

This article was downloaded by:

On: 25 January 2011

Access details: *Access Details: Free Access*

Publisher *Taylor & Francis*

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Separation Science and Technology

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713708471>

Equilibrium-Staged Separations: A Bibliography Update (2001)

Martyn S. Ray^a

^a Department of Chemical Engineering, Curtin University of Technology, Perth, Western Australia, Australia

Online publication date: 19 March 2003

To cite this Article Ray, Martyn S.(2003) 'Equilibrium-Staged Separations: A Bibliography Update (2001)', Separation Science and Technology, 38: 6, 1437 – 1461

To link to this Article: DOI: 10.1081/SS-120018819

URL: <http://dx.doi.org/10.1081/SS-120018819>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.



SEPARATION SCIENCE AND TECHNOLOGY
Vol. 38, No. 6, pp. 1437–1461, 2003

Equilibrium-Staged Separations: A Bibliography Update (2001)

Martyn S. Ray*

Department of Chemical Engineering, Curtin University of Technology,
Perth, Western Australia

ABSTRACT

This article continues a series of annual bibliographic updates of the published literature (since 1980) on distillation and other equilibrium-staged separation processes.^[1–10] This article provides a useful and quick reference source to the 2001 journal literature (from the 50 most important chemical engineering journals) for researchers in this area. The following topics are included: Distillation Theory and Design Methods, Distillation Control and Applications, Column Design Data, Absorption Reactions and Absorber Design, Cooling Towers, Liquid–Liquid Extraction, and Supercritical Extraction.

A complete bibliographic listing of the chemical engineering journal literature from 1959 to 2001 (with subsequent updates every six months) is available on a CD-ROM database.^[11]

*Correspondence: Martyn S. Ray, Department of Chemical Engineering, Curtin University of Technology, GPO Box U1987, Perth 6845, Western Australia; E-mail: M.Ray@exchange.curtin.edu.au.



Distillation Theory and Design Methods

- Agrawal, R. Multicomponent distillation columns with partitions and multiple reboilers and condensers. *Ind. Eng. Chem. Res.* **2001**, *40* (20), 4258–4266.
- Amminudin, K.A.; Smith, R. Design and optimization of fully thermally coupled distillation columns: application of dividing wall columns in retrofit. *Chem. Eng. Res. Des.* **2001**, *79* (7), 716–724.
- Amminudin, K.A.; Smith, R.; Thong, D.Y.C. Design and optimization of fully thermally coupled distillation columns: preliminary design and optimization methodology. *Chem. Eng. Res. Des.* **2001**, *79* (7), 701–715.
- Attarakih, M.; Fara, D.A.; Sayed, S. Dynamic modeling of a packed-bed glycerol–water distillation column. *Ind. Eng. Chem. Res.* **2001**, *40* (22), 4857–4865.
- Bagajewicz, M.; Ji, S. Rigorous procedure for the design of conventional atmospheric crude fractionation units: targeting. *Ind. Eng. Chem. Res.* **2001**, *40* (2), 617–626.
- Bagajewicz, M.; Soto, J. Rigorous procedure for the design of conventional atmospheric crude fractionation units: heat exchanger network. *Ind. Eng. Chem. Res.* **2001**, *40* (2), 627–634.
- Becker, H.; Godorr, S.; Kreis, H. Partitioned distillation columns: why, when and how? *Chem. Eng. (N.Y.)* **2001**, *108* (1), 68–74.
- Fidkwoski, Z.T.; Agrawal, R. Multicomponent thermally coupled systems of distillation columns at minimum reflux. *AIChE J.* **2001**, *47* (12), 2713–2724.
- Furzer, I.A. Froth heights on dual-flow trays with a heterogeneous binary azeotropic system and a heterogeneous ternary system with a homogeneous azeotrope. *Ind. Eng. Chem. Res.* **2001**, *40* (22), 4951–4966.
- Gaubert, M.A.; Gerbaud, V.; Joulia, X. Analysis and multiple steady states of an industrial heterogeneous azeotropic distillation. *Ind. Eng. Chem. Res.* **2001**, *40* (13), 2914–2924.
- Hayes, D.G.; Van Alstine, J.; Asplund, A.L. Triangular phase diagrams to predict the fractionation of free fatty acid mixtures via urea complex formation. *Sep. Sci. Technol.* **2001**, *36* (1), 45–58.
- Ilme, J.; Klemola, K.; Aittamaa, J. Calculating distillation efficiencies of multicomponent i-butane/n-butane column. *Chem. Eng. Commun.* **2001**, *184*, 1–21.
- Ishii, Y.; Otto, F.D. An efficient simultaneous correction procedure for multicomponent, multistage separation calculations for non-ideal systems. *Comput. Chem. Eng.* **2001**, *25* (9), 1285–1298.

**Equilibrium-Staged Separations****1439**

- Ivonne, R.D.; Vincent, G.; Xavier, J. Heterogeneous entrainer selection for the separation of azeotropic and close boiling temperature mixtures by heterogeneous batch distillation. *Ind. Eng. Chem. Res.* **2001**, *40* (22), 4935–4950.
- Lee, J.W.; Hauan, S.; Westerberg, A.W. Feasibility of a reactive distillation column with ternary mixtures. *Ind. Eng. Chem. Res.* **2001**, *40* (12), 2714–2728.
- Monroy-Loperena, R. A fast method to check steady-state input multiplicities in vapor–liquid flash separation. *Ind. Eng. Chem. Res.* **2001**, *40* (16), 3664–3669.
- Monroy-Loperena, R. Efficient, robust, and reliable single-stage vapor–liquid flash calculations. *Ind. Eng. Chem. Res.* **2001**, *40* (17), 3792–3800.
- Monroy-Loperena, R.; Vargas-Villamil, F.D. Determination of the polynomial defining Underwood's equations in short-cut distillation design. *Ind. Eng. Chem. Res.* **2001**, *40* (24), 5810–5814.
- Pelkonen, S.; Gorak, A.; Ohligschläger, A. Experimental study on multicomponent distillation in packed columns. *Chem. Eng. Process.* **2001**, *40* (3), 235–243.
- Petlyuk, F.B.; Danilov, R.Y. Theory of distillation trajectory bundles and its application to the optimal design of separation units: distillation trajectory bundles at finite reflux. *Chem. Eng. Res. Des.* **2001**, *79* (7), 733–746.
- Porter, K.E. Developments in distillation and separation technology (review). *AIChE J.* **2001**, *47* (5), 1060–1066.
- Rodriguez-Donis, I.; Gerbaud, V.; Joulia, X. Entrainer selection rules for the separation of azeotropic and close-boiling-temperature mixtures by homogeneous batch distillation process. *Ind. Eng. Chem. Res.* **2001**, *40* (12), 2729–2741.
- Ryan, J.M. Replotting the McCabe-Thiele diagram. *Chem. Eng. (N.Y.)* **2001**, *108* (5), 109–113.
- Thong, D.Y.C.; Jobson, M. Multicomponent homogeneous azeotropic distillation: column design. *Chem. Eng. Sci.* **2001**, *56* (14), 4393–4416.
- Zamprogna, E.; Barolo, M.; Seborg, D.E. Composition estimations in a middle-vessel batch distillation column using artificial neural networks. *Chem. Eng. Res. Des.* **2001**, *79* (6), 689–696.

Distillation Control and Applications

- Ahon, V.R.; de Medeiros, J.L. Optimal programming of ideal and extractive batch distillation: single vessel operations. *Comput. Chem. Eng.* **2001**, *25* (7), 1115–1140.



- Al-Amer, A.M. Preliminary selection of polymeric entrainers for the azeotropic distillation of MTBE/methanol and ethanol/water mixtures using the UNIFAC group-contribution calculations method. *Sep. Sci. Technol.* **2001**, 36 (14), 3277–3285.
- Al-Elg, A.H.; Palazoglu, A. Modeling and control of a high-purity double-effect distillation column (correction). *Comput. Chem. Eng.* **2001**, 25 (7), 1155.
- Allen, S.G.; Schulman, D.; Lichwa, J. A comparison between hot liquid water and steam fractionation of corn fiber. *Ind. Eng. Chem. Res.* **2001**, 40 (13), 2934–2941.
- Barolo, M.; Cengio, P.D. Closed-loop optimal operation of batch distillation columns. *Comput. Chem. Eng.* **2001**, 25 (4), 561–569.
- Baur, R.; Taylor, R.; Krishna, R. Dynamic behaviour of reactive distillation tray columns described with a nonequilibrium cell model. *Chem. Eng. Sci.* **2001**, 56 (4), 1721–1729.
- Baur, R.; Taylor, R.; Krishna, R. Dynamic behaviour of reactive distillation columns described by a nonequilibrium stage model. *Chem. Eng. Sci.* **2001**, 56 (6), 2085–2102.
- Bausa, J.; Tsatsaronis, G. Reducing the energy demand of continuous distillation processes by optimal controlled forced periodic operation. *Comput. Chem. Eng.* **2001**, 25 (2), 359–370.
- Caballero, J.A.; Grossmann, I.E. Generalized disjunctive programming model for the optimal synthesis of thermally linked distillation columns. *Ind. Eng. Chem. Res.* **2001**, 40 (10), 2260–2274.
- Chadda, N.; Malone, M.F.; Doherty, M.F. Effect of chemical kinetics on feasible splits for reactive distillation. *AIChE J.* **2001**, 47 (3), 590–601.
- Cui, X.; Yang, Z.; Shao, H. Batch distillation in a column with a cold middle vessel for heat-sensitive compounds. *Ind. Eng. Chem. Res.* **2001**, 40 (3), 879–884.
- Eckert, E.; Vanek, T. Some aspects of rate-based modelling and simulation of three-phase distillation columns. *Comput. Chem. Eng.* **2001**, 25 (4), 603–612.
- Fasesan, S.O.; Taiwo, E.A. Separation of a ternary system in a packed distillation column. *Ind. Eng. Chem. Res.* **2001**, 40 (1), 314–318.
- Furzer, I.A. Critical distillation experiments in a region near the homogeneous ternary azeotrope in the system ethyl acetate–ethanol–water. *Ind. Eng. Chem. Res.* **2001**, 40 (3), 990–992.
- Giessler, S.; Danilov, R.Y.; Pisarenko, R.Y. Systematic structure generation for reactive distillation processes. *Comput. Chem. Eng.* **2001**, 25 (1), 49–60.



