

9 References

- Akita, S.; Hirano, K.; Ohashi, Y. (1993). Equilibrium Distribution of Palladium (II) between Hydrochloric Acid Solution and a Macromolecular Resin Containing Tri-n-octylamine. *Solvent Extraction and Ion Exchange*, 11(5): 797-810.
- Alam, M.S.; Inoue, K.; Yoshizuka, K.; Ishibashi, H. (1998). Adsorptive Separation of Rhodium (III) Using Fe (III)- Templated Oxine Type of Chemically Modified Chitosan. *Separation Science and Technology*, 33 (5): 655-666.
- Al-Bazi, S.J.; Chow, A. (1984). Platinum Metals-Solution Chemistry and Separation Methods (Ion-Exchange and Solvent Extraction). *Talanta*, 31(10A): 815-836.
- Alguacil, F.J.; Madi, A.; Sastre, A. (2000). Facilitated Supported Membrane Transport of Gold(I) Using LIX79 in Cumene. *Journal of Membrane Science*, 166: 213-219.
- Alonso, A.I.; Pentelides, C.C. (1996). Modelling and Simulation of Integrated Membrane Processes for Recovery of Cr(VI) with Aliquat 336. *Journal of Membrane Science*, 110: 151-167.
- Amer, S. (1983). Aplicaciones de la Extracción con Disolventes a la Hidrometalurgia. XI Parte. Metales Preciosos (II). *Revista de Metalurgia*, 19(3): 161-183.
- Antico, E.; Masana, A.; Hidalgo, M.; Salvadó, V.; Valiente, M. (1994). New Sulphur-containing Reagents as Carriers for the Separation of Palladium by Solid Supported Liquid Membranes. *Hydrometallurgy*, 35: 343-352.
- Aprahamian, V.H.; Demopoulos, G.P. (1995). The Solution Chemistry and Solvent Extraction Behaviour of Cu, Fe, Ni, Zn, Pb, Sn, Ag, As, Sb, Bi, Se and Te in Acid Chloride Solutions Reviewed from the Standpoint of PGM Refining. *Mineral Processing and Extractive Metallurgy Review*, 14: 143.
- Argüelles-Monal, W.; Peniche-Covas, C. (1993). Preparation and Characterization of a Mercaptan Derivative of Chitosan for the Removal of Mercury from Brines. *Die Angewandte Makromolekulare Chemie*, 207: 1-8.
- Ashrafizadeh, S.N.; Demopoulos, G.P.; Rovira, M.; Sastre, A.M. (1998). Permeation of Iridium (IV) and Metal Impurity Chlorocomplexes Throught a Supported Liquid Membrane Designed for Rhodium Separation. *Separation Science and Technology*, 33: 1162-1195.

- Baba, Y.; Hirakawa, H. (1992). Selective Adsorption of Palladium(II), Platinum(IV), and Mercury(II) on a New Chitosan Derivatives Possessing Pyridyl Group. *Chemistry Letters*, 10: 1905-1908.
- Baba, Y.; Masaaki, K.; Kawano, Y. (1998). Synthesis of Chitosan Derivative Recognizing Planar Metal Ion and its Selective Adsorption Equilibria of Copper(II) over Iron(III). *Reactive & Functional Polymers*, 36: 167-172.
- Batista, I.; Roberts G.A.F. (1990). A Novel, Facile Technique for Deacetylating Chitin. *Makromolekular Chemistry*, 191: 429-434.
- Beauvais, R.A.; Alexandratos, S.D. (1998). Review: Polymer-supported Reagents for Selective Complexation of Metal Ions: An Overview. *Reactive & Functional Polymers*, 36: 113-123
- Belova, V.V.; Jidkova, T.I.; Vasilevich, S.A. (1997). Influence of the Amine Nature on the Composition of Palladium Complexes in Solvent Extraction Systems. *Solvent Extraction and Ion Exchange*. 15(6):1023-1043.
- Benguerel, E.; Demopoulos, G.P.; Harris, G.B. (1996). Speciation and Separation of Rhodium(III) from Chlorine Solutions: A Critical Review. *Hydrometallurgy*, 40: 135-152.
- Binman, S.; Belfer, S.; Shani, A. (1997). Metal Sorption Properties of Sulfur-Chlorinated Jojoba Wax Bound to Polystyrene Beads. *Journal of Applied Polymer Science*, 63: 625-633.
- Bohart, G.S.; Adams, E.Q. (1920). Some Aspects of the Behaviour of Charcoal with Respect to Chlorine. *Journal of the American Chemical Society*, 42: 523-544.
- Borwankar, R.P.; Wasan, D.T.; Li, N.N. (1987). Liquid Membranes Ion Removal from Aqueous Media. An overview. In: Patterson, J. W.; Passino, R. (ed.). *Metal Speciation, Separation, and Recovery*. Michigan: Lewis Publishers, p. 289-306.
- Broussignac, P. (1968). Haut Polymère Naturel Connue dans l'Industrie: Le Chitosane. *Chimie Industriel Genie, Chimie*, 99(9): 1241-1247.
- Buslaeva, T.M.; Malynov, I.V.; Koteneva, N.A.; Sinitsyn, N.M.; Kravchenko, V. V. (1990). Complexation While Extracting Ruthenium Chloro-Complexes by 3-Normal-Octylamine Oxide. *Zhurnal Neorganicheskoi Khimii*, 35: 1978-1983.
- Chen, D.; Lewandowski, Z.; Roe, F.; Surapaneni, P. (1993). Diffusivity of Cu²⁺ in Calcium Alginate Gel Beads. *Biotechnology and Bioengineering*, 41: 755-760.

