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Equilibrium-Staged Separations: A Bibliography (1991)

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BIBLIOGRAPHY

Equilibrium-Staged Separations: A Bibliography (1991)

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This article provides a bibliographic listing of published journal papers concerned with distillation and other equilibrium-staged separation processes during 1991. The references are taken from the 40 most important chemical engineering journals. This paper provides an update to the literature as provided in a previous bibliographic paper (1). A complete bibliography of the chemical engineering literature for 1991 has also been published by the author (2). The following topics are included in this paper:

1. Mass Transfer and Transport Processes Theory
2. Distillation Theory and Design Methods
3. Distillation Control and Applications
4. Column Design Data
5. Absorption Reactions and Absorber Design
6. Cooling Towers
7. Liquid–Liquid Extraction
8. Supercritical Extraction

1. Mass Transfer and Transport Processes Theory

Aubert, J. H., and Sylvester, A. P., "Microcellular foams," *Chemtech*, April, pp. 234–238; May, pp. 290–295 (1991).

Basic, A., and Dudukovic, M. P., "A series solution for mass transfer in laminar flow with surface reaction," *AIChE J.*, 37(9), 1341–1353 (1991).

Bischof, F.; Sommerfeld, M., and Durst, F., "The determination of mass transfer rates from individual small bubbles," *Chem. Eng. Sci.*, 46(12), 3115–3122 (1991).

Briggs, T., "A good foam guide?," *Chem. Ind.*, pp. 197–200 (March 18, 1991).

- Brocker, S., and Schulze, W., "A new method of calculating ternary mass transfer with a nontransferring species based on Gilliland parametric solution of the Maxwell-Stefan equations for the film model," *Chem. Eng. Commun.*, 107, 163-172 (1991).
- Chandhok, A. K., and Leighton, D. T., "The influence of end effects on mass transfer in oscillatory flows," *Chem. Eng. Sci.*, 46(10), 2661-2668 (1991).
- Chen, J. S., and Rosenberger, F., "Lag time and steady-state permeability for a diffusion system with serial and/or parallel paths," *Chem. Eng. Commun.*, 99, 77-88 (1991).
- Chyu, M. K., and Goldstein, R. J., "Influence of an array of wall-mounted cylinders on the mass transfer from a flat surface," *Int. J. Heat Mass Transfer*, 34(9), 2175-2186 (1991).
- Collins, M. W., and Ciofalo, M., "Computational fluid dynamics and its application to transport processes (review paper)," *J. Chem. Tech. Biotechnol.*, 52(1), 5-48 (1991).
- Comiti, J., and Renaud, M., "Liquid-solid mass transfer in packed beds of parallel-epipedal particles: Energetic correlation," *Chem. Eng. Sci.*, 46(1), 143-154 (1991).
- Crittenden, B. D., "Principles of stagewise separation process calculations," *Chem. Eng. Educ.*, 25(2), 106-110 (1991).
- Dogu, G.; Cabbar, C., and Dogu, T., "Thermal and mass diffusivity from dynamic single pellet experiments," *Chem. Eng. Commun.*, 102, 149-160 (1991).
- Edwards, B. J., and Beris, A. N., "Unified view of transport phenomena based on the generalized bracket formulation," *Ind. Eng. Chem. Res.*, 30(5), 873-881 (1991).
- Etters, J. N., "Mass transport in finite baths: Effect of surface barriers," *Ind. Eng. Chem. Res.*, 30(3), 589-591 (1991).
- Farr, W. W., et al., "Reaction-driven convection in a porous medium," *AIChE J.*, 37(7), 963-985 (1991).
- Georgiou, D. P., and Kladas, D., "Thermophoretic deposition near the leading edge of cylindrical surfaces," *Int. J. Heat Mass Transfer*, 34(1), 320-322 (1991).
- Giona, M., "Statistical analysis of anomalous transport phenomena in complex media," *AIChE J.*, 37(8), 1249-1254 (1991).
- Jadhav, S. V., and Pangarkar, V. G., "Particle-liquid mass transfer in mechanically agitated contactors," *Ind. Eng. Chem. Res.*, 30(11), 2496-2503 (1991).
- Kheshgi, H. S., and Scriven, L. E., "Dewetting: Nucleation and growth of dry regions," *Chem. Eng. Sci.*, 46(2), 519-526 (1991).
- Kiriakidis, D. G.; Mitsoulis, E., and Neale, G. H., "Linear displacement of a wetting fluid by an immiscible non-wetting fluid in a porous medium: A predictive algorithm," *Can. J. Chem. Eng.*, 69(2), 557-564 (1991).
- Kolb, W. B., and Cerro, R. L., "Coating the inside of a capillary of square cross section," *Chem. Eng. Sci.*, 46(9), 2181-2196 (1991).
- Kubaczka, A., and Bandrowski, J., "Solutions of a system of multicomponent mass transport equations for mixtures of real fluids," *Chem. Eng. Sci.*, 46(2), 539-556 (1991).
- Lage, J. L.; Bejan, A., and Anderson, R., "Efficiency of transient contaminant removal from a slot ventilated enclosure," *Int. J. Heat Mass Transfer*, 34(10), 2603-2616 (1991).
- Legentilhomme, P., and Legrand, J., "The effects of inlet conditions on mass transfer in annular swirling decaying flow," *Int. J. Heat Mass Transfer*, 34(4), 1281-1292 (1991).
- Malamataris, N. T., and Papanastasiou, T. C., "Unsteady free surface flows on truncated domains," *Ind. Eng. Chem. Res.*, 30(9), 2211-2219 (1991).
- Malcata, F. X., "Simulation of the mass transfer behaviour of individual gas bubbles undergoing fast chemical stripping using the jet stream model," *Int. J. Heat Mass Transfer*, 34(2), 559-572 (1991).
- Mallick, S. K., "Synthesis of separation processes with nonsharp separators," *Chem. Eng. Sci.*, 46(10), 2729-2738 (1991).

- Martynenko, O. G., "Heat and mass transfer bibliography: Soviet works," *Int. J. Heat Mass Transfer*, 34(1), 1–10 (1991).
- Narsimhan, G., "A model for unsteady state drainage of a static foam," *J. Food Eng.*, 14(2), 139–165 (1991).
- Novak, C. F.; Lake, L. W., and Schechter, R. S., "Geochemical modeling of two-phase flow with interface mass transfer," *AIChE J.*, 37(11), 1625–1633 (1991).
- Pauli, J.; Sobolik, V., and Onken, U., "Oxygen as depolarizer in electrodiffusion diagnostics of flow," *Chem. Eng. Sci.*, 46(12), 3302–3304 (1991).
- Peters, M. H., "An introduction to molecular transport phenomenon," *Chem. Eng. Educ.*, 25(4), 210–217 (1991).
- Peters, M. H., and Ying, R. X., "Phase-space diffusion equations for single Brownian particle motion near surfaces," *Chem. Eng. Commun.*, 108, 165–184 (1991).
- Poslinski, A. J.; Orlicki, D., and Tsamopoulos, J. A., "Inflation dynamics of fluid annular menisci inside a mold cavity: Deformation driven by large gas pressures," *Chem. Eng. Sci.*, 46(2), 597–608 (1991).
- Poslinski, A. J., and Tsamopoulos, J. A., "Inflation dynamics of fluid annular menisci inside a mold cavity: Deformation driven by small gas pressures," *Chem. Eng. Sci.*, 46(1), 215–232 (1991).
- Poulson, B., "Measuring and modelling mass transfer at bends in annular two phase flow," *Chem. Eng. Sci.*, 46(4), 1069–1082 (1991).
- Rashidi, M.; Hetsroni, G., and Banerjee, S., "Mechanisms of heat and mass transport at gas-liquid interfaces," *Int. J. Heat Mass Transfer*, 34(7), 1799–1810 (1991).
- Riede, T., and Schlunder, E. U., "Diffusivities of the ternary liquid mixture 2-propanol-water-glycerol and three-component mass transfer in liquids," *Chem. Eng. Sci.*, 46(2), 609–618 (1991).
- Rousar, I., and Nauman, E. B., "Spinodal decomposition with surface tension driven flows," *Chem. Eng. Commun.*, 105, 77–98 (1991).
- Sedahmed, G. H., and Nirdosh, I., "Natural convection mass transfer at an enclosure between two horizontal discs," *Chem. Eng. Commun.*, 101, 93–102 (1991).
- Seidel-Morgenstern, A., "Analysis of boundary conditions in the axial dispersion model by application of numerical Laplace inversion," *Chem. Eng. Sci.*, 46(10), 2567–2572 (1991).
- Shankar, A., and Lenhoff, A. M., "Dispersion and partitioning in short coated tubes," *Ind. Eng. Chem. Res.*, 30(5), 828–835 (1991).
- Skoczylas, A., and Majewski, W., "Effective interfacial area in mechanical thin-layer apparatus," *Chem. Eng. J.*, 46(2), 69–78 (1991).
- Soria, A., and de Lasa, H. I., "Averaged transport equations for multiphase systems with interfacial effects," *Chem. Eng. Sci.*, 46(8), 2093–2112 (1991).
- Stammer, A.; Bussing, W., and Schlunder, E. U., "Transport phenomena over partially active surfaces," *Chem. Eng. Process.*, 30(3), 125–132 (1991).
- Sung, H. J.; Lyu, M. S., and Chung, M. K., "Local mass transfer from a circular cylinder in a uniform shear flow," *Int. J. Heat Mass Transfer*, 34(1), 59–68 (1991).
- Szymczyk, J. A., "Marangoni and buoyant convection in a cylindrical cell under normal gravity," *Can. J. Chem. Eng.*, 69(6), 1271–1276 (1991).
- Tsay, C. S., and McHugh, A. J., "An improved numerical algorithm for ternary diffusion with a moving interface," *Chem. Eng. Sci.*, 46(4), 1179–1188 (1991).
- Tsuda, A., et al., "Axial dispersion of inert species in alveolated channels," *Chem. Eng. Sci.*, 46(5), 1419–1426 (1991).
- Various, "Heat and mass transfer (special topic issue)," *Chem. Eng. Res. Des.*, 69(1), 1–29 (1991).