Equilibrium-Staged Separations

1441

- Gorak, A.; Hoffmann, A. Catalytic distillation in structured packings: methyl acetate synthesis. *AIChE J.* **2001**, *47* (5), 1067–1076.
- Gray, M.R.; Le, T.; McCaffrey, W.C. Coupling of mass transfer and reaction in coking of thin films of an Athabasca vacuum residue. *Ind. Eng. Chem. Res.* **2001**, *40* (15), 3317–3324.
- Han, M.; Park, S. Profile position control of batch distillation based on a nonlinear wave model. *Ind. Eng. Chem. Res.* **2001**, *40* (19), 4111–4120.
- Hapoglu, H.; Karacan, S.; Koca, Z.S.E. Parametric and nonparametric model based control of a packed distillation column. *Chem. Eng. Process.* **2001**, *40* (6), 537–544.
- Hartman, E.L. Increase aromatics complex profitability. *Hydrocarbon Process.* **2001**, *80* (4), 97–100.
- Hou, K. Crude distillation unit online optimization. *Hydrocarbon Process.* **2001**, *80* (6), 69–74, 84.
- Jackson, J.R.; Grossmann, I.E. A disjunctive programming approach for the optimal design of reactive distillation columns. *Comput. Chem. Eng.* **2001**, *25* (11), 1661–1674.
- Jimenez, A.; Hernandez, S.; Montoy, F.A. Analysis of control properties of conventional and nonconventional distillation sequences. *Ind. Eng. Chem. Res.* **2001**, *40* (17), 3757–3761.
- Jimenez, L.; Wanhshafft, O.M.; Julka, V. Analysis of residue curve maps of reactive and extractive distillation units. *Comput. Chem. Eng.* **2001**, *25* (4), 635–642.
- Karacan, S.; Hapoglu, H.; Alpbaz, M. Application of optimal adaptive generalized predictive control to a packed distillation column. *Chem. Eng. J.* **2001**, *84* (3), 389–396.
- Kenig, E.Y.; Bader, H.; Gorak, A. Investigation of ethyl acetate reactive distillation process. *Chem. Eng. Sci.* **2001**, *56* (21), 6185–6193.
- Kibbey, T.C.G.; Pennell, K.D.; Hayes, K.F. Application of sieve-tray air strippers to the treatment of surfactant-containing wastewaters. *AIChE J.* **2001**, *47* (6), 1461–1470.
- Kim, Y.H. Structural design of extended fully thermally coupled distillation columns. *Ind. Eng. Chem. Res.* **2001**, *40* (11), 2460–2466.
- Lee, J.W.; Westerberg, A.W. Graphical design applied to MTBE and methyl acetate reactive distillation processes. *AIChE J.* **2001**, *47* (6), 1333–1345.
- Li, B. Steady-state online data reconciliation in a crude oil distillation unit. *Hydrocarbon Process.* **2001**, *80* (3), 61–64.
- Li, P.; Wozny, G. Tracking the predefined optimal policies for multiple-fraction batch distillation by using adaptive control. *Comput. Chem. Eng.* **2001**, *25* (1), 97–108.

- Liao, B.; Lei, Z.; Xu, Z. New process for separating propylene and propane by extractive distillation with aqueous acetonitrile. *Chem. Eng. J.* **2001**, *84* (3), 581–586.
- Liu, X.G.; Qian, J.X. Operational optimization of ideal internal thermally coupled distillation columns. *Dev. Chem. Eng. Mineral Process.* **2001**, *9* (1), 133–142.
- Lowe, K.; Wozny, G. A new strategy for product switchover and startup for a heat- and mass-integrated distillation system. *Chem. Eng. Process* **2001**, *40* (3), 295–302.
- Luo, H.P.; Xiao, W.D. A reactive distillation process for a cascade and azeotropic reaction system: carbonylation of ethanol with dimethyl carbonate. *Chem. Eng. Sci.* **2001**, *56* (2), 403–410.
- Manan, Z.A.; Banares-Alcantara, R. A new catalog of the most promising separation sequences for homogeneous azeotropic mixtures: systems without boundary crossing. *Ind. Eng. Chem. Res.* **2001**, *40* (24), 5795–5809.
- Mohl, K.D.; Kienle, A.; Sundmacher, K. A theoretical study of kinetic instabilities in catalytic distillation processes: influence of transport limitations inside the catalyst. *Chem. Eng. Sci.* **2001**, *56* (18), 5239–5254.
- Monroy-Loperena, R.; Alvarez-Ramirez, J. Dual composition control in a middle-vessel batch distillation column. *Ind. Eng. Chem. Res.* **2001**, *40* (20), 4377–4390.
- Nakaiwa, M.; Huang, K.; Naito, K. Parameter analysis and optimization of ideal heat integrated distillation columns. *Comput. Chem. Eng.* **2001**, *25* (4), 737–744.
- Noda, M.; Kato, A.; Chida, T. Optimal structure and on-line optimal operation of batch distillation column. *Comput. Chem. Eng.* **2001**, *25* (1), 109–118.
- Oisiovici, R.M.; Cruz, S.L. Inferential control of high-purity multicomponent batch distillation columns using an extended Kalman filter. *Ind. Eng. Chem. Res.* **2001**, *40* (12), 2628–2639.
- Okur, H.; Bayramoglu, M. The effect of the liquid-phase activity model on the simulation of ethyl acetate production by reactive distillation. *Ind. Eng. Chem. Res.* **2001**, *40* (16), 3639–3646.
- Parkinson, G. Hybrid distillation processes. *Chem. Eng. (N.Y.)* **2001**, *108* (11), 31–39.
- Phimister, J.R.; Seider, W.D. Bridge the gap with semicontinuous distillation. *Chem. Eng. Prog.* **2001**, *97* (8), 72–78.
- Popken, T.; Steinigeweg, S.; Gmehling, J. Synthesis and hydrolysis of methyl acetate by reactive distillation using structured catalytic packings: experiments and simulation. *Ind. Eng. Chem. Res.* **2001**, *40* (6), 1566–1574.



Equilibrium-Staged Separations

1443

- Rahimi, P.; Gentzis, T.; Taylor, E. The impact of cut point on the processability of Athabasca bitumen. *Fuel* **2001**, 80 (8), 1147–1154.
- Ramanathan, S.P.; Mukherjee, S.; Dahule, R.K. Optimization of continuous distillation columns using stochastic optimization approaches. *Chem. Eng. Res. Des.* **2001**, 79 (3), 310–322.
- Rao, D.P.; Goutami, C.V.; Jain, S. A direct method for incorporation of tray-efficiency matrix in simulation of multicomponent separation processes. *Comput. Chem. Eng.* **2001**, 25 (7), 1141–1152.
- Ravagnani, T.M.K.; Pereira, J.A.F.R. Three-phase fluidized distillation. *Can. J. Chem. Eng.* **2001**, 79 (6), 881–890.
- Rev, E.; Emtir, M.; Szitkai, Z. Energy savings of integrated and coupled distillation systems. *Comput. Chem. Eng.* **2001**, 25 (1), 119–140.
- Rodriguez, I.E.; Zheng, A.; Malone, M.F. The stability of a reactive flash. *Chem. Eng. Sci.* **2001**, 56 (16), 4737–4745.
- Rodriguez-Donis, I.; Pardillo-Fontdevila, E.; Gerbaud, V. Synthesis, experiments and simulation of heterogeneous batch distillation processes. *Comput. Chem. Eng.* **2001**, 25 (4), 799–806.
- Rong, B.G.; Kraslawski, A.; Nystrom, L. Design and synthesis of multicomponent thermally coupled distillation flowsheets. *Comput. Chem. Eng.* **2001**, 25 (4), 807–820.
- Ross, R.; Perkins, J.D.; Pistikopoulos, E.N. Optimal design and control of a high-purity industrial distillation system. *Comput. Chem. Eng.* **2001**, 25 (1), 141–150.
- Safonov, M.S.; Gorshkov, V.I.; Ivanov, V.A. Fractionation of 15N in countercurrent nitric acid–NO system at low temperature. *Sep. Sci. Technol.* **2001**, 36 (8), 1991–2026.
- Salomone, E.; Espinosa, J. Prediction of homogeneous azeotropes with interval analysis techniques exploiting topological considerations. *Ind. Eng. Chem. Res.* **2001**, 40 (6), 1580–1588.
- Schneider, R.; Noeres, C.; Kreul, L.U. Dynamic modeling and simulation of reactive batch distillation. *Comput. Chem. Eng.* **2001**, 25 (1), 169–176.
- Seferlis, P.; Grievink, J. Optimal design and sensitivity analysis of reactive distillation units using collocation models. *Ind. Eng. Chem. Res.* **2001**, 40 (7), 1673–1685.
- Serra, M.; Perrier, M.; Espuna, A. Analysis of different control possibilities for the divided wall column: feedback diagonal and dynamic matrix control. *Comput. Chem. Eng.* **2001**, 25 (4), 859–866.
- Sloley, A.W. Effectively control column pressure. *Chem. Eng. Prog.* **2001**, 97 (1), 38–48.
- Sloley, A.W. Improve tray operations. *Hydrocarbon Process.* **2001**, 80 (6), 85–86.