- Chiarizia, R. (1987). Discussion of the paper "Liquid Membranes for Metal Ion Removal from Aqueous Media. An overview" by R. P. Borwankar, D. T. Wasan, and N. N. Li. In: Patterson, J. W.; Passino, R. (ed.). *Metal Speciation, Separation, and Recovery*. Michigan: Lewis Publishers, p. 307-313.
- Clifford, D.; Weber, W.J.Jr. (1983). The Determinants of Divalent/Monovalent Selectivity in Anions Exchangers. *Reactive Polymers*, 1: 77-89.
- Cortina, J.L.; Meinhardt, E.; Roijals, O.; Martí, V. (1998). Modification and Preparation of Polymeric Adsorbents for Precious-metal Extraction in Hydrometallurgical Processes. *Reactive & Functional Polymers*, 36: 149-165.
- Cortina J.L.; Miralles, N.; Aguilar, M.; Sastre, A.M. (1996). Distribution Studies of Zn(II), Cu(II) and Cd(II) with Levextrel Resins Containing Di(2,4,4-trimethylpentyl)phosphinic Acid (Lewatit TP807'84). *Hydrometallurgy*, 40: 195-206.
- Côté, B.; Demopoulos G.P. (1995). New 8-hydroxyquinoline Derivative Extraction for Platinum Group Metals Separation. Part 4: Kinetics of Pd(II) Extraction and Stripping. *Solvent extraction and Ion Exchange*, 13(1): 83-107.
- Cotton, F.A.; Wilkinson, G. (1980). *Advanced Inorganic Chemistry*. New York: John Wiley & Sons, p. 1012.
- Cox, M. (1992). Solvent Extraction in Hydrometallurgy. In: Rydberg, J.; Musikas, C.; Choppin, G.R. (eds.). *Principles and Practices of Solvent Extraction*. New York: Marcel Dekker, p. 357-410.
- Crank, J. (1975). *The Mathematics of Diffusion*, 2nd edition. Oxford, U.K.: Clarendon Press.
- Daiminger, U.A.; Geist, A.G.; Nitsch, W.; Plucinski, P.K. (1996). Efficiency of Hollow Fiber Modules for Nondispersive Chemical Extraction. *Industrial & Engineering Chemistry Research*, 35: 184-191.
- Dambies, L.; Guibal, E.; Roze, A. (2000). Arsenic(V) Sorption on Molybdate-Impregnated Chitosan Beads. *Colloids and Surfaces. A: Physicochemical and Engineering Aspects*, 170: 19-31.
- Danesi, P.R. (1985). Separation of Metal Species by Supported Liquid Membranes. *Separation Science and Technology*, 19(11&12): 857-894.
- Dozol, J.F.; Casas, J.; Sastre, A.M. (1993). Influence of Membrane Solvent on Strontium Transport from Reprocessing Concentrate Solutions through Flat-Sheet-Supported Liquid Membranes. *Separation Science and Technology*, 28(11&12): 2007-2022.