- Various, "Mass transfer/separation processes (topic issue)," *Can. J. Chem. Eng.*, 69(6), 1287–1351 (1991).
- Various, "Transport phenomena and separation processes (topic issue)," *Can. J. Chem. Eng.*, 69(6), 1233–1381 (1991).
- von Stockar, U., and Lu, X., "Simple and accurate shortcut procedure to account for axial dispersion in countercurrent separation columns," *Ind. Eng. Chem. Res.*, 30(6), 1248–1257 (1991).
- Whitaker, S., "Role of the species momentum equation in the analysis of the Stefan diffusion tube," *Ind. Eng. Chem. Res.*, 30(5), 978–983 (1991).
- Wickern, G., "Mixed convection from an arbitrarily inclined semi-infinite flat plate: The influence of the inclination angle and the Prandtl number, *Int. J. Heat Mass Transfer*, 34(8), 1935–1958 (1991).
- Wong, T. H., and O'Brien, J. A., "Simulation studies of diffusion-limited coarsening in two dimensions," *AIChE J.*, 37(7), 1053–1064 (1991).
- Yeh, H. M., and Lin, W. H., "Thermal diffusion in an ideal column," *Sep. Sci. Technol.*, 26(3), 395–408 (1991).
- Yung, C. N., et al., "The transient motion of a spherical fluid droplet," *Chem. Eng. Commun.*, 110, 163–186 (1991).
- Zarraa, M. A., et al., "Effect of gas sparging on the rate of mass transfer at a single sphere," *Chem. Eng. J.*, 47(3), 187–191 (1991).

2. Distillation Theory and Design Methods

- Alejski, K., "Computation of the reacting distillation column using a liquid mixing model on the plates," *Comput. Chem. Eng.*, 15(5), 313–324 (1991).
- Al-Tuwaim, M. S., and Luyben, W. L., "Multicomponent batch distillation: Shortcut design of batch distillation columns," *Ind. Eng. Chem. Res.*, 30(3), 507–516 (1991).
- Biddulph, M. W., et al., "Point efficiencies on sieve trays," *AIChE J.*, 37(8), 1261–1264 (1991).
- Bunz, A. P.; Dohrn, R., and Prausnitz, J. M., "Three-phase flash calculations for multicomponent systems," *Comput. Chem. Eng.*, 15(1), 47–52 (1991).
- Chen, J. J. J., "Amundson's matrix method for binary distillation revisited," *Chem. Eng. Educ.*, 25(1), 50–52 (1991).
- Diwekar, U. M., "An efficient design method for binary, azeotropic, batch distillation columns," *AIChE J.*, 37(10), 1571–1578 (1991).
- Diwekar, U. M., and Madhavan, K. P., "BATCH-DIST: A comprehensive package for simulation, design, optimization and optimal control of multicomponent, multifraction batch distillation columns," *Comput. Chem. Eng.*, 15(12), 833–842 (1991).
- Diwekar, U. M., and Madhavan, K. P., "Multicomponent batch distillation column design," *Ind. Eng. Chem. Res.*, 30(4), 713–721 (1991).
- Duprat, F., and Gau, G., "Reactive distillation of pyridine mixtures with an organic acid: Determination of the reactive distillation equilibrium," *Can. J. Chem. Eng.*, 69(6), 1320–1326 (1991).
- Duprat, F., and Gau, G., "Reactive distillation of pyridine mixtures with an organic acid: Parametric sensitivity and optimization of the process," *Can. J. Chem. Eng.*, 69(6), 1327–1335 (1991).
- Fidkowski, Z. T.; Malone, M. F., and Doherty, M. F., "Nonideal multicomponent distillation: Use of bifurcation theory for design," *AIChE J.*, 37(12), 1761–1779 (1991).
- Horton, R. R.; Bequette, B. W., and Edgar, T. F., "Improvements in dynamic compartmental modeling for distillation," *Comput. Chem. Eng.*, 15(3), 197–202 (1991).

- Jacobsen, E. W., and Skogestad, S., "Multiple steady states in ideal two-product distillation," *AIChE J.*, 37(4), 499–511 (1991).
- Kienle, A., and Marquardt, W., "Bifurcation analysis and steady-state multiplicity of multicomponent non-equilibrium distillation processes," *Chem. Eng. Sci.*, 46(7), 1757–1770 (1991).
- Kippax, J. W., and Swift, J. D., "The interactions between thermodynamic property measurement: Use and development of multicomponent distillation column design," *Chem. Eng. Res. Des.*, 69(3), 211–212 (1991).
- Koehler, J.; Aguirre, P., and Blass, E., "Minimum reflux calculations for nonideal mixtures using the reversible distillation model," *Chem. Eng. Sci.*, 46(12), 3007–3022 (1991).
- Lang, P., et al., "Modelling of a crude distillation column," *Comput. Chem. Eng.*, 15(2), 133–140 (1991).
- Laroche, L., et al., "Homogeneous azeotropic distillation: Comparing entrainers," *Can. J. Chem. Eng.*, 69(6), 1302–1319 (1991).
- Mejdell, T., and Skogestad, S., "Estimation of distillation compositions from multiple temperature measurements using partial-least-squares regression," *Ind. Eng. Chem. Res.*, 30(12), 2543–2555 (1991).
- Mejdell, T., and Skogestad, S., "Comparison estimator in a pilot-plant distillation column using multiple temperatures," *Ind. Eng. Chem. Res.*, 30(12), 2555–2564 (1991).
- Moore, R. D., and Corripio, A. B., "On-line optimization of distillation columns in series," *Chem. Eng. Commun.*, 106, 71–86 (1991).
- Stichlmair, J., "Separation of ternary mixtures by rectification," *Int. Chem. Eng.*, 31(3), 423–433 (1991).

3. Distillation Control and Applications

- Andersen, H. W.; Laroche, L., and Morari, M., "Dynamics of homogeneous azeotropic distillation columns," *Ind. Eng. Chem. Res.*, 30(8), 1846–1855 (1991).
- Beckman, J. R., and Albers, W. F., "Energy-efficient ethanol–water fractionation by a carrier-gas method," *AIChE J.*, 37(2), 281–284 (1991).
- Bernot, C.; Doherty, M. F., and Malone, M. F., "Feasibility and separation sequencing in multicomponent batch distillation," *Chem. Eng. Sci.*, 46(5), 1311–1326 (1991).
- Bjorn, I.; Gren, U., and Strom, K., "A study of a heat pump distillation column system," *Chem. Eng. Process.*, 29(3), 185–191 (1991).
- Bowman, J. D., "Use column scanning for predictive maintenance," *Chem. Eng. Prog.*, 87(2), 25–31 (1991).
- Chiotti, O. J., and Iribarren, O. A., "Simplified models for binary batch distillation," *Comput. Chem. Eng.*, 15(1), 1–6 (1991).
- Deter, M., and Gerrard, A. M., "On finding the most cost efficient strategy for the separation of multicomponent mixtures using a single distillation column," *Chem. Eng. Res. Des.*, 69(6), 480–482 (1991).
- Doherty, M. F.; Malone, M. F., and Foucher, E. R., "Comments on Automatic screening of entrainers for homogeneous azeotropic distillation," *Ind. Eng. Chem. Res.*, 30(10), 2364 (1991).
- Douglas, P. L.; Mallick, S. K., and Wagler, R. M., "Synthesis of flexible thermally integrated distillation sequences," *Chem. Eng. Res. Des.*, 69(6), 483–491 (1991).
- Eckles, A.; Benz, P., and Fine, S., "When to use high-vacuum distillation?" *Chem. Eng.*, pp. 201–204 (May 1991).
- Edwards, N. S. A.; Gillard, R. D., and Groundwater, P. W., "Steam distillation using a rotary evaporator," *Chem. Ind.*, p. 762 (October 21, 1991).