- Smejkal, Q.; Hanika, J.; Kolena, J. 2-Methylpropylacetate synthesis in a system of equilibrium reactor and reactive distillation column. *Chem. Eng. Sci.* **2001**, *56* (2), 365–370.
- Stichlmair, J.; Frey, T. Mixed-integer nonlinear programming optimization of reactive distillation processes. *Ind. Eng. Chem. Res.* **2001**, *40* (25), 5978–5982.
- Suelves, I.; Islas, C.A.; Herod, A.A. Comparison of fractionation methods for the structural characterization of petroleum residues. *Energy Fuels* **2001**, *15* (2), 429–437.
- Sun, R.; Tomkinson, J. Fractional separation and physico-chemical analysis of lignins from the black liquor of oil palm trunk fibre pulping. *Sep. Purif. Technol.* **2001**, *24* (3), 529–539.
- Thong, D.Y.C.; Jobson, M. Multicomponent homogeneous azeotropic distillation: assessing product feasibility. *Chem. Eng. Sci.* **2001**, *56* (14), 4369–4391.
- Thong, D.Y.C.; Jobson, M. Multicomponent homogeneous azeotropic distillation: column sequence. *Chem. Eng. Sci.* **2001**, *56* (14), 4417–4432.
- Tsouris, C.; Blankenship, K.D.; Dong, J. Enhancement of distillation efficiency by application of an electric field. *Ind. Eng. Chem. Res.* **2001**, *40* (17), 3843–3847.
- Tuchlenski, A.; Beckmann, A.; Reusch, D. Reactive distillation: industrial applications, process design and scale-up. *Chem. Eng. Sci.* **2001**, *56* (2), 387–394.
- Tyner, K.H.; Westerberg, A.W. Multiperiod design of azeotropic separation systems: an agent based solution. *Comput. Chem. Eng.* **2001**, *25* (9), 1267–1284.
- Tyner, K.H.; Westerberg, A.W. Multiperiod design of azeotropic separation systems: approximate models. *Comput. Chem. Eng.* **2001**, *25* (11), 1569–1584.
- Venkateswarlu, C.; Avantika, S. Optimal state estimation of multicomponent batch distillation. *Chem. Eng. Sci.* **2001**, *56* (20), 5771–5786.
- Vora, N.; Daoutidis, P. Dynamics and control of an ethyl acetate reactive distillation column. *Ind. Eng. Chem. Res.* **2001**, *40* (3), 833–849.
- Zheng, Y.; Ng, F.T.T.; Rempel, G.L. Catalytic distillation: a three-phase nonequilibrium model for the simulation of the aldol condensation of acetone. *Ind. Eng. Chem. Res.* **2001**, *40* (23), 5342–5349.
- Zhu, G.Y.; Henson, M.A.; Megan, L. Low-order dynamic modeling of cryogenic distillation columns based on nonlinear wave phenomenon. *Sep. Purif. Technol.* **2001**, *24* (3), 467–487.



Column Design Data

- Barletta, T. Diagnose flooding columns efficiently. *Hydrocarbon Process.* **2001**, *80* (7), 71–75.
- Basu, S. Wall effect in laminar flow of non-Newtonian fluid through a packed bed. *Chem. Eng.* **2001**, *81* (1), 323–329.
- Bravo, J.L.; Seibert, A.F.; Fair J.R. The effects of free water on the performance of packed towers in vacuum service. *Ind. Eng. Chem. Res.* **2001**, *40* (26), 6181–6184.
- Brunazzi, E.; Paglianti, A.; Pintus, S. A capacitance probe and a new model to identify and predict the capacity of columns equipped with structured packings. *Ind. Eng. Chem. Res.* **2001**, *40* (4), 1205–1212.
- Chen, D.; Fei, W.; Pratt, H.R.C. Impacts of packing section on mass transfer to drop swarms. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 167–180.
- Eisfeld, B.; Schnitzlein, K. The influence of confining walls on the pressure drop in packed beds. *Chem. Eng. Sci.* **2001**, *56* (14), 4321–4329.
- Erasmus, A.B.; Nieuwoudt, I. Mass transfer in structured packing: a wetted-wall study. *Ind. Eng. Chem. Res.* **2001**, *40* (10), 2310–2321.
- Fourar, M.; Lenormand, R.; Larachi, F. Extending the F-function concept to two-phase flow in trickle beds. *Chem. Eng. Sci.* **2001**, *56* (21), 5987–5994.
- Garrouch, A.A.; Ali, L.; Qasem, F. Using diffusion and electrical measurements to assess tortuosity of porous media. *Ind. Eng. Chem. Res.* **2001**, *40* (20), 4363–4369.
- Iliuta, I.; Larachi, F. Mechanistic model for structured-packing-containing columns: irrigated pressure drop, liquid holdup, and packing fractional wetted area. *Ind. Eng. Chem. Res.* **2001**, *40* (23), 5140–5146.
- Kister, H.Z. Troubleshoot tower chimney-trays effectively. *Hydrocarbon Process.* **2001**, *80* (4), 101–107.
- Kolev, N.; Razkazova-Velkova, E. A new column packing for operation at extremely low liquid loads. *Chem. Eng. Process.* **2001**, *40* (5), 471–476.
- Kozicki, W. Viscoelastic flow in packed beds or porous media. *Can. J. Chem. Eng.* **2001**, *79* (1), 124–131.
- Linek, V.; Moucha, T.; Rejl, F.J. Hydraulic and mass transfer characteristics of packings for absorption and distillation columns: Rauschert-Metall-Sattel-Rings. *Chem. Eng. Res. Des.* **2001**, *79* (7), 725–732.
- Marchot, P.; Toye, D.; Pelsser, A.M. Liquid distribution images on structured packing by X-ray computed tomography. *AIChE J.* **2001**, *47* (6), 1471–1476.
- Mariani, N.J.; Martnez, O.M.; Barreto, G.F. Evaluation of heat transfer parameters in packed beds with cocurrent downflow of liquid and gas. *Chem. Eng. Sci.* **2001**, *56* (21), 5995–6001.



- Mijangos, F.; Varona, F.; Lombrana, J.I. Pressure drop changes during dissolution of pyrite cinder in a fixed bed. *Powder Technol.* **2001**, *115* (1), 75–83.
- Montillet, A.; Le Coq, L. Characteristics of fixed beds packed with anisotropic particles: use of image analysis. *Powder Technol.* **2001**, *121* (2), 138–148.
- Olujic, Z.; Jansen, H.; Kaibel, B. Stretching the capacity of structured packings. *Ind. Eng. Chem. Res.* **2001**, *40* (26), 6172–6180.
- Piche, S.; Iliuta, I.; Grandjean, B.P.A. A unified approach to the hydraulics and mass transfer in randomly packed towers. *Chem. Eng. Sci.* **2001**, *56* (21), 6003–6013.
- Piche, S.; Larachi, F.; Grandjean, B.P.A. Improved liquid hold-up correlation for randomly packed towers. *Chem. Eng. Res. Des.* **2001**, *79* (1), 71–80.
- Piche, S.; Larachi, F.; Grandjean, B.P.A. Flooding capacity in packed towers: database, correlations, and analysis. *Ind. Eng. Chem. Res.* **2001**, *40* (1), 476–487.
- Predojevic, Z.J.; Petrovic, D.L.; Dudukovic, A.P. Pressure drop in a countercurrent gas-flowing solids-packed bed contactor. *Ind. Eng. Chem. Res.* **2001**, *40* (25), 6039–6043.
- Rangel, N.; Santos, A.; Pinho, C. Pressure drop in packed shallow beds of cylindrical cork stoppers. *Chem. Eng. Res. Des.* **2001**, *79* (5), 547–552.
- Schnitzlein, K. Modelling radial dispersion in terms of the local structure of packed beds. *Chem. Eng. Sci.* **2001**, *56* (2), 579–585.
- Sederman, A.J.; Alexander, P.; Gladden, L.F. Structure of packed beds probed by magnetic resonance imaging. *Powder Technol.* **2001**, *117* (3), 255–269.
- Senol, A. Mass transfer efficiency of randomly-packed column: modeling considerations. *Chem. Eng. Process.* **2001**, *40* (1), 41–48.
- Tobis, J. Turbulent resistance of complex bed structures. *Chem. Eng. Commun.* **2001**, *184*, 71–88.
- Wang, Z.; Afacan, A.; Nandakumar, K. Porosity distribution in random packed columns by gamma ray tomography. *Chem. Eng. Process* **2001**, *40* (3), 209–219.
- Wen, X.; Shu, Y.; Nandakumar, K. Predicting liquid flow profile in randomly packed beds from computer simulation. *AIChE J.* **2001**, *47* (8), 1770–1779.
- Woerlee, G.F.; Berends, J. A capacity model for vertical pipes and packed columns based on entrainment. *Chem. Eng. J.* **2001**, *84* (3), 355–366.
- Woerlee, G.F.; Berends, J.; Olujic, Z. A comprehensive model for the pressure drop in vertical pipes and packed columns. *Chem. Eng. J.* **2001**, *84* (3), 367–380.



