

AZEOTROPIC DATA FOR BINARY MIXTURES

J. Gmehling, J. Menke, J. Krafczyk, K. Fischer, J.-C. Fontaine, and H. V. Kehlenan

Binary homogeneous (single-phase) liquid mixtures having an extremum (maximum or minimum) vapor pressure P at constant temperature T , as a function of composition, are called azeotropic mixtures, or simply azeotropes. The composition is usually expressed as mole fractions, where x_i for component i in the liquid phase and y_i for component i in the vapor phase are identical. Mixtures that do not show a maximum or minimum are called zeotropic. A maximum (minimum) of the $P(x_i)$ or $P(y_i)$ curves corresponds to a minimum (maximum) of the boiling temperature T at constant P plotted as a function of x_i or y_i , [see $T(x_i)$ and $T(y_i)$ curves, Types I and II, in Fig. 1]. Azeotropes in which the pressure is a maximum (temperature is a minimum) are often called positive azeotropes, while pressure-minimum (temperature-maximum) azeotropes are called negative azeotropes. The coordinates of an azeotropic point are the azeotropic temperature T_{az} , pressure P_{az} , and the vapor-phase composition $y_{1,az}$, which is the same as the liquid-phase composition $x_{1,az}$.

In the two-phase liquid-liquid region of partially miscible (heterogeneous) mixtures, the vapor pressure at constant T (or the boiling temperature at constant P) is independent of the global composition x_i of the two coexisting liquid phases between the equilibrium compositions x_i^* and x_i^{**} ($x_i^* < x_i^{**}$)

ration is impossible by ordinary distillation, even with an infinitely large number of stages.

Following eq. (1) azeotropic behavior will always occur in homogeneous binary systems when the vapor pressure ratio P_1^s/P_2^s is equal to the ratio of the activity coefficients γ_1/γ_2 .

Various thermodynamic methods based on g^E -models (Wilson, NRTL, UNIQUAC) or group contribution methods (UNIFAC, modified UNIFAC, ASOG, PSRK) can be used for either calculating or predicting the required activity coefficients for the components under given conditions of temperature and composition (Reference 2).

Because of the importance of azeotropic data for the design of distillation processes, compilations have been available in book form for quite some time (References 3-7). The most recent printed data collection was published in 1994 (Reference 8). A revised and extended version appeared in 2004 (Reference 9).

A collection of approximately 47,400 zeotropic and azeotropic data sets, compiled from 6600 references, are stored in a comprehensive computerized data bank (Reference 10). The references from the above-mentioned compilations and from the vapor-liquid equilibrium part of the Dortmund Data Bank (Reference 11) were supplemented by references found from CAS online

Azeotropic Data For Binary Mixtures

John Aurie Dean



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CRC Handbook of Thermophysical and Thermochemical Data David R. Lide, Henry V. Kehiaian, 2020-09-23 The CRC Handbook of Thermophysical and Thermochemical Data is an interactive software and handbook package that provides an invaluable source of reliable data embracing a wide range of properties of chemical substances mixtures and reacting systems Use the handbook and software together to quickly and easily generate property values at any desired temperature pressure or mixture composition *CRC Handbook of Chemistry and Physics, 85th Edition* David R. Lide, 2004-06-29 Get a FREE first edition facsimile with each copy of the 85th Researchers around the world depend upon having access to authoritative up to date data And for more than 90 years they have relied on the CRC Handbook of Chemistry and Physics for that data This year is no exception New tables extensive updates and added sections mean the Handbook has again set a new standard for reliability utility and thoroughness This edition features a Foreword by world renowned neurologist and author Oliver Sacks a free facsimile of the 1913 first edition of the Handbook and thumb tabs that make it easier to locate particular data New tables in this edition include Index of Refraction of Inorganic Crystals Upper and Lower Azeotropic Data for Binary Mixtures Critical Solution Temperatures of Polymer Solutions Density of Solvents as a Function of Temperature By popular request several tables omitted from recent editions are back including Coefficients of Friction and Miscibility of Organic Solvents Ten other sections have been substantially revised with some such as the Table of the Isotopes and Thermal Conductivity of Liquids significantly expanded The Fundamental Physical Constants section has been updated with the latest CODATA NIST values and the Mathematical Tables appendix now features several new sections covering topics that include orthogonal polynomials Clebsch Gordan coefficients and statistics **CRC Handbook of Chemistry and Physics, 96th Edition** William M. Haynes, 2015-06-09 Proudly serving the scientific community for over a century this 96th edition of the CRC Handbook of Chemistry and Physics is an update of a classic reference mirroring the growth and direction of science This venerable work continues to be the most accessed and respected scientific reference in the world An authoritative resource consisting of tables of data and current international recommendations on nomenclature symbols and units its usefulness spans not only the physical sciences but also related areas of biology geology and environmental science The 96th edition of the Handbook includes 18 new or updated tables along with other updates and expansions A new series highlighting the achievements of some of the major historical figures in chemistry and physics was initiated with the 94th edition This series is continued with this edition which is focused on Lord Kelvin Michael Faraday John Dalton and Robert Boyle This series which provides biographical information a list of major achievements and notable quotations attributed to each of the renowned chemists and physicists will be continued in succeeding editions Each edition will feature two chemists and two physicists The 96th edition now includes a complimentary eBook with purchase of the print version This reference puts physical property data and mathematical formulas used in labs and classrooms every day within easy reach New Tables

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