- Farhat, S., et al., "Optimal control of batch distillation via nonlinear programming," *Chem. Eng. Process.*, 29(1), 33–38 (1991).
- Figuerola, J. L., et al., "Highly structured stability margins for process control systems: A case study of decoupling control in distillation," *Comput. Chem. Eng.*, 15(7), 493–502 (1991).
- Foucher, E. R.; Doherty, M. F., and Malone, M. F., "Automatic screening of entrainers for homogeneous azeotropic distillation," *Ind. Eng. Chem. Res.*, 30(4), 760–772 (1991).
- Hartounian, H., and Sandler, S. I., "Polymer fractionation in aqueous two-phase polymer systems," *Biotechnol. Prog.*, 7(3), 279–282 (1991).
- Hower, T. C., and Kister, H. Z., "Solve process column problems," *Hydrocarbon Process.*, 70(5), 89–91 (1991).
- Hwang, Y. L., "Nonlinear wave theory for dynamics of binary distillation columns," *AIChE J.*, 37(5), 705–723 (1991).
- Iribarren, O. A., and Chiotti, O. J., "Simplified analytical prediction of distillation column startup time at total reflux," *Can. J. Chem. Eng.*, 69(1), 377–382 (1991).
- Jacobsen, E. W., et al., "Robust control of homogeneous azeotropic distillation columns," *AIChE J.*, 37(12), 1810–1824 (1991).
- Lee, M., and Park, S., "Dynamic structural transformation for the analysis of distillation control structures," *AIChE J.*, 37(11), 1725–1729 (1991).
- Li, R., and Olson, J. H., "Fault detection and diagnosis in a closed-loop nonlinear distillation process: Application of extended Kalman filters," *Ind. Eng. Chem. Res.*, 30(5), 898–908 (1991).
- McMullan, B. D.; Ravicz, A. E., and Wei, S. Y. J., "Troubleshooting a packed vacuum column: A success story," *Chem. Eng. Prog.*, 87(7), 69–74 (1991).
- Momoh, S. O., "Assessing the accuracy of selectivity as a basis for solvent screening in extractive distillation processes," *Sep. Sci. Technol.*, 26(5), 729–742 (1991).
- Papastathopoulou, H. S., and Luyben, W. L., "Control of a binary sidestream distillation column," *Ind. Eng. Chem. Res.*, 30(4), 705–713 (1991).
- Porter, K. E., and Momoh, S. O., "Finding the optimum sequence of distillation columns: An equation to replace the 'rules of thumb' (heuristics)," *Chem. Eng. J.*, 46(3), 97–108 (1991).
- Quintero-Marmol, E.; Luyben, W. L., and Georgakis, C., "Application of an extended Luenberger observer to the control of multicomponent batch distillation," *Ind. Eng. Chem. Res.*, 30(8), 1870–1880 (1991).
- Rani, K. Y., and Gangiah, K., "Adaptive generic model control: Dual composition control of distillation," *AIChE J.*, 37(11), 1634–1644 (1991).
- Sandelin, P. M., et al., "Robust multiobjective linear quadratic control of distillation using low-order controllers," *Chem. Eng. Sci.*, 46(11), 2815–2828 (1991).
- Sandelin, P. M.; Haggbloom, K. E., and Waller, K. V., "A disturbance sensitivity parameter and its application to distillation control," *Ind. Eng. Chem. Res.*, 30(6), 1182–1186 (1991).
- Sandelin, P. M.; Haggbloom, K. E., and Waller, K. V., "Disturbance rejection properties of control structures at one-point control of a two-product distillation column," *Ind. Eng. Chem. Res.*, 30(6), 1187–1193 (1991).
- Simandl, J., and Svrcek, W. Y., "Extension of the simultaneous-solution and inside-outside algorithms to distillation with chemical reactions," *Comput. Chem. Eng.*, 15(5), 337–348 (1991).
- Skogestad, S., et al., "Comments on 'Tuning controllers on distillation columns with the distillate-bottoms structure' and response (letters)," *Ind. Eng. Chem. Res.*, 30(8), 2019–2020 (1991).

- Tham, M. T., et al., "On-line multivariable adaptive control of a binary distillation column," *Can. J. Chem. Eng.*, 69(4), 997-1010 (1991).
- Toth, K., and Jancso, G., "Theoretical calculation of the sulfur isotope separation factor in the distillation of hydrogen sulfide," *Sep. Sci. Technol.*, 26(9), 1267-1272 (1991).
- Tyzack, J., "Distillation applications for agitated thin film evaporators," *Chem. Engineer*, pp. 20-23 (February 14, 1991).
- Unterreiner, J. M.; McHugh, M. A., and Krukoni, V. J., "Breaking the trimethyl borate-methanol azeotrope with supercritical methane," *Ind. Eng. Chem. Res.*, 30(4), 740-745 (1991).
- Woinet, R.; Thomas, G., and Bordet, J., "Adaptive control based on pole placement: An experimental test on a binary distillation column," *Chem. Eng. Sci.*, 46(4), 949-958 (1991).
- Wong, D. S. H.; Jang, S. S., and Chang, C. F., "Simulation of dynamics and phase pattern changes for an azeotropic distillation column," *Comput. Chem. Eng.*, 15(5), 325-336 (1991).
- Xu, X., et al., "Simulation of thermally coupled distillations with two liquid phases," *Int. Chem. Eng.*, 31(4), 728-736 (1991).
- Yang, D. R.; Seborg, D. E., and Mellichamp, D. A., "Combined balance control structure for distillation columns," *Ind. Eng. Chem. Res.*, 30(9), 2159-2168 (1991).

4. Column Design Data

- Bekassy-Molnar, E., and Mustafa, H., "Clear liquid height on sieve plates in the froth, mixed and spray regimes," *Chem. Eng. Res. Des.*, 69(1), 14-20, (1991).
- Bekassy, Molnar, E., and Mustafa, H., "Influence of surface tension on pressure drop of sieve plates," *Chem. Eng. Res. Des.*, 69(4), 287-294 (1991).
- Bennett, D. L., and Grimm, H. J., "Eddy diffusivity for distillation sieve trays," *AIChE J.*, 37(4), 589-596 (1991).
- Coker, A. K., "Understand the basics of packed-column design," *Chem. Eng. Prog.*, 87(11), 93-99 (1991).
- Darton, R., and Weve, D., "Distillation: The importance of equipment choice," *Chem. Engineer*, pp. 19-24 (November 14, 1991).
- Davies, B.; Ali, Z., and Porter, K. E., "Spray-to-bubbly transition for distillation systems containing two liquid phases," *AIChE J.*, 37(4), 597-606 (1991).
- Fulmer, J. W., and Graf, K. C., "Distill acetone in tower packing," *Hydrocarbon Process.*, 70(10), 87-91 (1991).
- Glinos, K., and Myers, R. D., "Sizing of vacuum relief valves for atmospheric distillation columns," *J. Loss Prev.*, 4(3), 166-169 (1991).
- Hower, T. C., and Kister, H. Z., "Solve process column problems," *Hydrocarbon Process.*, 70(6), 83-87 (1991).
- Kister, H. Z., and Gill, D. R., "Predict flood point and pressure drop for modern random packings," *Chem. Eng. Prog.*, 87(2), 32-42 (1991).
- Kurtz, D. P.; McNulty, K. J., and Morgan, R. D., "Stretch the capacity of high-pressure distillation columns," *Chem. Eng. Prog.*, 87(2), 43-49 (1991).
- Lockett, M. J., and Augustyniak, J. D., "On tilted trays," *Chem. Eng. Res. Des.*, 69(2), 99-107 (1991).
- Nawrocki, P. A.; Xu, Z. P., and Chuang, K. T., "Mass transfer in structured corrugated packing," *Can. J. Chem. Eng.*, 69(6), 1336-1343 (1991).
- Robbins, L. A., "Improve pressure-drop prediction with a new correlation," *Chem. Eng. Prog.*, 87(5), 87-91 (1991).

- Robinson, K., "Trays or packings?" *Chem. Engineer*, pp. 23–26 (June 27, 1991).
- Shah, G. C., "Effectively troubleshoot structured-packing distillation systems," *Chem. Eng. Prog.*, 87(4), 49–56 (1991).