Absorption Reactions and Absorber Design

- Abdi, M.A. Improve containment control in amine systems. *Hydrocarbon Process.* **2001**, 80 (10), 102C–102H.
- Aliouche, D.; Ait-Amar, H.; Lahfati, K. Experimental determination and liquid absorption capacities interpretation of biotextiles with complex absorbent structure: influence of superabsorptive gel polymer. *Chem. Eng. J.* **2001**, 81 (1), 317–322.
- Anon. Low-temperature NO_x absorption wins top prize. *Chem. Eng. (N.Y.)* **2001**, 108 (11), 92–93.
- Aroonwilas, A.; Tontiwachwuthikul, P.; Chakma, A. Effects of operating and design parameters on carbon dioxide absorption in columns with structured packings. *Sep. Purif. Technol.* **2001**, 24 (3), 403–411.
- Ayres, D.; Caldas, M.; Semiao, V. Prediction of the droplet size and velocity joint distribution for sprays. *Fuel* **2001**, 80 (3), 383–394.
- Baird, M.H.I.; Nirdosh, I. Low-cost experiments in mass transfer: absorption of carbon dioxide from a single bubble. *Chem. Eng. Educ.* **2001**, 35 (3), 198–201.
- Boyadjiev, C. On the mechanism and kinetics of the transport processes in systems with intensive interphase mass transfer: comparative analysis of the absorption and desorption rates. *Int. J. Heat Mass Transfer* **2001**, 44 (6), 1119–1125.
- Brown, C.A.; Hohne, P.A. Eliminating a sulfuric acid mist plume from a wet caustic scrubber on a petroleum coke calciner. *Environ. Prog.* **2001**, 20 (3), 182–186.
- Cents, A.H.G.; Brilman, D.W.F.; Versteeg, G.F. Gas absorption in an agitated gas–liquid–liquid system. *Chem. Eng. Sci.* **2001**, 56 (3), 1075–1083.
- Dagaonkar, M.V.; Beenackers, A.A.C.M.; Pangarkar, V.G. Enhancement of gas–liquid mass transfer by small reactive particles at realistically high mass transfer coefficients: absorption of SO₂ into aqueous slurries of Ca(OH)₂ and Mg(OH)₂ particles. *Chem. Eng. J.* **2001**, 81 (1), 203–212.
- de Montigny, D.; Tontiwachwuthikul, P.; Chakma, A. Parametric studies of carbon dioxide absorption into highly concentrated monoethanolamine solutions. *Can. J. Chem. Eng.* **2001**, 79 (1), 137–142.
- Ferreira, E.C.; Salcedo, R. A tool to optimize VOC removal during absorption and stripping. *Chem. Eng. (N.Y.)* **2001**, 108 (1), 94–98.
- Gunaseelan, P.; Wankat, P.C. Failure modes in concentrated absorbers during the transition to standby operation. *Ind. Eng. Chem. Res.* **2001**, 40 (3), 850–853.
- Guo, G.; Thompson, K.E. Experimental analysis of local mass transfer in packed beds. *Chem. Eng. Sci.* **2001**, 56 (1), 121–132.

- Huang, J.; Chen, L.; Yang, C.L. Absorption of hydrogen sulfide in NaOCl caustic aqueous solution. *Environ. Prog.* **2001**, *20* (3), 175–181.
- Kenig, E.Y.; Schneider, R.; Gorak, A. Reactive absorption: optimal process design via optimal modelling. *Chem. Eng. Sci.* **2001**, *56* (2), 343–350.
- Lee, J.Y.; Khang, S.J.; Tseng, C.H. The effects of pulsed corona discharge on sulfur dioxide absorption into water. *Ind. Eng. Chem. Res.* **2001**, *40* (24), 5822–5830.
- Liu, S. A continuum model for gas–liquid flow in packed towers. *Chem. Eng. Sci.* **2001**, *56* (21), 5945–5953.
- Mandal, B.P.; Guha, M.; Biswas, A.K. Removal of carbon dioxide by absorption in mixed amines: modelling of absorption in aqueous MDEA/MEA and AMP/MEA solutions. *Chem. Eng. Sci.* **2001**, *56* (21), 6217–6224.
- Marki, E.; Lenti, B.; Vatai, G. Clean technology for acetone absorption and recovery. *Sep. Purif. Technol.* **2001**, *21* (1–3), 377–382.
- Negny, S.; Meyer, M.; Prevost, M. Enhancement of absorption efficiency for a laminar film flow by hydrodynamic conditions generated by a new type of column wall. *Chem. Eng. J.* **2001**, *83* (1), 7–13.
- Nemec, D.; Bercic, G.; Levec, J. The hydrodynamics of trickling flow in packed beds operating at high pressures: the relative permeability concept. *Chem. Eng. Sci.* **2001**, *56* (21), 5955–5962.
- Oliveira, M.S.N.; Ni, X. Gas hold-up and bubble diameters in a gassed oscillatory baffled column. *Chem. Eng. Sci.* **2001**, *56* (21), 6143–6148.
- Panthaky, M.A.; Hudgins, R.R.; Silveston, P.L. Trickle-bed scrubbing of flue gas sulphur dioxide using non-aqueous solvents. *Can. J. Chem. Eng.* **2001**, *79* (5), 765–770.
- Piche, S.R.; Larachi, F.; Grandjean, B.P.A. Improving the prediction of irrigated pressure drop in packed absorption towers. *Can. J. Chem. Eng.* **2001**, *79* (4), 584–594.
- Saboni, A.; Alexandrova, S. Sulfur dioxide absorption and desorption by water drops. *Chem. Eng. J.* **2001**, *84* (3), 577–580.
- Schubert, S.; Grunewald, M.; Agar, D.W. Enhancement of carbon dioxide absorption into aqueous methyldiethanolamine using immobilised activators. *Chem. Eng. Sci.* **2001**, *56* (21), 6211–6216.
- Sovani, S.D.; Chou, E.; Sojka, P.E. High pressure effervescent atomization: effect of ambient pressure on spray cone angle. *Fuel* **2001**, *80* (3), 427–435.
- Srivastava, R.K.; Jozewicz, W.; Singer, C. Sulfur dioxide scrubbing technologies: a review. *Environ. Prog.* **2001**, *20* (4), 219–228.
- Stockfleth, R.; Brunner, G.; Holdup, pressure drop, and flooding in packed countercurrent columns for the gas extraction. *Ind. Eng. Chem. Res.* **2001**, *40* (1), 347–356.