- Dozol, J.F.; Casas, J.; Sastre, A.M. (1995). Transport of Cesium from Reprocessing Concentrate Solutions through Flat-Sheet-Supported Liquid Membranes: Influence of the Extractant. *Separation Science and Technology*, 30(3): 435-448.
- Eiden, C.A.; Jewell, C.A.; Wightman, J.P. (1980). Interaction of Lead and Chromium with Chitin and Chitosan. *Journal of Applied Polymer Science*, 25: 1587-1599.
- Findon, A.; McKay, G.; Blair, H.S. (1993). Transport Studies for the Sorption of Copper Ions by Chitosan. *Journal Environmental Health*, 28(1): 173-185.
- Fontàs, C.; Antico, E.; Salvadó, M.; Valiente, M.; Hidalgo, M. (1997). Chemical Pumping of Rhodium by a Supported Liquid Membrane Containig Aliquat 336 as Carrier. *Anal. Chim. Acta*, 346: 199-206.
- Fontàs, C.; Compañó, L.; Polo, A.; Salvadó, V.; Hidalgo, M. (2001). Benzil(2-Methoxy-3-diphenylphosphino)propil ether as a Carrier for the Selective Transport of Pd(II) Throught a Solid Supported Liquid Membrane. *Solvent Extraction and Ion Exchange*, 19(2): 329-344.
- Fontàs, C.; Salvadó, V.; Hidalgo, M. (1999). Solvent Extraction of Pt(IV) by Aliquat 336 and its Application to a Solid Supported Liquid Membrane System. *Solvent Extraction and Ion Exchange*, 17(1): 149-162.
- Fu, J.; Nakamura, S.; Akiba, K. (1995a). Extraction of Platinum(IV) with Trioctylamine and its Application to Liquid Membrane Transport. *Separation Science and Technology*, 30: 609-619.
- Fu, J.; Nakamura, S.; Akiba, K. (1995b). Transport of Palladium(II) Throught Trioctylamine Liquid Membrane. *Separation Science and Technology*, 30: 793-803.
- Fu, J.; Nakamura, S.; Akiba, K. (1995c). Iridium (IV) transport across trioctylamine supported liquid membrane. *Separation Science and Technology*, 30(20): 3821-3830.
- Fuji Spinning Co., LTD. (1989). *Process for Producing Granular Porous Chitosan*. United States Patent, n^o 4833237. 1989-05-23.
- Gadd, G.M. (1990). Biosorption. *Chemistry and Industry*, 13: 421-426.
- Gonglai, Y.; Aistad, J. (1995). Separation of Rhodium from Ruthenium and Iridium by Fast Solvent Extraction with HDEHP. *Journal of Radioanalytical and Nuclear Chemistry*, 196: 287-294.

