Measurement and Thermodynamic Correlation of Phase Equilibria of HI+ H_2O+ I_2 System for separation of I_2 from HIx Mixture by Crystallization

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SI cycle is the thermo-chemical water splitting process using sulfur and iodine and consists of a Bunsen reaction, sulfuric acid decomposition and HI decomposition. This process is most attractive in aspect of green technology and cost savings by recycling chemical elements in net reactions and reusing heat from nuclear power plants. HI decomposition is the key step in the cycle and the reaction efficiency can be improved by the separation of iodine. The measurement and modeling of solid-liquid phase equilibrium of hydrogen iodide + iodine + water system for separation process by crystallization are important but challenging.

In this work, solubility of iodine in HI acid of various concentrations at 298K-360K are measured and correlated using NRTL and UVa model.