

The importance of pH in physicochemical models and process applications

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The knowledge of thermodynamics of aqueous electrolyte solutions helps on problem solving as it relates the chemical energy, chemical reactions, solubilities, and an important intensive property pH. The thermodynamic analysis of the system shows how these quantities change in different temperatures, pressures, and compositions. In this work, reactive aqueous salt solutions with dissolved gases and precipitates have been studied. Examples of calculations of the chemical and physical equilibrium, speciation, and pH are shown. The applications include industrially important alkaline oxygen-pressurized hydrogen peroxide solution and aqueous carbon dioxide calcite system. The knowledge of the solution properties like pH along with the model results of other system properties can be used for process control. For example, in the production of pulp and recycled paper, the best available techniques and continuous improvements are needed to produce an environmentally acceptable, energy-efficient process. Rigorous multicomponent thermodynamic models and sound measurements are required to effect the ever-smaller input of chemicals, raw materials, and water.