Species Identification, Volatility and Thermodynamic Properties of Gaseous and Aqueous Arsenous Acid in High-Temperature Solutions

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The liquid and steam chemistry of arsenic(III) has been investigated under the range of conditions typical of geothermal fluids, at temperatures from 298K to 573K and saturated steam pressure. Properties have been measured by volatility distribution and solution calorimetry at high temperatures, solubility measurements and electrometric titration. A new gaseous species, arsenous acid, has been identified. The only significant volatile arsenic species under saturated steam conditions in the absence of chloride has been shown to be arsenous acid gas. In liquid phases containing substantial concentrations of chloride, chloroarsenite is a significant contributor to arsenic solubility and mixed chloride and hydroxide gaseous species of arsenic(III) may contribute to arsenic volatility from high-chloride geothermal brines.