5. Absorption Reactions and Absorber Design

- Al-Ghawas, H. A., and Sandall, O. C., "Simultaneous absorption of carbon dioxide, carbonyl sulfide and hydrogen sulfide in aqueous methyldiethanolamine," *Chem. Eng. Sci.*, 46(2), 665–676 (1991).
- Akman, U., and Sunol, A. K., "Modeling of supercritical desorbers with an equation-of-state-based isotherm," *AIChE J.*, 37(2), 215–224 (1991).
- Anon., "Scrubber to handle NO_x and particulates," *Chem. Eng.*, p. 163 (February 1991).
- Baird, M. H. I., and Rama Rao, N. V., "An inverted cup reciprocating plate for gas absorption," *Can. J. Chem. Eng.*, 69(4), 927–933 (1991).
- Ball, T., and Veldman, R., "Improve gas treating," *Chem. Eng. Prog.*, 87(1), 67–72 (1991).
- Benitez-Garcia, J., et al., "On the effect of basicity on the kinetics of carbon dioxide absorption in tertiary amines," *Chem. Eng. Sci.*, 46(11), 2927–2932 (1991).
- Bohn, M. S., and Swanson, L. W., "A comparison of models and experimental data for pressure drop and heat transfer in irrigated packed beds," *Int. J. Heat Mass Transfer*, 34(10), 2509–2520 (1991).
- Bontozoglou, V., and Karabelas, A. J., "Numerical calculation of simultaneous absorption of hydrogen sulfide and carbon dioxide in aqueous hydroxide solutions," *Ind. Eng. Chem. Res.* 30(12), 2598–2603 (1991).
- Boyes, A. P., et al., "The cocurrent downflow contactor (CDC): Mass transfer and reaction characteristics in unpacked and packed-bed operation," *Chem. Eng. Res. Des.*, 69(3), 200–202 (1991).
- Brauner, N., "Non-isothermal vapour absorption into falling film," *Int. J. Heat Mass Transfer*, 34(3), 767–784 (1991).
- Camacho, F., et al., "Influence of operating and physical variables on interfacial area determination," *AIChE J.*, 37(8), 1196–1204 (1991).
- Carey, T. R.; Hermes, J. E., and Rochelle, G. T., "A model of acid gas absorption/stripping using methyldiethanolamine with added acid," *Gas Sep. Purif.*, 5(2), 95–110 (1991).
- Chaudhuri, S. K., and Sharma, M. M., "Absorption of ethylene in concentrated sulfuric acid," *Ind. Eng. Chem. Res.*, 30(2), 339–345 (1991).
- Delaloye, M. M.; von Stockar, U., and Lu, X. P., "The influence of viscosity on the liquid-phase mass transfer resistance in packed columns," *Chem. Eng. J.*, 47(1), 51–61 (1991).
- Demyanovich, R. J., "Absorption of carbon dioxide by impinging, thin liquid sheets," *Chem. Eng. Commun.*, 103, 151–166 (1991).
- El Azrak, A., et al., "The gas-phase mass transfer coefficient and interfacial area in an absorption column equipped with Glitsch valve-trays," *Int. Chem. Eng.*, 31(2), 273–283 (1991).
- Escobillana, G. P., et al., "Behaviour of absorption/stripping columns for the carbon dioxide–MEA system: Modelling and experiments," *Can. J. Chem. Eng.*, 69(4), 969–978 (1991).
- Foumeny, E. A., and Roshani, S., "Mean voidage of packed beds of cylindrical particles," *Chem. Eng. Sci.*, 46(9), 2363–2364 (1991).
- Glasscock, D. A.; Critchfield, J. E., and Rochelle, G. T., "Carbon dioxide absorption/desorption in mixtures of methyldiethanolamine with monoethanolamine or diethanolamine," *Chem. Eng. Sci.*, 46(11), 2829–2846 (1991).

- Goto, S.; Saikawa, K., and Gaspillo, P. D., "Mass transfer and holdup in gas-liquid cocurrent flow packed beds containing water-repellent particles," *Can. J. Chem. Eng.*, **69**(6), 1344-1347 (1991).
- Grottoli, M. G.; Biardi, G., and Pellegrini, L., "A new simulation model for a real trays absorption column," *Comput. Chem. Eng.*, **15**(3), 171-180 (1991).
- Heisel, M. P., and Belloni, A. E., "Options available in the Solinox vent gas purification process," *Gas Sep. Purif.*, **5**(2), 111-114 (1991).
- Hix, R. M., and Lynn, S., "Reactive absorption of hydrogen sulfide by a solution of sulfur dioxide in poly(glycol ether): Effect of a volatile dissolved reactant on mass-transfer enhancement," *Ind. Eng. Chem. Res.*, **30**(5), 930-939 (1991).
- Katima, J. H. Y., and Handley, D., "Modelling of nitrogen oxides absorption into sodium hydroxide solution in a packed column," *Process. Saf. Environ. Prot.*, **69**(B3), 153-159 (1991).
- Kcan, J. A.; Turner, H. M., and Price, B. C., "Dehydrator packing performance," *Hydrocarbon Process.*, **70**(4), 47-52 (1991).
- Kister, H. Z., and Gill, D. R., "Predict flood point and pressure drop for modern random packings," *Chem. Eng. Prog.*, **87**(2), 32-42 (1991).
- Kolev, N., and Semkov, K., "On the evaluation of the interfacial turbulence (the Marangoni effect) in gas (vapour)-liquid mass transfer: Modelling of packed columns accounting for axial mixing and Marangoni effects," *Chem. Eng. Process.*, **29**(2), 83-92 (1991).
- Koschel, J., et al., "Absorption of carbon monoxide, hydrogen and methane in toluene and copper(I) tetrachloroaluminate-toluene solutions at elevated pressures," *Energy Fuels*, **5**(5), 729-733 (1991).
- Lee, K. R., "Absorption of carbon dioxide in water using a wetted-wick column," *Int. Chem. Eng.*, **31**(2), 379-386 (1991).
- Li, K. Y., and Hsiao, K. J., "How to optimize an air stripper," *Chem. Eng.*, pp. 114-118 (July 1991).
- Littel, R. J., et al., "Modelling of simultaneous absorption of hydrogen sulphide and CO₂ in alkanolamine solutions: Influence of parallel and consecutive reversible reactions and coupled diffusion of ionic species," *Chem. Eng. Sci.*, **46**(9), 2303-2314 (1991).
- Littel, R. J.; Versteeg, G. F., and van Swaaij, W. P. M., "Physical absorption into non-aqueous solutions in a stirred cell reactor," *Chem. Eng. Sci.*, **46**(12), 3308-3313 (1991).
- Mackowiak, J., "Pressure drop in irrigated packed columns," *Chem. Eng. Process.*, **29**(2), 93-106 (1991).
- Mak, A. N. S., et al., "Axial dispersion in single-phase flow in a pulsed packed column containing structured packing," *Chem. Eng. Sci.*, **46**(3), 819-826 (1991).
- Mendelsohn, M. H., and Harkness, J. B. L., "Enhanced flue-gas denitrification using ferrous-EDTA and a polyphenolic compound in an aqueous scrubber system," *Energy Fuels*, **5**(2), 244-248 (1991).
- Newman, S. A., "Sour water design by charts," *Hydrocarbon Process.*, **70**(9), 145-150; **70**(10), 101-106; **70**(11), 139-141 (1991).
- Nirmalakhandan, N., et al., "Cascade air-stripping: A new technology to meet new regulations," *Chem. Eng. Commun.*, **102**, 47-58 (1991).
- Olujic, Z.; Stoter, F., and de Graauw, J., "Gas distribution in large-diameter packed columns," *Gas Sep. Purif.*, **5**(2), 59-66 (1991).
- Oyevaar, M. H.; Bos, R., and Westerterp, K. R., "Interfacial areas and gas hold-ups in gas-liquid contactors at elevated pressures from 0.1 to 8.0 MPa," *Chem. Eng. Sci.*, **46**(5), 1217-1232 (1991).
- Pasiuk-Bronikowska, W., and Rudzinski, K. J., "Absorption of sulphur dioxide into aqueous systems," *Chem. Eng. Sci.*, **46**(9), 2281-2292 (1991).

