
EXPRESSIONS FOR ENTHALPIES OF CONCURRENTLY POLYNUCLEAR COMPLEX FORMATION REACTIONS IN TWO-PHASE AQUEOUS SYSTEMS

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Abstract. The paper presents a new thermodynamic approach to studying polynuclear complex formation reactions in multicomponent two-phase systems “solid phase – saturated aqueous solution” under real conditions. The quintessence of developed approach consists in the thermodynamic analysis of concurrent reactions on the basis of the introduced notion of generalized reaction equation. The formation of complex polynuclear species is characterized by certain peculiarities in the function of studied two-phase heterogeneous systems. The evidence of the formation of polynuclear complexes of the metal ion with a complexing agent leads to an apparition in expressions for the enthalpy ΔH and heat capacity ΔC_p of certain concentration functions, which are normative multipliers, referring these thermochemical quantities to 1 mole of the metal ion. It is shown that one of these functions (Φ) characterizes the degree of formation of polynuclear complexes. In the case of concurrent formation of mono- and polynuclear complexes, the derived expressions are useful in distinguishing separate contributions of apart complex formation reaction in the ΔH and ΔC_p of the overall process.

Keywords: complex formation enthalpy, generalized reaction equation, heat capacity, heterogeneous system, polynuclear complex.