**Equilibrium-Staged Separations****1449**

- Sweeney, A.J.; Liu, Y.A. Use of simulation to optimize NO_x abatement by absorption and selective catalytic reduction. *Ind. Eng. Chem. Res.* **2001**, *40* (12), 2618–2627.
- Tang, J.; Dang, J.; Dai, X. Kinetic model for absorption of carbon dioxide into ammoniated aqueous solutions of sodium sulfate. *Ind. Eng. Chem. Res.* **2001**, *40* (2), 674–680.
- Tsuda, H.; Perez-Blanco, H. An experimental study of a vibrating screen as means of absorption enhancement. *Int. J. Heat Mass Transfer* **2001**, *44* (21), 4087–4094.
- Veawab, A.; Tontiwachwuthikul, P.; Chakma, A. Investigation of low-toxic organic corrosion inhibitors for carbon dioxide separation process using aqueous MEA solvent. *Ind. Eng. Chem. Res.* **2001**, *40* (22), 4771–4777.
- Vorbach, M.; Marr, R.; Siebenhofer, M. Redox-absorption of sulfur dioxide. *Sep. Sci. Technol.* **2001**, *36* (5), 1041–1052.
- Wu, H.; Chung, T.W.; Lai, M.H. Effects of Marangoni convection on the mass transfer performance in a packed-bed absorber. *Ind. Eng. Chem. Res.* **2001**, *40* (3), 885–891.
- Yang, R.; Jou, T.M. The effect of non-absorbable gas on an absorption process for the falling film flow inside a porous medium. *Int. J. Heat Mass Transfer* **2001**, *44* (6), 1259–1266.
- Yeh, J.T.; Pennline, H.W.; Resnik, K.P. Study of carbon dioxide absorption and desorption in a packed column. *Energy Fuels* **2001**, *15* (2), 274–278.
- Zhang, X.; Zhang, C.F.; Qin, S.J. A kinetics study on the absorption of carbon dioxide into a mixed aqueous solution of methyldiethanolamine and piperazine. *Ind. Eng. Chem. Res.* **2001**, *40* (17), 3785–3791.
- Zhang, X.; Zhang, C.F.; Xu, G.W. An experimental apparatus to mimic carbon dioxide removal and optimum concentration of MDEA aqueous solution. *Ind. Eng. Chem. Res.* **2001**, *40* (3), 898–901.

Cooling Towers

- Hile, A.C.; Lai, L.; Kolmetz, K. Monitor cooling towers for environmental compliance. *Chem. Eng. Prog.* **2001**, *97* (3), 37–41.
- Hoots, J.E.; Johnson, D.A.; Lammering, J.D. Operate cooling towers correctly at high cycles of concentration. *Chem. Eng. Prog.* **2001**, *97* (3), 30–36.
- Iyuke, S.E.; Mohamad, A.B.; Daud, W.R.W. Estimation of humidification load from humidifier column by convective heat transfer in water–air–vapour system. *Chem. Eng. Sci.* **2001**, *56* (16), 4949–4956.
- Makkinejad, N. Temperature profile in countercurrent/cocurrent spray towers. *Int. J. Heat Mass Transfer* **2001**, *44* (2), 429–442.
- Silverberg, P. Wet versus dry cooling. *Chem. Eng. (N.Y.)* **2001**, *108* (4), 52.



Liquid-Liquid Extraction

- Agble, D.; Mendes-Tatsis, M.A. The prediction of Marangoni convection in binary liquid-liquid systems with added surfactants. *Int. J. Heat Mass Transfer* **2001**, *44* (7), 1439-1449.
- Agrawal, Y.K.; Menon, S.K.; Sudhakar, S. Solvent extraction and separation of yttrium with dibenzo-18-crown-6. *Sep. Purif. Technol.* **2001**, *24* (1), 197-203.
- Akl, M.A.; Kabil, M.A.; Abdallah, A.M. Use of eriochrome cyanine R for separation-flotation and micro-determination of hafnium and zirconium in real samples. *Sep. Sci. Technol.* **2001**, *36* (12), 2747-2760.
- Alguacil, F.J.; Martinez, S. Solvent extraction of Zn(II) by Cyanex 923 and its application to a solid-supported liquid membrane system. *J. Chem. Technol. Biotechnol.* **2001**, *76* (3), 298-302.
- Alonso, A.I.; Lassahn, A.; Gruhn, G. Optimal design of non-dispersive solvent extraction processes. *Comput. Chem. Eng.* **2001**, *25* (2), 267-285.
- Andreev, B.M. Separation of hydrogen isotopes in water-hydrogen sulfide system. *Sep. Sci. Technol.* **2001**, *36* (8), 1949-1990.
- Avila-Rodriguez, M.; Barron-Zambrano, J.; Navarro, R. Thermodynamic study of liquid-liquid extraction of arsenic(V) by NMPL from sulfuric acid medium. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 457-472.
- Baes, C.F. Modeling solvent extraction systems with SXFIT. *Solvent Extr. Ion Exch.* **2001**, *19* (2), 193-214.
- Baudot, A.; Floury, J.; Smorenburg, H.E. Liquid-liquid extraction of aroma compounds with hollow fiber contactor. *AIChE J.* **2001**, *47* (8), 1780-1793.
- Berends, A.M.; Witkamp, G.J. Removal of aluminum from pickling bath liquids by tertiary and quaternary amine extractants. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 473-490.
- Berman, Y.; Tamir, A. A new effective combination of a thin-film extractor and gravity settler. *Can. J. Chem. Eng.* **2001**, *79* (3), 305-313.
- Berthon, L.; Morel, J.M.; Zorz, N. DIAMEX process for minor actinide partitioning: hydrolytic and radiolytic degradations of malonamide extractants. *Sep. Sci. Technol.* **2001**, *36* (5), 709-728.
- Briceno, M.; Salager, J.L.; Bertrand, J. Influence of dispersed phase content and viscosity on the mixing of concentrated oil-in-water emulsions in the transition flow regime. *Chem. Eng. Res. Des.* **2001**, *79* (8), 943-948.
- Brodkorb, M.J.; Slater, M.J. Multicomponent and contamination effects on mass transfer in a liquid-liquid extraction rotating disc contactor. *Chem. Eng. Res. Des.* **2001**, *79* (3), 335-346.



Equilibrium-Staged Separations

1451

- Buch, A.; Pareau, D.; Stambouli, M. Solvent extraction of nickel(II) by 2-ethylhexanal oxime from various aqueous solutions. *Solvent Extr. Ion Exch.* **2001**, *19* (2), 277–300.
- Cameron, T.; Husson, S.M. Recovery of amino acids from aqueous solution by reversible complexation with mixed organic extractants. *Sep. Sci. Technol.* **2001**, *36* (5), 849–866.
- Camirand, M.; Jahoda, M.; Hornof, V. Effect of gravity forces on oil recovery in a Hele-Shaw cell. *Can. J. Chem. Eng.* **2001**, *79* (1), 161–163.
- Chiarizia, R.; Barrans, R.E.; Ferraro, J.R. Aggregation of dialkyl-substituted diphosphonic acids and its effect on metal ion extraction. *Sep. Sci. Technol.* **2001**, *36* (5), 687–708.
- Chiarizia, R.; McAlister, D.R.; Herlinger, A.W. Solvent extraction by dialkyl-substituted diphosphonic acids in a depolymerizing diluent: alkaline earth cations. *Solvent Extr. Ion Exch.* **2001**, *19* (2), 261–276.
- Chiarizia, R.; McAlister, D.R.; Herlinger, A.W. Solvent extraction by dialkyl-substituted diphosphonic acids in a depolymerizing diluent: Fe(III) and actinide ions. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 415–440.
- Cichy, W.; Schlosser, S.; Szymanowski, J. Recovery of phenol with Cyanex-923 in membrane extraction–stripping systems. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 905–924.
- Cierpiszewski, R.; Szymanowski, J. Copper extraction from chloride solution by solvating and chelating extractants. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 441–456.
- de Preez, J.G.H.; Gerber, T.I.A.; Edge, W. Nitrogen reagents in metal ion separation: the synthesis and extraction behavior of a new NS imidazole derivative. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 143–154.
- Deep, A.; Malik, P.; Gupta, B. Extraction and separation of Ti(IV) using thiophosphinic acids and its recovery from ilmenite and red mud. *Sep. Sci. Technol.* **2001**, *36* (4), 671–685.
- Dehkordi, A.M. Novel type of impinging streams contactor for liquid–liquid extraction. *Ind. Eng. Chem. Res.* **2001**, *40* (2), 681–688.
- Dehkordi, A.M.; Kaghazchi, T.; Sohrabi, M. Application of an air-operated two impinging streams extractor in liquid–liquid extraction and comparison with other contactor types. *Can. J. Chem. Eng.* **2001**, *79* (2), 227–235.
- Dhami, P.S.; Chitnis, R.R.; Gopalakrishnan, V. Studies on the partitioning of actinides from high level waste using a mixture of HDEHP and CMPO as extractant. *Sep. Sci. Technol.* **2001**, *36* (2), 325–335.
- Duche, S.N.; Dhadke, P.M. Comparative study of the determination of platinum by extraction with Cyanex 923 and Cyanex 471X from bromide media. *J. Chem. Technol. Biotechnol.* **2001**, *76* (12), 1227–1234.