- Pearson, J., and Thompson, K., "Gas-fired dehumidification," *Energy World*, pp. 15–18 (September 1991).
- Phaneswara Rao, D., "Design of packed towers for absorption and desorption of carbon dioxide using hot promoted potassium carbonate solution," *Gas Sep. Purif.*, 5(3), 177–180 (1991).
- Pohorecki, R., and Kucharski, E., "Desorption with chemical reaction in the system carbon dioxide–aqueous solution of potassium carbonate," *Chem. Eng. J.*, 46(1), 1–8 (1991).
- Porter, K. E.; Sitthiosoth, S., and Jenkins, J. D., "Designing a solvent for gas absorption," *Chem. Eng. Res. Des.*, 69(3), 229–236 (1991).
- Ramirez Santa-Pau, F., et al., "Fluid dynamic aspects of liquid–gas contacting: Lift tubes with packing," *Int. Chem. Eng.*, 31(2), 315–324 (1991).
- Reyes, S. C., and Iglesia, E., "Monte Carlo simulations of structural properties of packed beds," *Chem. Eng. Sci.*, 46(4), 1089–1100 (1991).
- Rivera, P. J., and Hirtzel, C. S., "Temperature-programmed desorption of molecules from solid surfaces: Effects of surface site distribution and lateral interactions on desorption spectra," *Chem. Eng. Commun.*, 108, 333–346 (1991).
- Robbins, L. A., "Improve pressure-drop prediction with a new correlation," *Chem. Eng. Prog.*, 87(5), 87–91 (1991).
- Ruhland, F.; Kind, R., and Weiss, S., "The kinetics of the absorption of sulfur dioxide in calcium hydroxide suspensions," *Chem. Eng. Sci.*, 46(4), 939–948 (1991).
- Sadasivam, M., and Balakrishnan, A. R., "Analysis of thermal effects in packed bed liquid desiccant dehumidifiers," *Chem. Eng. Process.*, 30(2), 79–86 (1991).
- Saez, A. E., et al., "Static liquid hold-up in packed beds of spherical particles," *AIChE J.*, 37(11), 1733–1736 (1991).
- Sandhu, S. S., "Removal of chlorine from the chlorine–nitrogen mixture in a film of liquid water," *Chem. Eng. Educ.*, 25(2), 92–95 (1991).
- Semkov, K., "Liquid flow distribution in packed beds by multipoint liquid distributors," *Chem. Eng. Sci.*, 46(5), 1393–1400 (1991).
- Semkov, K., and Kolev, N., "On the evaluation of the interfacial turbulence (the Marangoni effect) in gas (vapour)–liquid mass transfer: A method for estimating the interfacial turbulence effect," *Chem. Eng. Process.*, 29(2), 77–82 (1991).
- Skrbic, B.; Cvejanov, J., and Paunovic, R., "An extension of semi-empirical gas–liquid equilibrium model for sulfur dioxide absorption in aqueous sodium citrate solution," *Chem. Eng. Sci.*, 46(12), 3314–3317 (1991).
- Stroh, F., and Balakotaiah, V., "Modeling of reaction-induced flow maldistributions in packed beds," *AIChE J.*, 37(7), 1035–1052 (1991).
- Suchak, N. J.; Jethani, K. R., and Joshi, J. B., "Modeling and simulation of NO_x absorption in pilot-scale packed columns," *AIChE J.*, 37(3), 323–339 (1991).
- Teng, T. T., and Mather, A. E., "Solubility of acid gases in chemical and mixed solvents," *Gas Sep. Purif.*, 5(1), 29–34 (1991).
- Tinge, J. T., et al., "The absorption of propane and ethene in slurries of activated carbon in water," *Chem. Eng. Sci.*, 46(1), 343–350 (1991).
- Uddholm, H., "A mass transfer model for dimensioning a centrifugal absorber in an air cleaning plant," *Int. J. Heat Mass Transfer*, 34(4), 941–948 (1991).
- Warmuzinski, K., and Tanczyk, M., "Oscillatory Marangoni instability during absorption accompanied by chemical reaction," *Chem. Eng. Sci.*, 46(8), 2031–2040 (1991).
- Warmuzinski, K., and Tanczyk, M., "Marangoni instability during the absorption of carbon dioxide into aqueous solutions of monoethanolamine," *Chem. Eng. Process.*, 30(2), 113–121 (1991).
- Wubs, H. J.; Beenackers, A. A. C. M., and Krishna, R., "Absorption of hydrogen sulfide

- in aqueous solutions of iodine: A critical review," *Chem. Eng. Sci.*, 46(2), 703–706 (1991).
- Xu, S., et al., "Rate of absorption of carbon dioxide in a mixed solvent," *Ind. Eng. Chem. Res.*, 30(6), 1213–1217 (1991).
- Yan, T. Y., "Reaction of trace mercury in natural gas with dilute polysulfide solutions in a packed column," *Ind. Eng. Chem. Res.*, 30(12), 2592–2595 (1991).
- Yaparpalvi, R., and Chuang, K. T., "Room temperature purification of humid air containing low levels of carbon monoxide," *Ind. Eng. Chem. Res.*, 30(9), 2219–2225 (1991).

6. Cooling Towers

- Burger, R., "Improve counterflow cooling tower operation," *Hydrocarbon Process.*, 70(3), 59–61 (1991).
- Burger, R., "Colder cooling tower water pays off," *Chem. Eng.*, pp. 177–182 (March 1991).
- Butcher, C., "Controlling *Legionella* in cooling towers," *Chem. Engineer*, p. 14 (April 11, 1991).
- Croix, R., and Suarez, S., "Monitor cooling tower and cooling fans," *Hydrocarbon Process.*, 70(7), 71–74 (1991).
- Di Cintio, R., et al., "Separate ethylene efficiently," *Hydrocarbon Process.*, 70(7), 83–90 (1991).
- Jones, B., "Causes of cooling tower underperformance," *Process. Eng.*, pp. 43–44 (December 1991).
- Osterle, F., "On the analysis of counter-flow cooling towers," *Int. J. Heat Mass Transfer*, 34(4), 1313–1316 (1991).

7. Liquid–Liquid Extraction

- Abu-Shady, A. S. I.; Amer, S. A., and Hegazi, M. F., "Mechanism of acetic acid transfer from aqueous sodium chloride solutions to some organic solvents," *J. Chem. Tech. Biotechnol.*, 52(2), 177–186 (1991).
- Alves dos Reis, M., "Waste lubricating oil rerefining by extraction-flocculation: A pilot plant study," *Ind. Eng. Chem. Res.*, 30(11), 2449–2456 (1991).
- Anon., "Membrane process for liquid–liquid extraction," *Chem. Eng.*, p. 95 (December 1991).
- Baird, M. H. I., "Solvent extraction: The challenges of a 'mature' technology," *Can. J. Chem. Eng.*, 69(6), 1287–1301 (1991).
- Baird, M. H. I., and Rao, N. V. R., "Axial mixing in a reciprocating plate column with very small density gradients," *AIChE J.*, 37(7), 1019–1026 (1991).
- Blanco, C. G., and Guillen, M. D., "Study of relationships between solvent effectiveness in coal tar pitch extractions and solvent solubility parameters," *Ind. Eng. Chem. Res.*, 30(7), 1579–1582 (1991).
- Butcher, C., "Solvent recovery goes up-market," *Chem. Engineer*, p. 16 (April 25, 1991).
- Camurdan, M. C.; Taylor, P. A., and Baird, M. H. I., "Adaptive control of hydrodynamic holdup in a Karr extraction column," *Can. J. Chem. Eng.*, 69(2), 578–588 (1991).
- Camurdan, M. C.; Taylor, P. A., and Baird, M. H. I., "An application of a cascaded self tuning regulator to a Karr solvent extraction column," *Can. J. Chem. Eng.*, 69(2), 588–595 (1991).
- Camurdan, M. C.; Taylor, P. A., and Baird, M. H. I., "Control of mass transfer and hydrodynamic holdup in a Karr solvent extraction column," *Can. J. Chem. Eng.*, 69(3), 761–772 (1991).

