Diffusion measurements in binary liquid mixtures by Raman spectroscopy

It is shown that Raman spectroscopy allows determination of the molar fractions in mixtures subjected to molecular diffusion. Spectra of three binary systems, benzene/n-hexane, benzene/cyclohexane, and benzene/acetone, were obtained during vertical (exchange) diffusion at several different heights (z) as a function of time. A procedure to determine time-dependent concentration profiles and diffusion coefficients is described in detail for one system, and results are given for the two other cases. For the system benzene/cyclohexane, much lower diffusion coefficients than reported in the literature were found, even in a thermostatically controlled diffusion cell, recording spectra through circulating water. For the system benzene/acetone, the determined diffusion coefficients were in good agreement with the literature data. The limitations of the Raman method are discussed, and it is concluded that many more systems ought to be studied. It is pointed out that diffusion profiles can be obtained in ternary and higher systems, where proper measurements are almost nonexistent.

General information
State: Published
Organisations: Energy and Materials, Department of Chemistry, Department of Chemical and Biochemical Engineering, Center for Phase Equilibria and Separation Processes, Center for Energy Resources Engineering
Contributors: Berg, R. W., Hansen, S. B., Shapiro, A., Stenby, E. H.
Pages: 367-373
Publication date: 2007
Peer-reviewed: Yes

Publication information
Journal: Applied Spectroscopy
Volume: 61
Issue number: 4
ISSN (Print): 0003-7028
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.6 SJR 0.489 SNIP 0.867
Web of Science (2017): Impact factor 1.642
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.76 SJR 0.486 SNIP 0.964
Web of Science (2016): Impact factor 1.529
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.96 SJR 0.64 SNIP 1.066
Web of Science (2015): Impact factor 1.798
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.96 SJR 0.633 SNIP 1.054
Web of Science (2014): Impact factor 1.875
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.08 SJR 0.641 SNIP 1.144
Web of Science (2013): Impact factor 2.014
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.81 SJR 0.574 SNIP 1.088
Web of Science (2012): Impact factor 1.942
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.62 SJR 0.609 SNIP 1.011