- Duchemin, C.R.; Engle, N.L.; Bonnesen, P.V. Solvatochromic solvent polarity measurements of alcohol solvent modifiers and correlation with cesium extraction strength. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 1037–1058.
- Dukov, I.L.; Jordanov, V.M.; Atanassova, M. Stoichiometry of the praseodymium complex extracted by a mixture of 1-phenyl-3-methyl-4-benzoyl-5-pyrazolone and Aliquat-336. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 619–628.
- Dyrkacz, G.R.; Bloomquist, C.A.A. Solvent extraction of separated macerals in carbon disulfide/N-methylpyrrolidone. *Energy Fuels* **2001**, *15* (6), 1403–1408.
- Dyrkacz, G.R.; Bloomquist, C.A.A. Binary solvent extractions of upper Freeport coal. *Energy Fuels* **2001**, *15* (6), 1409–1413.
- Ermakov, S.A.; Ermakov, A.A.; Chupakhin, O.N. Mass transfer with chemical reaction in conditions of spontaneous interfacial convection in processes of liquid extraction. *Chem. Eng. J.* **2001**, *84* (3), 321–324.
- Feng, X.; Song, C. The extraction and stripping behavior of heptavalent technetium with trialkyl phosphine oxide. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 51–60.
- Ferraro, J.R.; Borkowski, M.; Chiarizia, R.; McAlister, D.R. FT-IR spectroscopy of nitric acid in TBP/octane solution. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 981–992.
- Fiskum, S.K.; Rapko, B.M.; Lumetta, G.J. Partitioning of mercury from actinides in the TRUEX process. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 643–658.
- Fitch, A.W.; Ni, X.; Stewart, J. Characterisation of flexible baffles in an oscillatory baffled column. *J. Chem. Technol. Biotechnol.* **2001**, *76* (10), 1074–1079.
- Francis, T.; Meera, R.; Reddy, M.L.P. Extraction of mercury(II) with dicyclohexano-18-crown-6, and its application to industrial wastes. *Sep. Sci. Technol.* **2001**, *36* (10), 2341–2353.
- Francis, T.; Ramamohan, T.; Reddy, M.L. Liquid–liquid extraction of Hg(II) from acidic chloride solutions using bis-2-ethylhexyl sulfoxide. *J. Chem. Technol. Biotechnol.* **2001**, *76* (7), 737–742.
- Fujii, T.; Yamana, H.; Watanabe, M. Extraction of molybdenum from nitric acid by octyl(phenyl)-N,N-diisobutylcarbamoylmethyl-phosphine oxide. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 127–142.
- Godfrey, J.C.; Houlton, D.; Ramlochan, K.R.M. Single phase axial mixing in rotating disc contactors. *Chem. Eng. Res. Des.* **2001**, *79* (2), 156–162.
- Gomez-Siurana, A.; Ruiz-Bevia, F.; Fernandez-Sempere, J. Purification of phosphoric acid by extraction with 2-ethyl-1-hexanol: equilibrium data



Equilibrium-Staged Separations

1453

- and mass transfer coefficients. *Ind. Eng. Chem. Res.* **2001**, *40* (3), 892–897.
- Hamad, F.A.; Khan, M.K.; Pierscionek, B.K. Comparison of experimental results and numerical predictions of drop diameter from a single submerged nozzle in a liquid–liquid system. *Can. J. Chem. Eng.* **2001**, *79* (3), 322–328.
- Hilber, T.; Marr, R.; Siebenhofer, M. Solid/liquid extraction of zinc from EAF-dust. *Sep. Sci. Technol.* **2001**, *36* (5), 1323–1334.
- Hironaka, M.; Hirata, M.; Takanashi, H. Kinetics of lactic acid extraction with quaternary ammonium salt. *Sep. Sci. Technol.* **2001**, *36* (13), 2927–2944.
- Hu, X.; Tang, Z.; Zhu, Y. Separation of hydrocortisone and its stereoisomer from fermentation liquor by chloroform extraction process. *Sep. Sci. Technol.* **2001**, *36* (7), 1421–1436.
- Ilias, S.; Schimmel, K.A.; Nukunya, T. Stripping of Zn(II), Cu(II), Co(II), and Cd(II) from DEHPA using EDTA in a hollow-fiber membrane module. *Sep. Sci. Technol.* **2001**, *36* (5), 823–834.
- Ionova, G.; Ionov, S.; Rabbe, C. Mechanism of trivalent actinide/lanthanide separation using bis(2,4,4-trimethylpentyl) dithiophosphinic acid (Cyanex 301) and neutral o-bearing co-extractant synergistic mixtures. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 391–414.
- Iyer, J.N.; Dhadke, P.M. Liquid–liquid extraction and separation of gallium(III), indium(III), and thallium (III) by Cyanex-925. *Sep. Sci. Technol.* **2001**, *36* (12), 2773–2784.
- Jensen, M.P.; Chiarizia, R.; Urban, V. Investigation of the aggregation of the neodymium complexes of dialkylphosphoric, -oxothiophosphinic, and -dithiophosphinic acids in toluene. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 865–884.
- Juang, R.S.; Ju, H.S. Effect of added complexing agents on extraction of Cu(II) from sulfate solutions by di(2-ethylhexyl)-phosphoric acid. *Sep. Sci. Technol.* **2001**, *36* (11), 2499–2514.
- Kamil, M.; Bushra, A.; Ahmad, A. Minimum agitation speed for liquid–liquid–gas dispersion in mechanically agitated vessels. *Chem. Eng. Process.* **2001**, *40* (1), 49–57; *40* (3), 303–305.
- Katalnikov, S.G. Physico-chemical and engineering principles of boron isotopes separation by using BF₃-anisole.BF₃ system. *Sep. Sci. Technol.* **2001**, *36* (8), 1737–1768.
- Kislik, V. Application of preferential solvation concept for interpretation of mechanisms of acid solvent extraction by amines. *Sep. Sci. Technol.* **2001**, *36* (13), 2899–2926.
- Koladkar, D.V.; Dhadke, P.M. Cobalt–nickel separation: the extraction of cobalt(II) and nickel(II) with bis(2-ethylhexyl) phosphinic acid (PIA-8) in toluene. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 1059–1071.

- Kostoglou, M.; Karabelas, A.J. A contribution towards predicting the evolution of droplet size distribution in flowing dilute liquid/liquid dispersions. *Chem. Eng. Sci.* **2001**, *56* (14), 4283–4292.
- Kubota, F.; Shinohara, K.; Shimojo, K. Extraction of rare earth metals by calix[4]arene solubilized in AOT reversed micellar solution. *Sep. Purif. Technol.* **2001**, *24* (1), 93–100.
- Kumar, A.; Mohapatra, P.K.; Pathak, P.N. Extraction of Mo(VI) from nitric acid medium by di(octyl-phenyl) phosphoric acid. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 491–506.
- Kyser, E.A. Extraction of plutonium into 30% tributyl phosphate from nitric acid solutions containing fluoride, aluminum, and boron. *Sep. Sci. Technol.* **2001**, *36* (5), 729–742.
- Kyuchoukov, G.; Marinova, M.; Molinier, J. Extraction of lactic acid by means of a mixed extractant. *Ind. Eng. Chem. Res.* **2001**, *40* (23), 5635–5639.
- Law, J.D.; Herbst, R.S.; Todd, T.A. The universal solvent extraction (UNEX) process: flowsheet development and demonstration of UNEX process for separation of cesium, strontium, and actinides from actual acidic radioactive waste. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 23–36.
- Lee, M.J.; Wu, F.L.; Lin, H.M. Separation of closely boiling compounds of catechol and 4-methoxyphenol with the aid of 1,4-butanediol. *Ind. Eng. Chem. Res.* **2001**, *40* (21), 4596–4602.
- Legrand, J.; Morancas, P.; Carnelle, G. Liquid–liquid dispersion in an SMX-Sulzer static mixer. *Chem. Eng. Res. Des.* **2001**, *79* (8), 949–956.
- Leonard, R.A.; Conner, C.; Liberatore, M.W. Development of a solvent extraction process for cesium removal from SRS tank waste. *Sep. Sci. Technol.* **2001**, *36* (5), 743–766.
- Li, M.; Willauer, H.D.; Huddleston, J.G. Temperature effects on polymer-based aqueous biphasic extraction technology in the paper pulping process. *Sep. Sci. Technol.* **2001**, *36* (5), 835–848.
- Liao, W.; Yu, G.; Li, D. Solvent extraction of cerium(IV) and fluorine(I) from sulphuric acid leaching of bastnasite by Cyanex 923. *Solvent Extr. Ion Exch.* **2001**, *19* (2), 243–260.
- Liu, Y.S.; Dai, Y.Y. Distribution behavior of aminobenzoic acids by extraction with di(2-ethylhexyl) phosphoric acid and trioctylamine. *Sep. Sci. Technol.* **2001**, *36* (15), 3473–3486.
- Lozano, L.J.; Juan, D. Solvent extraction of polyvanadates from sulphate solutions by Primene 81R: its application to the recovery of vanadium from spent sulphuric acid catalysts leaching solutions. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 659–676.
- Luo, G.S.; Pan, S.; Liu, J.G. Liquid–liquid phase equilibrium under external electric fields. *Sep. Sci. Technol.* **2001**, *36* (12), 2799–2809.