- Carter, C., and Robins, M. M., "Homogenisation of oil-in-water emulsions: Effect of pressure and composition on droplet size distribution," *Food Bioprod. Process.*, 69(C3), 127-133 (1991).
- Chatzi, E. G.; Boutris, C. J., and Kiparissides, C., "On-line monitoring of drop size distributions in agitated vessels: Effect of stabilizer concentration," *Ind. Eng. Chem. Res.*, 30(6), 1307-1313 (1991).
- Chen, B. H., and Liu, C. H., "Liquid-liquid extraction in a reciprocating screen plate column," *Can. J. Chem. Eng.*, 69(1), 300-307 (1991).
- Chester, A. K., "The modelling of coalescence processes in fluid-liquid dispersion: A review of current understanding," *Chem. Eng. Res. Des.*, 69(4), 259-270 (1991).
- Chiu, H. L., and Huang, S. D., "Adsorptive bubble separation of heptachlor and hydroxy-chlordene," *Sep. Sci. Technol.*, 26(1), 73-84 (1991).
- Cho, S. H., and Kim, Y. K., "Selective removal of cadmium from mixed metal solution by carbonate infusion," *Sep. Sci. Technol.*, 26(3), 381-394 (1991).
- Cohen, O.; Arad, D., and Schmuckler, G., "Extraction of copper salts with a mixed extractant (III): Aggregation and molecular structure," *Solv. Extr. Ion Exch.*, 9(5), 703-716 (1991).
- Cohen, R. D., "Effect of turbulence damping on the steady-state drop size distribution in stirred liquid-liquid dispersions," *Ind. Eng. Chem. Res.*, 30(1), 277-279 (1991).
- Cote, G.; Chen, F. M., and Bauer, D., A general survey of the properties of a new class of functionalised materials with organopolysiloxane structure, *Solv. Extr. Ion Exch.*, 9(2), 289-308 (1991).
- Cusack, R., and Karr, A., "Liquid-liquid extractor design and specification," *Chem. Eng.*, pp. 112-120 (April 1991).
- Cusack, R. W., and Fremeaux, P., "A fresh look at liquid-liquid extraction," *Chem. Eng.*, pp. 132-138 (March 1991).
- Cusack, R. W.; Fremeaux, P., and Glatz, D., "A fresh look at liquid-liquid extraction," *Chem. Eng.*, pp. 66-76 (February 1991).
- Daoud, J. A.; Khalifa, S. M., and Aly, H. F., "Kinetics of europium(III) extraction by thenoyltrifluoroacetone and triphenylarsine oxide mixture in chloroform, *Solv. Extr. Ion Exch.*, 9(1), 137-154 (1991).
- Dongaonkar, K. R.; Pratt, H. R. C., and Stevens, G. W., "Mass transfer and axial dispersion in a Kuhn extraction column," *AIChE J.*, 37(5), 694-704 (1991).
- Eid, K., et al., "Drop breakage in a pulsed sieve-plate column," *Chem. Eng. Sci.*, 46(7), 1595-1608 (1991).
- Eiteman, M. A., and Gainer, J. L., "The effect of the pH difference between phases on partitioning in poly(ethylene glycol)-phosphate aqueous two-phase systems," *Chem. Eng. Commun.*, 105, 171-184 (1991).
- Eyal, A. M., and Baniel, A. M., "Recovery and concentration of strong mineral acids from dilute solutions through LLX: Review of parameters for adjusting extractant properties and analysis of process options," *Solv. Extr. Ion Exch.*, 9(2), 195-210 (1991).
- Eyal, A. M.; Hazan, B., and Bloch, R., "Recovery and concentration of strong mineral acids from dilute solutions through LLX: Reversible extraction with branched-chain amines," *Solv. Extr. Ion Exch.*, 9(2), 211-222 (1991).
- Eyal, A. M.; Hazan, B., and Bloch, R., "Recovery and concentration of strong mineral acids from dilute solutions through LLX: A 'temperature swing' based process," *Solv. Extr. Ion Exch.*, 9(2), 223-236 (1991).
- Facon, S.; Cote, G., and Bauer, D., "Solvent extraction of antimony(III), bismuth(III), lead(II), and tin(IV) with bis(2,4,4-trimethylpentyl) phosphinodithioic acid (Cyanex 301)," *Solv. Extr. Ion Exch.*, 9(5), 717-734 (1991).

- Godfrey, J. C., and Slater, M. J., "Slip velocity relationships for liquid-liquid extraction columns," *Chem. Eng. Res. Des.*, **69**(2), 130-141 (1991).
- Goetz-Grandmont, G. J.; Taheri, M., and Brunette, J. P., "An indirect approach to synergistic extraction mechanisms: Spectroscopy of indium(III) lipophilic complexes extractable from perchlorate medium," *Solv. Extr. Ion Exch.*, **9**(4), 533-548 (1991).
- Gomma, H. G.; Landau, J., and Al-Taweel, A. M., "Gas-liquid contacting in reciprocating plate columns: Hydrodynamics," *Can. J. Chem. Eng.*, **69**(1), 228-239 (1991).
- Gorski, B.; Gorski, N., and Beer, M., "Extraction of Sc, Y, and lanthanides by quaternary ammonium salts," *Solv. Extr. Ion Exch.*, **9**(4), 623-636 (1991).
- Gourdon, C., and Casamatta, G., "Influence of mass transfer direction on the operation of a pulsed sieve-plate pilot column," *Chem. Eng. Sci.*, **46**(11), 2799-2808 (1991).
- Gourdon, C.; Casamatta, G., and Angelino, H., "Single drop experiments with liquid test systems: A way of comparing two types of mechanically agitated extraction columns," *Chem. Eng. J.*, **46**(3), 137-148 (1991).
- Grosser, K. A.; Erickson, K. L., and Carbonell, R. G., "Enhanced dispersion resulting from solute exchange between phases," *AIChE J.*, **37**(4), 512-526 (1991).
- Guillen, M. D., et al., "Study of the effectiveness of 27 organic solvents in the extraction of coal tar pitches," *Energy Fuels*, **5**(1), 188-191 (1991).
- Hall, P. J., and Larsen, J. W., "Evidence for low-temperature second-order phase transitions in coal/solvent systems using differential scanning calorimetry," *Energy Fuels*, **5**(1), 228-229 (1991).
- Harbuck, D. D.; Judd, J. C., and Behunin, D. V., "Germanium solvent extraction from sulfuric acid solutions (and co-extraction of germanium and gallium)," *Solv. Extr. Ion Exch.*, **9**(3), 383-402 (1991).
- Hasegawa, Y.; Kobayashi, I., and Yoshimoto, S., "Extraction of palladium(II) and platinum(IV) as chlorocomplex acids into basic organic solvents," *Solv. Extr. Ion Exch.*, **9**(5), 759-768 (1991).
- Haynes, C. A., et al., "Electrostatic potentials and protein partitioning in aqueous two-phase systems," *AIChE J.*, **37**(9), 1401-1410 (1991).
- Haywood, R. J.; Rensizbulut, M., and Raithby, G. D., "Transient deformation of freely-suspended liquid droplets in electrostatic fields," *AIChE J.*, **37**(9), 1305-1317 (1991).
- He, W.; Baird, M. H. I., and Chang, J. S., "The effect of electric field on droplet formation and motion in a viscous liquid," *Can. J. Chem. Eng.*, **69**(5), 1174-1184 (1991).
- Horwitz, E. P.; Dietz, M. L., and Fisher, D. E., "SREX: A new process for the extraction and recovery of strontium from acidic nuclear waste streams," *Solv. Extr. Ion Exch.*, **9**(1), 1-26 (1991).
- Hrdlicka, A., "Ion-pair extraction of molybdenum(VI) in the presence of 2,3-dihydroxynaphthalene," *Solv. Extr. Ion Exch.*, **9**(2), 259-276 (1991).
- Huang, J. Y., and Huang, S. D., "Solvent sublation and adsorbing colloid flotation of acid red," *Sep. Sci. Technol.*, **26**(1), 59-72 (1991).
- Iio, K.; Takahashi, K., and Takeuchi, H., "Solvent extraction of titanium(IV) from nitric acid solution by di(2-ethylhexyl)phosphoric acid," *Solv. Extr. Ion Exch.*, **9**(1), 27-44 (1991).
- Inoue, S., "Solvent extraction of lanthanides with *N-m*- and *N-p*-methoxybenzoyl-*N*-phenylhydroxylamine," *Solv. Extr. Ion Exch.*, **9**(4), 593-606 (1991).
- Ishii, H., et al., "Solvent extraction of indium with 1-(4-alkylphenyl)-3-hydroxy-2-methyl-4-pyridones," *Solv. Extr. Ion Exch.*, **9**(1), 61-72 (1991).
- Ishii, H.; Suzuki, T., and Odashima, T., "Solvent extraction of some trivalent lanthanoids with salicylaldehyde *n*-alkanolhydrazones," *Solv. Extr. Ion Exch.*, **9**(3), 481-496 (1991).

