# Volatility and Thermodynamic Properties of Arsenous Acid in Aqueous Solutions up to the Critical Temperature

Essmaiil Djamali [C, S]
Chemistry, Central College HCC, Houston, TX, U.S.A.
essmaiildjamali@gmail.com

David R. Fyke, Keith D. Chen, Peter J. Turner and James W. Cobble
Chemistry, SDSU, San Diego, CA, U.S.A.

The liquid-vapor equilibrium of aqueous arsenic(III) has been investigated at temperatures from 298 K to 647 K and at saturated steam pressure. Thermodynamic properties have been measured by volatility distribution and solution calorimetry at high temperatures. Furthermore, we investigated the formation of chloroarsenite from arsenous acid

$$H_3AsO_3(aq) + Cl^-(aq) = HAsO_2Cl^-(aq) + H_2O(l) \quad (1)$$
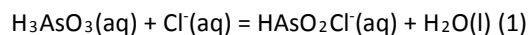
up to high temperatures and at the steam saturated pressure. The principal species of arsenic(III) in brines under geothermal conditions have been identified. Chloroarsenite anion and arsenous acid gas, commonly not considered, are the major contributors to arsenic concentrations from brines in the liquid and steam phases at moderately elevated temperatures.

In the present study, values for the dissociation constant of arsenous acid were also measured at temperatures up to 368.15 K and extended to 647 K using a unified theory of electrolytes [1, 2]. The dissociation constant values from the present study agreed with the corresponding literature data to well within the uncertainties of the experimental data [3, 4]. Furthermore, a comparison of the thermodynamic properties for gaseous $As(OH)_3$ obtained from this study with the corresponding values calculated from statistical thermodynamic functions indicates good agreement.

References:

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