Equilibrium-Staged Separations

1455

- Mathur, J.N.; Murali, M.S.; Nash, K.L. Actinide partitioning: a review. *Solvent Extr. Ion Exch.* **2001**, *19* (3), 357–390.
- Matsumoto, M.; Otono, T.; Kondo, K. Synergistic extraction of organic acids with tri-*n*-octylamine and tri-*n*-butylphosphate. *Sep. Purif. Technol.* **2001**, *24* (1), 337–342.
- McAlister, D.R.; Dietz, M.L.; Chiarizia, R. Metal ion extraction by silyl-substituted diphosphonic acids: P,P'-di[3-(trimethylsilyl)-1-propylene] methylene- and ethylene-diphosphonic acids. *Sep. Sci. Technol.* **2001**, *36* (16), 3541–3562.
- McMorris, J.; Husson, S.M. Gas antisolvent-induced regeneration of lactic acid-laden extractants. *Sep. Sci. Technol.* **2001**, *36* (5), 1129–1148.
- Meikrantz, D.H.; Meikrantz, S.B.; Macaluso, L.L. Annular centrifugal contactors for multiple stage extraction processes. *Chem. Eng. Commun.* **2001**, *188*, 115–127.
- Memon, S.; Yilmaz, M. Solvent extraction of metal cations by chemically modified biscalix[4]arenes. *Sep. Sci. Technol.* **2001**, *36* (12), 2785–2798.
- Memon, S.; Yilmaz, M. Biscalixarenes: synthesis and investigation of the extraction behavior of biscalix[4]arene derivatives in a two-phase extraction system. *Sep. Sci. Technol.* **2001**, *36* (3), 473–486.
- Menoyo, B.; Elizalde, M.P.; Almela, A. Extraction of lead by Cyanex 302 from phosphoric acid media. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 677–698.
- Mhaske, A.; Dhadke, P. Liquid–liquid extraction and separation of rhodium(III) from other platinum group metals with Cyanex 925. *Sep. Sci. Technol.* **2001**, *36* (14), 3253–3266.
- Mimura, H.; Ohta, H.; Hishi, H. Uptake properties of palladium for biopolymer microcapsules enclosing Cyanex 302 extractant. *Sep. Sci. Technol.* **2001**, *36* (1), 31–44.
- Morgan, G.; Wiesmann, U. Single and multistage foam fractionation of rinse water with alkyl ethoxylate surfactants. *Sep. Sci. Technol.* **2001**, *36* (10), 2247–2264.
- Mowafy, E.A.; Aly, H.F. Extraction of actinides and selected fission products from nitric acid medium using long chain monoamides. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 629–642.
- Moyer, B.A.; Baes, C.F.; Case, F.I. Liquid–liquid equilibrium analysis in perspective: complete model of water, nitric acid, and uranyl nitrate extraction by di-2-ethylhexyl sulfoxide in dodecane. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 757–790.
- Murali, M.S.; Mathur, J.N. Use of a mixture of TRPO and TBP for the partitioning of actinides from high-level waste solutions of PUREX origin

- and its comparison with CMPO and other phosphorus-based extractants. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 61–78.
- Nishihama, S.; Hirai, T.; Komasaawa, I. Review of advanced liquid–liquid extraction systems for the separation of metal ions by a combination of conversion of the metal species with chemical reaction. *Ind. Eng. Chem. Res.* **2001**, *40* (14), 3085–3091.
- Ortiz, I.; Galan, B.; San Roman, F. Kinetics of separating multicomponent mixtures by nondispersive solvent extraction: Ni and Cd. *AIChE J.* **2001**, *47* (4), 895–905.
- Ortiz, I.; San Roman, F.; Galan, B. Kinetics of the recovery of Cd from highly concentrated aqueous solutions by non-dispersive solvent extraction. *Chem. Eng. J.* **2001**, *81* (1), 129–136.
- Otu, E.O.; Chiarizia, R. Temperature effects in the extraction of metal ions by dialkyl-substituted diphosphonic acids: the Am(III) case. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 885–904.
- Otu, E.O.; Chiarizia, R. Thermodynamics of the extraction of metal ions by dialkyl-substituted diphosphonic acids: the U(VI) and Sr(II) case. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 1017–1036.
- Pacek, A.W.; Ding, P.; Nienow, A.W. The effect of volume fraction and impeller speed on the structure and drop size in aqueous/aqueous dispersions. *Chem. Eng. Sci.* **2001**, *56* (10), 3247–3255.
- Paiva, A.P. Recovery of indium from aqueous solutions by solvent extraction. *Sep. Sci. Technol.* **2001**, *36* (7), 1395–1420.
- Pathak, P.N.; Kumbhare, L.B.; Manchanda, V.K. Structural effects in N,N-dialkyl amides on their extraction behavior toward uranium and thorium. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 105–126.
- Pathak, P.N.; Kumbhare, L.B.; Manchanda, V.K. Structural effects in N,N-dialkyl amides on their extraction behavior toward uranium and thorium (correction). *Solvent Extr. Ion Exch.* **2001**, *19* (5), 945–946.
- Preston, J.S.; du Preez, A.C. Solvent extraction of trivalent lanthanides and yttrium from nitrate media by dialkyl sulphoxides. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 581–596.
- Qin, W.; Cao, Y.; Luo, X. Extraction mechanism and behavior of oxalic acid by trioctylamine. *Sep. Purif. Technol.* **2001**, *24* (3), 419–426.
- Reddy, M.L.P.; Francis, T. Recent advances in the solvent extraction of mercury(II) with calixarenes and crown ethers. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 839–864.
- Reyes-Labarta, J.A.; Grossmann, I.E. Disjunctive optimization design models for complex liquid–liquid multistage extractors. *AIChE J.* **2001**, *47* (10), 2243–2252.



Equilibrium-Staged Separations

1457

- Romanovskiy, V.N.; Smirnov, I.V.; Babain, V.A. The universal solvent extraction (UNEX) process: development of the UNEX process solvent for the separation of cesium, strontium, and the actinides from acidic radioactive waste. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 1–22.
- Sasaki, Y.; Sugo, Y.; Suzuki, S. The novel extractants, diglycolamides, for the extraction of lanthanides and actinides in nitric acid/n-dodecane system. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 91–104.
- Sastre, A.M.; Alguacil, F.J. Co-extraction and selective stripping of copper(II) and molybdenum(VI) using LIX 622. *Chem. Eng. J.* **2001**, *81* (1), 109–112.
- Schimmel, K.A.; Ilias, S.; Akella, S. Nondispersive liquid–liquid extraction of Zn(II), Cu(II), Co(II), and Cd(II) from dilute solution with DEHPA in a hollow-fiber membrane module. *Sep. Sci. Technol.* **2001**, *36* (5), 805–822.
- Senol, A. Extraction equilibria of nicotinic acid using Alamine 336 and conventional solvents: effect of diluent. *Chem. Eng. J.* **2001**, *83* (3), 155–163.
- Senol, A. Extraction equilibria of formic and levulinic acids using Alamine 308/diluent and conventional solvent systems. *Sep. Purif. Technol.* **2001**, *21* (1), 165–179.
- Shiraishi, Y.; Hirai, T.; Komasaawa, I. Photochemical desulfurization and denitrogenation process for vacuum gas oil using an organic two-phase extraction system. *Ind. Eng. Chem. Res.* **2001**, *40* (1), 293–303.
- Skerget, M.; Knez, Z. Modelling high-pressure extraction processes. *Comput. Chem. Eng.* **2001**, *25* (4), 879–886.
- Suresh, G.; Murali, M.S.; Mathur, J.N. Effect of anions on thermodynamics of extraction of Am(III) and Eu(III) with octyl(phenyl)-N,N-diisobutyl-carbamoyl-methylphosphine oxide. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 947–964.
- Tian, G.; Zhu, Y.; Xu, J. Extraction of Am(III) and Ln(III) by dialkyldithiophosphinic acid with different alkyl groups. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 993–1006.
- Trtic, T.M.; Vladislavljevic, G.T.; Comor, J.J. Single-stage and two-stage solvent extraction of Tl(III) in hollow-fiber contactors under recirculation mode of operation. *Sep. Sci. Technol.* **2001**, *36* (2), 295–312.
- Tudose, R.Z.; Apreotesei, G. Mass transfer coefficients in liquid–liquid extraction. *Chem. Eng. Process.* **2001**, *40* (5), 477–485.
- Turanov, A.N.; Karandashev, V.K.; Baulin, V.E. Extractive properties of phosphoryl-substituted aza- and diaza-crown ethers towards rare-earth metal ions. *Solvent Extr. Ion Exch.* **2001**, *19* (4), 597–618.