- Jarvis, N. V., "Thermodynamic modeling of solvent extraction systems: Successes and problems," *Sep. Sci. Technol.*, 26(10), 1403-1418 (1991).
- Jeelani, S. A. K., and Hartland, S., "Collision of oscillating liquid drops," *Chem. Eng. Sci.*, 46(7), 1807-1814 (1991).
- Jeelani, S. A. K., and Hartland, S., "Effect of approach velocity on binary and interfacial coalescence," *Chem. Eng. Res. Des.*, 69(4), 271-281 (1991).
- Kamelbkiewicz, S. J.; Leory, M. J. F., and Brunette, J. P., "Synergistic extraction of cadmium and zinc with 1-phenyl-3-methyl-4-benzoylpyrazol-5-ol and *n*-dodecylamine mixtures, emulsion formation," *Solv. Extr. Ion Exch.*, 9(5), 769-786 (1991).
- Kato, S.; Nakayama, E., and Kawasaki, J., "Types of dispersion in agitated liquid-liquid systems," *Can. J. Chem. Eng.*, 69(1), 222-227 (1991).
- Kinugasa, T.; Tanahashi, S. I., and Takeuchi, H., "Extraction of lysozyme using reversed micellar solution: Distribution equilibrium and extraction rates," *Ind. Eng. Chem. Res.*, 30(11), 2470-2476 (1991).
- Kiriakidis, D. G.; Mitsoulis, E., and Neale, G. H., "Linear displacement of a wetting fluid by an immiscible non-wetting fluid in a porous medium: A predictive algorithm," *Can. J. Chem. Eng.*, 69(2), 557-564 (1991).
- Knott, M., "New solution to mixer-settler problem," *Process Eng.*, p. 45 (March 1991).
- Kodera, Y., et al., "Solvent extraction of nitrogen compounds from coal liquids," *Fuel*, 70(6), 765-770 (1991).
- Komatsu, Y., et al., "Solvent extraction separation of alkaline earth metal ions with thenoyltrifluoroacetone and trioctylphosphine oxide in carbon tetrachloride," *Solv. Extr. Ion Exch.*, 9(3), 471-480 (1991).
- Korchinsky, W. J., "Hydrodynamic and mass transfer parameter correlations for the rotating disc contactor," *J. Chem. Tech. Biotechnol.*, 50(2), 239-256 (1991).
- Kumar, S.; Kumar, R., and Gandhi, K. S., "Influence of the wetting characteristics of the impeller on phase inversion," *Chem. Eng. Sci.*, 46(9), 2365-2367 (1991).
- Kumar, S.; Kumar, R., and Gandhi, K. S., "Alternative mechanisms of drop breakage in stirred vessels," *Chem. Eng. Sci.*, 46(10), 2483-2490 (1991).
- Larsen, J. W.; Cheng, J. C., and Pan, C. S., "Solvent extraction of coals during analytical solvent swelling: A potential source of error," *Energy Fuels*, 5(1), 57-59 (1991).
- Lis, S.; Mathur, J. N., and Choppin, G. R., "Luminescence study of Eu(III) complexes extracted in the organic phase," *Solv. Extr. Ion Exch.*, 9(4), 637-650 (1991).
- Lu, X. Y.; Valsaraj, K. T., and Thibodeaux, L. J., "Studies in batch and continuous solvent sublation: Continuous countercurrent solvent sublation and bubble fractionation of hydrophobic organics from aqueous solutions," *Sep. Sci. Technol.*, 26(7), 977-990 (1991).
- Lumetta, G. J., et al., "Extraction of zinc(II) ion by didodecyl naphthalenesulfonic acid (HDDNS) in carbon tetrachloride: The role of aggregation," *Solv. Extr. Ion Exch.*, 9(1), 155-176 (1991).
- Ma, E.; Jiang, P., and Jin, P., "Kinetics and mechanism of yttrium extraction with three acidic phosphorus extractants," *J. Chem. Tech. Biotechnol.*, 51(3), 315-322 (1991).
- Moyer, B. A., and Case, F. I., "On the origin of haze in extraction solvents: Dilution-induced supersaturation of water," *Solv. Extr. Ion Exch.*, 9(2), 277-288 (1991).
- Moyer, B. A., et al., "Liquid-liquid equilibrium analysis in perspective: Slope analysis of the extraction of uranyl nitrate from nitric acid by di-2-ethylhexylsulfonate," *Solv. Extr. Ion Exch.*, 9(5), 833-864 (1991).
- Naser, S. F., and Fournier, R. L., "A system for the design of an optimum liquid-liquid extractant molecule," *Comput. Chem. Eng.*, 15(6), 397-414 (1991).

- Olazabal, M. A.; Fernandez, L. A., and Madariaga, J. M., "The separation of aluminum from an alkaline solution containing molybdenum and vanadium by extraction with LIX26 dissolved in *n*-octanol/hexane mixtures," *Solv. Extr. Ion Exch.*, 9(5), 735-748 (1991).
- Otu, E. O., "Solvent extraction with sulphonic acids," *Solv. Extr. Ion Exch.*, 9(5), 875-884 (1991).
- Pahari, P. K., and Sharma, M. M., "Recovery of morpholine via reactive extraction," *Ind. Eng. Chem. Res.*, 30(8), 2015-2017 (1991).
- Papamichael, N.; Borner, B., and Hustedt, H., "Continuous aqueous phase extraction of proteins: Automated on-line monitoring of fumarase activity and protein concentration," *J. Chem. Tech. Biotechnol.*, 50(4), 457-468 (1991).
- Parthasarathy, R.; Jameson, G. J., and Ahmed, N., "Bubble break-up in stirred vessels: Predicting the Sauter mean diameter," *Chem. Eng. Res. Des.*, 69(4), 295-301, (1991).
- Pashkov, G. L., et al., "Solvent extraction of copper(II), nickel(II) and cobalt(II) from halide and thiocyanate solutions by aldioximes," *Solv. Extr. Ion Exch.*, 9(4), 549-568 (1991).
- Pathak, S. P., et al., "New salt-polyethylene-glycol systems for two-phase aqueous extraction," *Biochem. Eng. J.*, 46(1), B31-B34 (1991).
- Patil, T. A., et al., "Enzyme mass transfer coefficient in aqueous two-phase system using a packed extraction column," *Can. J. Chem. Eng.*, 69(2), 548-557 (1991).
- Pazos, C.; Curieses, J. P. S., and Coca, J., "Solvent extraction equilibrium of nickel from ammoniacal solutions by LIX 64N," *Solv. Extr. Ion Exch.*, 9(4), 569-592 (1991).
- Penner, L. R., and Russell, J. H., "Synergic extraction of ammoniacal Ni," *Solv. Extr. Ion Exch.*, 9(3), 403-422 (1991).
- Poole, L. J., and King, C. J., "Regeneration of carboxylic acid-amine extracts by back-extraction with an aqueous solution of a volatile amine," *Ind. Eng. Chem. Res.*, 30(5), 923-929 (1991).
- Poole, L. J., and King, C. J., "An improved extractant for separation of ammonia from sour waters by combined stripping and extraction," *Solv. Extr. Ion Exch.*, 9(1), 103-126 (1991).
- Pratt, H. R. C., and Stevens, G. W., "Generalized design equations for backmixed liquid extraction columns with nonlinear equilibria," *Ind. Eng. Chem. Res.*, 30(4), 733-739 (1991).
- Preston, J. S., and du Preez, A. C., "The solvent extraction of europium(II) by some organophosphorus and carboxylic acids," *Solv. Extr. Ion Exch.*, 9(2), 237-258 (1991).
- Rama Rao, N. V.; Vijayan, S., and Baird, M. H. I., "Hydrodynamics of a vibrating perforated-plate extraction column," *Can. J. Chem. Eng.*, 69(1), 212-221 (1991).
- Rao, K. S. M. S. R.; Stewart, R., and Todd, P., "Electrokinetic demixing of two-phase aqueous polymer systems: Separation rates of polyethylene glycol-maltodextrin mixtures," *Sep. Sci. Technol.*, 26(2), 257-268 (1991).
- Rickelton, W. A.; Robertson, A. J., and Hillhouse, J. H., "The significance of diluent oxidation in cobalt-nickel separation," *Solv. Extr. Ion Exch.*, 9(1), 73-84 (1991).
- Rols, J. L., et al., "Modeling of oxygen transfer in water through emulsified organic liquids," *Chem. Eng. Sci.*, 46(7), 1869-1873 (1991).
- Salem, A. B., and Fikri, M., "An algorithm for solving countercurrent extraction processes," *Sep. Sci. Technol.*, 26(1), 25-36 (1991).
- Salem, A. B. S., "Extraction in a single-stage mixer-settler," *Ind. Eng. Chem. Res.*, 30(7), 1582-1588 (1991).
- Savastano, C. A., and Ortiz, E. S., "Effect of changing hydrodynamic conditions on the rate of processes at liquid-liquid interfaces: Metal ion extraction and water solubilization by reversed micelles," *Chem. Eng. Sci.*, 46(3), 741-750 (1991).

