentate ligands in solution. *Journal of Inorganic Chemistry*. **1981**. Vol.26. No.7. P.1792-1799. (russian)
- [6] V.I. Kornev, N.S. Buldakova. Protolytic and coordination equilibria in aqueous solutions of nickel(II) salts, ethylenediaminetetraacetic acid and diaminoethane. *Chemical Physics and Mesoscopics*. **2012**. Vol.14. No.2. P.285-291. (russian)
- [7] V.I. Kornev, N.S. Buldakova, T.N. Kropacheva. Mono- and binuclear ethylenediaminetetraacetates of nickel(II) in water solution of amino acids *Chemical Physics and Mesoscopics*. **2014**. Vol.16. No.2. P.289-294. (russian)
- [8] V.I. Kornev, N.S. Buldakova, M.V. Didik. *Journal of Inorganic Chemistry*. **2014**. Vol.59. No.6. P.808-813. (russian)
- [9] N.N. Barhanova, A.Ya. Fridman, N.M. Dyatlov. Investigation of the effect of action coordinating ligands with epoxy mixed with polynuclear metal compounds and chelating amines. *Proc. rep. XIII All-Union Chugaevsk. ings of the Conference. on the chemical. Complex. Comm. M.*, **1978**. P.24. (russian)
- [10] N.S. Buldakova, V.I. Kornev. Modeling of complex formation of nickel(II) with amino acids in aqueous solutions. *Vestnik. Udmurt. Univ. Physics. Chemistry*. **2013**. Vol.1. P.35-41. (russian)
- [11] V.I. Kornev, N.S. Buldakova. Polynuclear complexonates nickel(II) in aqueous solutions of  $\beta$ -hydroxy- $\alpha$ -aminopropionic acid. *Butlerov Communications*. **2013**. Vol.34. No.6. P.98-104. ROI: jbc-02/13-34-6-98

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- [12] P. Gans, A. Sabatini, A. Vacca. Investigation of equilibria in solution. Determination of equilibrium constants with the Hyperquad suite of programs. *Talanta*. **1996**. Vol.43. No.10. P.1739-1753.
- [13] S. Ziemniak, M. Goyette, K. Combs. Cobalt(II) oxide solubility and phase stability in alkaline media at elevated temperatures. *J. Solution Chem.* **1999**. Vol.28. No.7. P.809-836.
- [14] S.N. Gridchin, L.A. Kochergina, D.F. Pyrzu, Y.M. Shmatko. The stability constants alkilendiamintetraatsetat manganese (II). *Coord. Chemistry*. **2004**. Vol.30. No.11. P.830-834. (russian)
- [15] A. El-Sherif. Mixed-ligand complexes of 2-(aminomethyl)benzimidazole palladium(II) with various biologically relevant ligands. *J. Solution. Chem.* **2006**. Vol.35. No.9. P.1287-1301.