- van Vliet, R.E.; Tiemersma, T.P.; Krooshof, G.J. The use of liquid-liquid extraction in the EPDM solution polymerization process. *Ind. Eng. Chem. Res.* **2001**, *40* (21), 4586-4595.
- Varnek, A.; Wipff, G.; Solovev, V.P. Towards an information system on solvent extraction. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 791-838.
- Vidyalakshmi, V.; Subramanian, M.S.; Srinivasan, T.G. Effect of extractant structure on third phase formation in the extraction of uranium and nitric acid by N,N-dialkyl amides. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 37-50.
- Visser, A.E.; Swatloski, R.P.; Griffin, S.T. Liquid/liquid extraction of metal ions in room temperature ionic liquids. *Sep. Sci. Technol.* **2001**, *36* (5), 785-804.
- Wang, J.; Song, C. Hot test of trialkyl phosphine oxide (TRPO) for removing actinides from highly saline high-level liquid waste (HLLW). *Solvent Extr. Ion Exch.* **2001**, *19* (2), 231-242.
- Wang, X.; Zhu, Y.; Jiao, R. Separation of Am from macro amount of lanthanides by a countercurrent multistage extraction with purified Cyanex 301 and TBP. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 1007-1016.
- Weigl, M.; Geist, A.; Gompper, K. Kinetics of lanthanide/actinide co-extraction with N,N'-dimethyl-N,N'-dibutyltetradecylmalonic diamide (DMDBDMA). *Solvent Extr. Ion Exch.* **2001**, *19* (2), 215-230.
- Yang, X.J.; Pin, C. A novel solid-phase extraction scheme for the group separation of high field strength elements (Nb, Ta, Zr, Hf) from Al-, Ti-, and Fe-rich geological materials. *Sep. Sci. Technol.* **2001**, *36* (4), 571-586.
- Yu, X.; Gu, G.; Fu, X. Thermochemistry study on the extraction of Co(II) and Ni(II) with Cyanex 272 in kerosene. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 939-943.
- Zhang, A. Study of the antagonistic extraction of palladium(II) with 1-phenyl-3-methyl-4-propionylpyrazolone-5-one and an organic amine. *Solvent Extr. Ion Exch.* **2001**, *19* (5), 925-938.
- Zhang, A.; Hu, J.; Zhang, X. Hydroxylamine derivative in Purex process: study on the partition of uranium/neptunium and uranium/plutonium with N,N-diethylhydroxylamine in the purification cycle of uranium contactor. *Solvent Extr. Ion Exch.* **2001**, *19* (6), 965-980.
- Zhang, P.; Song, C.L.; Liang, J.F. Extraction and retention of plutonium with gamma-irradiated 30% trialkylphosphine oxide-kerosene solution. *Solvent Extr. Ion Exch.* **2001**, *19* (1), 79-90.
- Zhigang, T.; Rongqi, Z.; Zhanting, D. Separation of isopropanol from aqueous solution by salting-out extraction. *J. Chem. Technol. Biotechnol.* **2001**, *76* (7), 757-763.

**Equilibrium-Staged Separations****1459**

- Zhu, J.H.; Wei, D.Z.; Cao, X.J. Partitioning behaviour of cephalexin and 7-aminodeacetoxycephalosporanic acid in PEG/ammonium sulfate aqueous two-phase systems. *J. Chem. Technol. Biotechnol.* **2001**, 76 (11), 1194–1200.
- Zhu, Z.; Ye, J.; Gu, J. The extraction of Fe^{3+} and La^{3+} by synergetic effects of TBP and p-tert-butylcalix[8]arene octacarboxylic acid. *Sep. Sci. Technol.* **2001**, 36 (12), 2761–2772.

Supercritical Extraction

- Blanchard, L.A.; Brennecke, J.F. Recovery of organic products from ionic liquids using supercritical carbon dioxide. *Ind. Eng. Chem. Res.* **2001**, 40 (1), 287–292.
- Boukouvalas, C.; Louli, V.; Magoulas, K. Bench-scale application of supercritical fluid extraction for the removal of phenol from aqueous solution. *Sep. Sci. Technol.* **2001**, 36 (10), 2279–2292.
- Camy, S.; Condoret, J.S. Dynamic modeling of a fractionation process for a liquid mixture using supercritical carbon dioxide. *Chem. Eng. Process.* **2001**, 40 (6), 499–509.
- Chiang, K.Y.; Huang, L.M.; Lee, Y.S. Recovery of heavy metals in electrostatic precipitator ash by carbon dioxide as a pre-extraction reagent. *Sep. Sci. Technol.* **2001**, 36 (10), 2327–2340.
- Dimitrov, K.; Boyadzhiev, L.; Barth, D. Poly(ethylene glycol)nonylphenyl ether extraction with supercritical carbon dioxide in a packed column. *Sep. Sci. Technol.* **2001**, 36 (2), 313–324.
- Elshani, S.; Smart, N.G.; Lin, Y. Application of supercritical fluids to the reactive extraction and analysis of toxic heavy metals from environmental matrices: system optimization. *Sep. Sci. Technol.* **2001**, 36 (5), 1197–1210.
- Freemantle, M. Spent nuclear fuel reprocessed in supercritical carbon dioxide. *Chem. Eng. News* **2001**, 1 October, 14.
- Gabbard, R.G.; Knox, D.E. A supercritical extraction experiment for the unit operations laboratory. *Chem. Eng. Educ.* **2001**, 35 (2), 96–101.
- Grajek, H. Elucidating the changes in activated carbon pore structure as a result of tert-butylbenzene adsorption and its desorption by means of supercritical carbon dioxide. *Adsorpt. Sci. Technol.* **2001**, 19 (4), 303–319.
- Habulin, M.; Knez, Z. Activity and stability of lipases from different sources in supercritical carbon dioxide and near-critical propane. *J. Chem. Technol. Biotechnol.* **2001**, 76 (12), 1260–1266.



- Heath, K.D.; Cochran, H.D. Electrodispersion of fine aqueous droplets in supercritical carbon dioxide. *Sep. Sci. Technol.* **2001**, *36* (5), 1211–1224.
- Hsu, R.C.; Lin, B.H.; Chen, C.W. The study of supercritical carbon dioxide extraction for *Ganoderma lucidum*. *Ind. Eng. Chem. Res.* **2001**, *40* (20), 4478–4481.
- Kim K.H.; Hong, J. Desorption kinetic model for supercritical fluid extraction of spearmint leaf oil. *Sep. Sci. Technol.* **2001**, *36* (7), 1437–1450.
- Lin, Y.; Wu, H.; Smart, N.G. Studies on in-situ chelation/supercritical fluid extraction of lanthanides and actinides using a radiotracer technique. *Sep. Sci. Technol.* **2001**, *36* (5), 1149–1162.
- Mahajani, S.M.; Sharma, M.M.; Sridhar, T. Extractive hydration of n-butene with solid acid catalysts in the liquid phase and under supercritical conditions. *Chem. Eng. Sci.* **2001**, *56* (19), 5625–5633.
- Rose, J.L.; Monnery, W.D.; Svrcek, W.Y. Experimental data for the extraction of Peace River bitumen using supercritical ethane. *Fuel* **2001**, *80* (8), 1101–1110.
- Saka, S.; Kusdiana, D. Biodiesel fuel from rapeseed oil as prepared in supercritical methanol. *Fuel* **2001**, *80* (2), 225–231.
- Sarrade, S.; Schrive, L.; Gourgouillon, D. Enhanced filtration of organic viscous liquids by supercritical carbon dioxide addition and fluidification: application to used oil regeneration. *Sep. Purif. Technol.* **2001**, *25* (1), 315–321.
- Vradman, L.; Herskowitz, M.; Korin, E. Regeneration of poisoned nickel catalyst by supercritical carbon dioxide extraction. *Ind. Eng. Chem. Res.* **2001**, *40* (7), 1589–1590.
- Wang, T.; Ma, J.; Shen, Z. Modifier effect on extraction of mercury with sodium diethyldithiocarbamate in supercritical carbon dioxide. *Sep. Sci. Technol.* **2001**, *36* (14), 3267–3276.

REFERENCES

1. Ray, M.S. Equilibrium-staged separations: a bibliography update (2000). *Sep. Sci. Technol.* **2001**, *37* (10), 2477–2504.
2. Ray, M.S. Equilibrium-staged separations: a bibliography update (1999). *Sep. Sci. Technol.* **2000**, *35* (16), 2675–2781.
3. Ray, M.S. Equilibrium-staged separations: a bibliography update (1998). *Sep. Sci. Technol.* **1999**, *34* (16), 3305–3321.

**Equilibrium-Staged Separations****1461**

4. Ray, M.S. Equilibrium-staged separations: a bibliography update (1997). *Sep. Sci. Technol.* **1999**, 34 (1), 139–156.
5. Ray, M.S. Equilibrium-staged separations: a bibliography update (1996). *Sep. Sci. Technol.* **1997**, 32 (18), 3067–3083.
6. Ray, M.S. Equilibrium-staged separations: a bibliography update (1995). *Sep. Sci. Technol.* **1997**, 32 (7), 1163–1187.
7. Ray, M.S. Equilibrium-staged separations: a bibliography update (1994). *Sep. Sci. Technol.* **1995**, 30 (20), 3723–3745.
8. Ray, M.S. Equilibrium-staged separations: a bibliography update (1992–1993). *Sep. Sci. Technol.* **1994**, 29 (17), 2359–2385.
9. Ray, M.S. Equilibrium-staged separations: a bibliography (1991). *Sep. Sci. Technol.* **1993**, 28 (6), 1361–1378.
10. Ray, M.S. Distillation (1980–1990): a bibliography. *Sep. Sci. Technol.* **1992**, 27 (1), 105–128.
11. *Engineering and Applied Science Database* on CD-ROM (including *CHERUB* chemical engineering database), published by Royal Melbourne Institute of Technology, Australia (ISSN 1038-7900). Full details available from www.rmitpublishing.com.au, or the author (MSR).

Received September 2002