- Shillington, D. P., and Tait, B. K., "The extraction of cobalt(II) from a thiocyanate medium by some diamine and monoamine extractants dissolved in 5% isodecanol-benzene," *Solv. Extr. Ion Exch.*, 9(3), 423-434 (1991).
- Shillington, D. P., and Tait, B. K., "Diamine extractants in metal separation: An illustration of the potential of the chelate extraction mode in the platinum(IV)-palladium(II)-base metal system," *Solv. Extr. Ion Exch.*, 9(5), 749-758 (1991).
- Sreelatha, S., et al., "Thermodynamic modeling of chemical equilibria in liquid-liquid extraction of lutetium," *Sep. Sci. Technol.*, 26(12), 1531-1548 (1991).
- Stephan, H., et al., "Liquid-liquid extraction of strontium with amido podands," *Solv. Extr. Ion Exch.*, 9(3), 435-458 (1991).
- Stephan, H., et al., "Liquid-liquid extraction of metal ions with amido podands," *Solv. Extr. Ion Exch.*, 9(3), 459-470 (1991).
- Stoyanov, E. S., et al., "A study of complexes yielded by nitric acid, Fe(III) and Eu(III) extraction from nitrate media with acidic Zr(IV) and Hf(IV) di-2-ethylhexylphosphates," *Solv. Extr. Ion Exch.*, 9(5), 787-832 (1991).
- Szymanowski, J.; Jakubiak, A., and Alejski, K., "Interfacial activity of *N*-8-quinolyl-*p*-dodecylbenzenesulphonamide and the interfacial mechanism of copper extraction," *J. Chem. Tech. Biotechnol.*, 51(3), 301-314 (1991).
- Tsouris, C., and Tavlarides, L. L., "Control of dispersed-phase volume fraction in multistage extraction columns," *Chem. Eng. Sci.*, 46(11), 2857-2866 (1991).
- Tzedakis, T., and Savall, A., "Performance predictions in the scale-up of a liquid-liquid CSTR for indirect electro-oxidation of aromatic hydrocarbons," *Chem. Eng. Sci.*, 46(9), 2269-2280 (1991).
- Ulrich, R. K.; Majmudar, V. K., and Koppaiah, M. K., "A saponification cycle for solvent recovery from sand surfaces following bitumen extraction," *Chem. Eng. Commun.*, 109, 61-72 (1991).
- Valsaraj, K. T., and Thibodeaux, L. J., "Studies in batch and continuous solvent sublation: A complete model and mechanisms of sublation of neutral and ionic species from aqueous solution," *Sep. Sci. Technol.*, 26(1), 37-58 (1991).
- Valsaraj, K. T., and Thibodeaux, L. J., "Studies in batch and continuous solvent sublation: Continuous countercurrent solvent sublation of neutral and ionic species from aqueous solutions," *Sep. Sci. Technol.*, 26(3), 367-380 (1991).
- Valsaraj, K. T.; Thibodeaux, L. J., and Lu, X. Y., "Studies in batch and continuous solvent sublation: Solubility of pentachlorophenol in alcohol-water mixtures and its effects on solvent sublation," *Sep. Sci. Technol.*, 26(4), 529-538 (1991).
- Vijayalakshmi, C. S., and Gulari, E., "An improved model for the extraction of multivalent metals in Winsor II microemulsion systems," *Sep. Sci. Technol.*, 26(2), 291-300 (1991).
- Wang, H.; Pan, J., and Gu, J., "Extraction kinetics of palladium(II) with bis(2-ethylhexyl) sulfoxide from hydrochloric acid media," *Ind. Eng. Chem. Res.*, 30(6), 1257-1261 (1991).
- Wang, M. L., and Hu, K. H., "Extraction mechanism of phenol by sulfuric acid salts of trioctylamine," *Chem. Eng. Commun.*, 107, 189-200 (1991).
- Weatherley, L. R., et al., "Solvent extraction of penicillin: A study of electrostatic spraying behaviour during enhanced extraction in a spray column," *Food Bioprod. Process.*, 69(C2), 83-90 (1991).
- Westland, A. D., and Otu, E. O., "The thermodynamics of extraction of some lanthanide and other ions by 2-ethylhexylhydrogen-*p*-phenylphosphonate," *Solv. Extr. Ion Exch.*, 9(4), 607-622 (1991).
- White, D. A., "Correlation of ternary equilibrium data for use in computer-based calculations for solvent extraction plant design," *Chem. Eng. Sci.*, 46(1), 375-377 (1991).

- Wichterlova, J., and Rod, V., "Determination of mixer-settler efficiency by a response method," *Chem. Eng. Res. Des.*, 69(4), 282–286 (1991).
- Wichterlova, J.; Rod, V., and Hancil, V., "Prediction of the performance of an extraction column from tracer experiments with a stationary continuous phase," *Chem. Eng. Process.*, 29(1), 39–48 (1991).
- Yang, B., and Hartland, S., "Coalescence of single drops on sloping planes," *Chem. Eng. Sci.*, 46(5), 1437–1444 (1991).
- Yang, S. T.; White, S. A., and Hsu, S. T., "Extraction of carboxylic acids with tertiary and quaternary amines: Effect of pH," *Ind. Eng. Chem. Res.*, 30(6), 1335–1342 (1991).
- Yang, W., and Carleson, T. E., "Linear oscillations of a drop in uniform alternating electric fields," *AIChE J.*, 37(11), 1601–1606 (1991).
- Zapatero, M. J., et al., "Solvent extraction of copper(II) with the active component of LIX 54: Synergic effect in the presence of tri-*n*-octylphosphine oxide," *Solv. Extr. Ion Exch.*, 9(1), 177–194 (1991).
- Zheng, D.; Gray, N. B., and Stevens, G. W., "Comparison of naphthenic acid, versatic acid and D2EHPA for the separation of rare earths," *Solv. Extr. Ion Exch.*, 9(1), 85–102 (1991).

8. Supercritical Extraction

- Adschiri, T.; Suzuki, T., and Arai, K., "Catalytic reforming of coal tar pitch in supercritical fluid," *Fuel*, 70(12), 1483–1484 (1991).
- Akman, U., and Sunol, A. K., "Modeling of supercritical desorbers with an equation-of-state-based isotherm," *AIChE J.*, 37(2), 215–224 (1991).
- Anon., "Supercritical fluid technology for spray coatings," *Chem. Eng.*, p. 96 (December 1991).
- Dams, A., and Schlunder, E. U., "Mass transfer in supercritical fluid extraction of a binary aromatic mixture, naphthalene and phenanthrene, from porous rods," *Chem. Eng. Process.*, 30(2), 69–78 (1991).
- de Haan, A. B., and de Graauw, J., "Mass transfer in supercritical extraction columns with structured packings for hydrocarbon processing," *Ind. Eng. Chem. Res.*, 30(11), 2463–2470 (1991).
- Ghonasgi, D., et al., "Supercritical carbon dioxide extraction of organic contaminants from aqueous streams," *AIChE J.*, 37(6), 944–950 (1991).
- Gregorowicz, J., et al., "The perturbed hard chain theory for the prediction of supercritical fluid extraction: Pure component properties," *Chem. Eng. Sci.*, 46(5), 1427–1436 (1991).
- Hayashi, J. I., et al., "Removal of calcium from low rank coals by treatment with carbon dioxide dissolved in water," *Fuel*, 70(10), 1181–1186 (1991).
- Kumar, P. K. R.; Sankar, K. U., and Lonsane, B. K., "Supercritical fluid extraction from dry mouldy bran for the purification of gibberellic acid from the concomitant products produced during solid state fermentation," *Biochem. Eng. J.*, 46(2), B53–B58 (1991).
- Miller, D. A.; Blanch, H. W., and Prausnitz, J. M., "Enzyme-catalyzed interesterification of triglycerides in supercritical carbon dioxide," *Ind. Eng. Chem. Res.*, 30(5), 939–946 (1991).
- Shaw, R. W., et al., "Supercritical water: A medium for chemistry," *Chem. Eng. News*, pp. 26–39 (December 23, 1991).
- Shishido, M., et al., "The gasification reactivity of residual coal chars from supercritical fluid extraction of coal," *Fuel*, 70(4), 539–545 (1991).
- Shishido, M.; Mashiko, T., and Arai, K., "Co-solvent effect of tetralin or ethanol on supercritical toluene extraction of coal," *Fuel*, 70(4), 545–550 (1991).

- Srinivasan, M. P.; Smith, J. M., and McCoy, B. J., "Ethyl acetate desorption from activated carbon with supercritical carbon dioxide: Effect of initial loading," *Chem. Eng. Sci.*, **46**(1), 371–375 (1991).
- Stolarski, M., and Szczygiel, J., "Supercritical gas extraction of Polish brown coals," *Fuel*, **70**(12), 1421–1426 (1991).
- Tan, C. S.; Chen, B. S., and Wong, C. W., "Separation of toluene–trichlorotrinitrobenzene mixture with carbon dioxide at elevated pressures," *Sep. Sci. Technol.*, **26**(9), 1245–1256 (1991).
- Unterreiner, J. M.; McHugh, M. A., and Krukonis, V. J., "Breaking the trimethyl borate–methanol azeotrope with supercritical methane," *Ind. Eng. Chem. Res.*, **30**(4), 740–745 (1991).
- Wu, B. C.; Klein, M. T., and Sandler, S. I., "Solvent effects on reactions in supercritical fluids," *Ind. Eng. Chem. Res.*, **30**(5), 822–828 (1991).
- Wu, Y. Y.; Wong, D. S. H., and Tan, C. S., "Thermodynamic model for the adsorption of toluene from supercritical carbon dioxide on activated carbon," *Ind. Eng. Chem. Res.*, **30**(11), 2492–2496 (1991).
- Yokota, K., and Fujimoto, K., "Supercritical-phase Fischer–Tropsch synthesis reaction: The effective diffusion of reactant and products in the supercritical-phase reaction," *Ind. Eng. Chem. Res.*, **30**(1), 95–100 (1991).
- Yokota, K.; Hanakata, Y., and Fujimoto, K., "Supercritical phase Fischer–Tropsch synthesis reaction: Extraction capability of supercritical fluids," *Fuel*, **70**(8), 989–994 (1991).
- Yun, S. L. J., et al., "Solubility of cholesterol in supercritical carbon dioxide," *Ind. Eng. Chem. Res.*, **30**(11), 2476–2482 (1991).

REFERENCES

1. M. S. Ray, "Distillation (1980–1990): A Bibliography," *Sep. Sci. Technol.*, **27**(1), 105–128 (1992).
2. M. S. Ray, *The Chemical Engineering Complete Annual Bibliography (1991)*, Chemical Engineering Department, Curtin University, Western Australia, 1992.

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