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This work presents the thermodynamic modeling of the fluid phases of Tetra-n-butyl ammonium halides aqueous solutions with the electrolyte Cubic-Plus-Association (e-CPA) Equation of State (EOS). The adjustable model parameters are obtained by fitting the experimental data of mean ionic activity coefficients and osmotic coefficients. Several other thermodynamic properties of the aqueous solutions, such as relative static permittivity, liquid density and saturation pressure, are subsequently predicted by the e-CPA EOS. The results of Tetra-n-butyl ammonium bromide aqueous solution show that the model can satisfactorily correlate the mean ionic activity coefficients and osmotic coefficients with the percentage average absolute deviations being 7.2% and 5.9%. The model overpredicts the liquid density with a deviation of 9.2%, while it can correlate the liquid density within 0.2% with a volume translation parameter. In order to have a more complete picture of the capabilities and limitations of the model, the consistencies of experimental data, parameter estimation approaches and the ion sizes are extensively analyzed and discussed.

General information
State: Published
Organisations: Department of Chemical and Biochemical Engineering, CERE – Center for Energy Resources, KT Consortium
Contributors: Sun, L., Liang, X., Solms, N. V., Kontogeorgis, G. M.
Pages: 37 - 47
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Fluid Phase Equilibria
Volume: 486
ISSN (Print): 0378-3812
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.22 SJR 0.95 SNIP 1.033
Web of Science (2017): Impact factor 2.197
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.33 SJR 0.85 SNIP 1.187
Web of Science (2016): Impact factor 2.473
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 1.99 SJR 0.866 SNIP 0.998
Web of Science (2015): Impact factor 1.846
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.28 SJR 0.981 SNIP 1.232
Web of Science (2014): Impact factor 2.2
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.31 SJR 1.001 SNIP 1.277
Web of Science (2013): Impact factor 2.241
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.31 SJR 1.151 SNIP 1.279
Web of Science (2012): Impact factor 2.379
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes