

Thermodynamics of solutions NaCl–H₂SO₄–H₂O

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Abstract

The method of thermodynamic modeling is used to estimate equilibrium and the compositions of the gas phase and water solutions of the system NaCl–H₂SO₄–H₂O at atmospheric pressure and temperatures of 25-100 °C in the range of total reagent concentrations from 0 to 3.6 mol/l. The results of the modeling indicate the probability of interactions with the formation of solutions containing mainly cations H₃O⁺, Na⁺, anions Cl⁻, HSO₄⁻ and in a very low concentration of anion SO₄²⁻. The gas phase is characterized by the presence of variable amounts of water vapor and hydrogen chloride with a proportionally varying contents of nitrogen and oxygen in a ratio that meets the air. The increase in the total reagent concentrations and temperature must be accompanied by an increase in the content of HCl in solution and the gas phase. Changing the ratio of reagents NaCl/H₂SO₄ in the range from 0 to 19 indicating the possibility of the presence of the regions of the maximum concentration of HCl in the gas phase close to the ratio of reagents equal to 0.5, and concentrations in solution of about ratio of 0.4. Estimated interphase distribution of HCl, which showed a predominant concentration of HCl in aqueous solution (99%). Simulation result indicate promising solutions of the system NaCl–H₂SO₄–H₂O in chemical engineering.

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