INFORMATION RETRIEVAL

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A diffusion model for reactions with turbulent mixing, Mao, K. W., and H. L. Toor, **AIChE Journal, 16,** No. 1, p. 49 (January, 1970).

Key Words: A. Mixing-6, 8, 9, Chemical Reactions-9, Diffusion-6, 8, Conversion-7, 8, Mathematical Model-8, 10, Stoichiometry-6, Turbulence-6, Reaction Rate-7.

Abstract: A diffusion model based on the simultaneous interdiffusion and reaction between alternate slabs of reactants is used to simulate the data of Vassilatos and Toor. After slab sizes are chosen to fit the conversion data for very rapid reactions in a stoichiometric mixture, reasonably good predictions are obtained of the effect of stoichiometry and reaction velocity constant on conversion.

Viscoelasticity in shearing and accelerative flows: a simplified integral theory, Adams, E. B., and D. C. Bogue, **AIChE Journal, 16,** No. 1, p. 53 (January, 1970).

Key Words: A. Mathematical Model-8, Viscosity-8, 9, Stresses-8, 9, Pressure Drop-8, 9, Shear-9, Curve Fitting-10, Flow-9, Viscoelastic-0, Non-Newtonian-0, Polymers-9.

Abstract: An explicitly, four-constant model for viscosity and normal stresses in simple shear has been developed. In essence the procedure involves curve fitting the linear relaxation spectrum. The four constant appears also in equations for the stress distribution and for pressure drop in accelerative flow between flat plates; flow along rays is assumed.

Numerical evaluation of temperature profiles and interface position in filaments undergoing solidification, Morrison, Milton E., **AIChE Journal, 16,** No. 1, p. 57 (January, 1970).

Key Words: A. Solidification-8, 9, Cooling-8, 9, Freezing-8, 9, Liquids-1, Filament-1, Polymer-1, Mathematical Model-10, Spinning-4, Fibers-2, Heat Transfer-8, 9, Time-6, Interface-7, Temperature-7.

Abstract: A numerical method has been described for the solution of the general equations which depict solidification in the cylindrical coordinate system. The method has been outlined for cooling and solidification of a moving filament of molten polymer. The solution is given in terms of six-dimensionless variables. Plots are shown for the solution of the heat transfer equations and associated boundary conditions for several values of the dimensionless variables. The method describes the process for cooling and freezing liquids when convective and/or radiative energy losses are considered. The form of the theoretical equation compared very favorably with experimental data.

Evaporation rates of volatile liquids in a laminar flow system: parts I and II, Clark, Michael W., and C. Judson King, **AIChE Journal, 16,** No. 1, p. 64 (January, 1970).

Key Words: A. Evaporation-7, 8, Liquids-9, Volatile-0, Flow-9, Laminar-0, Composition-8, Gases-5, Concentration-6, Mass Transfer-6, 7, Flux-6, Temperature-7. B. Evaporation-8, Pure-Component System-9, Pentane-9, Isopentane-9, Nitrogen-5. C. Evaporation-8, Mixtures-9, Binary Systems-9, Carbon Disulfide-9, *n*-Pentane-9, Cyclopentane-9, Ethyl Ether-9, *n*-Tridecane-5, Nitrogen-5.

Abstract: Normal pentane and isopentane were evaporated into nitrogen in laminar, concurrent flow in a rectangular channel. Composition profiles within the gas phase were measured, and the evaporation rates were compared with theoretical predictions with satisfactory agreement.

Free convection melting of ice spheres, Vanier, C. R., and Chi Tien, **AIChE Journal, 16,** No. 1, p. 76 (January, 1970).

Key Words: Heat Transfer-7, 8, Convection-8, Melting-8, Ice Sphere-1.

Abstract: Experimental results have been obtained for heat transfer to melting ice spheres by measuring the rate of change of apparent weight. It is found that the traditional correlation format of Nusselt number against Rayleigh number is satisfactory only for bulk temperatures above 7°C. Average Nusselt numbers obtained from the sphere experiments are closely related to previous theoretical work with vertical flat plates.

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Molecular Thermodynamics of Fluid-Phase Equilibria, J. M. Prausnitz, Prentice-Hall, Inc., Englewood Cliffs, New Jersey (1969). $16.50.

A few of the textbooks on thermodynamics stand apart from the others because of their exceptional clarity and usefulness (for example, "The Principles of Chemical Equilibrium" by K. S. Denbigh, "Thermodynamics" by H. B. Callen, and others). To this list of exceptional books on thermodynamics must now be added "Molecular Thermodynamics of Fluid-Phase Equilibria" by J. M. Prausnitz.

This book is by no means a treatise on thermodynamics, but those topics contained in the book are covered thoroughly. As suggested by the title, chemical reaction equilibria are excluded. Also omitted are specialized topics such as thermodynamics of electrolytes, surfaces, and metallic solutions. The book is focused almost entirely upon the problem of vapor-liquid equilibria.

The book is not intended to serve as a textbook for a first course in thermodynamics; the level is for "university seniors or first-year graduate students." However, some teachers of undergraduate courses in chemical engineering thermodynamics will find it useful as supplementary material.

It is surprising that a book bearing this title can be written without the formal introduction of statistical mechanics. The author concentrates upon the application of practical results of statistical mechanics (for example, gas-phase virial coefficients) rather than the fundamental principles of statistical mechanics. Thus "partition coefficient" but not "partition function" is found in the index. The savings in space obtained by the omission of statistical-mechanical derivations is used for the interpretation of experimental data in terms of existing theories of intermolecular forces. This book differs from standard textbooks of physical chemistry in that the emphasis is upon the application of theories of intermolecular forces, always within the framework of thermodynamics, to real fluid mixtures.

Anyone interested in fluid-phase (that is, vapor-liquid equilibria) will find this book to be an indispensable reference.

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