- Gonzalez-Davila, M.; Santana-Casiano, M.; Milleno, F.J. (1990). The Adsorption of Cd(II) and Pd(II) to Chitin in Seawater. *J. Colloid Interface Sci.*, 137: 102-110.
- Grant, R.A. (1990). The Separation Chemistry of Rhodium and Iridium. In: Manziak, L. (ed.). *Precious Metals Recovery and Refining*. Allentown, U. S. A.: IPMI, p. 7-18.
- Guibal, E.; Jansson-Charrier, M.; Saucedo, I.; Le Cloirec, P. (1995). Enhance of Metal Ion Sorption Performances of Chitosan: Effect of Structure on the Diffusion Properties. *Langmuir*, 11: 591-598.
- Guibal, E.; Larkin, A.; Vincent, T.; Tobin, J.M. (1999a). Chitosan Sorbents for Platinum Recovery from Dilute Solutions. *Industrial & Engineering Chemistry Research*, 38: 401-412.
- Guibal, E.; Milot, C.; Roussy, J. (1999b). Molybdate Sorption by Cross-Linked Chitosan Beads: Dynamic Studies. *Water Environment Research*, 71(1): 10-17.
- Guibal, E.; Milot, C.; Tobin, J.M. (1998). Metal-Anion Sorption by Chitosan Beads: Equilibrium and Kinetic Studies. *Industrial & Engineering Chemistry Research*, 37(4): 1454-1463.
- Guibal, E.; Vincent, T.; Navarro Mendoza, R. (2000). Synthesis and Characterization of a Thiourea Derivative of Chitosan for Platinum Recovery. *Journal of Applied Polymer Science*, 75: 119-134.
- Guibal, E.; Von Offenbergs Sweeney, N.; Vincent, T.; Tobin, J.M. (2002). Sulfur-Derivatives of Chitosan for Palladium Sorption. Submitted for publication in *Reactive & Functional Polymers*.
- Harris, G.B. (1993). A Review of Precious Metals Refining. In: Mishra, R. K. (ed.). *Precious Metals 1993*. Allentown, U.S.A.: IPMI, p. 351-373.
- Hasegawa, Y.; Sekine, T. (1991). Solvent Extraction of Precious Metals. In: Benner, L.S.; Suzuki, T.; Meguro, K.; Tanaka, S. (ed.). *Precious Metals Science and Technology*. Allentown, U.S.A: IPMI, p. 401-402.
- Heras, A.; Rodriguez, N.M.; Ramos, V.M.; Agulló, E. (2001). N-methylene Phosphonic Chitosan: A Novel Soluble Derivative. *Carbohydrate Polymers*, 44: 1-8.
- Hidalgo, M.; Masana, A.; Salvadó, V.; Muñoz, M.; Valiente, M. (1991). Extraction of Palladium with Tri-Isobutylphosphine Sulfide (Cyanex-471) in Toluene from Chloride Solutions Containing Thiocyanate. *Talanta*, 38: 483-488.
- Hirano, S.; Yamaguchi, R. (1976). N-acetylchitosan Gel - Polyhydrate of Chitin. *Biopolymers*, 15(9): 1685-1691.

- Hirano, S.; Yamaguchi, R.; Fukui, N.; Iwata, M. (1990). A Chitosan Oxalate Gel: Its Conversion to a N-acetylchitosan Gel *via* a Chitosan Gel. *Carbohydrate Research*, 201: 145-149.
- Hsien T.-Y.; Rorrer, G.L. (1995). Effects of Acylation and Crosslinking on the Material Properties and Cadmium Ion Adsorption Capacity of Porous Chitosan Beads. *Separation Science and Technology*, 30(12): 2455-2475.
- Hsien T.-Y.; Rorrer, G.L. (1997). Heterogeneous Cross-Linking of Chitosan Gel Beads: Kinetics, Modelling and Influence on Cadmium Ion Adsorption Capacity. *Industrial & Engineering Chemistry Research*, 36: 3631-3638.
- Hutchins, R.A. (1973). New Method Simplifies Design of Activated-Carbon Systems. *Chemical Engineering*, august 20, pp: 133-138.
- Inoue, K.; Baba, Y.; Yoshizuka, K. (1993). Adsorption of Metal Ions on Chitosan and Crosslinked Copper(II)-Complexed Chitosan. *Bulletin Chemistry Society Japan.*, 66: 2915-2921.
- Inoue, K.; Yamaguchi, T.; Iwasaki, M.; Ohto, K.; Yoshizuka, K. (1995). Adsorption of Some Platinum Group Metals on Some Complexane Types of Chemical Modified chitosan. *Separation Science And Technology*, 30(12): 2477-2489.
- Izatt, R.M.; Clark, G.A.; Christensen, J.J. (1987). Transport of AgBr_2^- , PdBBr_4^{2-} and AuBr_4^- in an Emulsion Membrane System Using K^+ -dicyclohexano-18-crown-6 as Carrier. *Separation Science and Technology*, 22: 691-698.
- Jang, L.K.; Lopez, S.L.; Eastman, S.L.; Pryfogle, P. (1991): Recovery of Copper and Cobalt by Biopolymer Gels. *Biotechnology and Bioengineering*, 37: 266-273.
- Juang, R.S.; Ju, C.Y. (1997). Equilibrium Sorption of Copper(II)-Ethylenediaminetetraacetic Acid Chelates onto Cross-Linked, Polyaminated Chitosan Beads. *Industrial & Engineering Chemistry Research*, 36: 5403-5409.
- Juang, R.S.; Ju, C.Y. (1998). Kinetics of Sorption of Cu(II)-Ethylenediaminetetraacetic Acid Chelated Anions on Cross-Linked, Polyaminated Chitosan Beads. *Industrial & Engineering Chemistry Research*, 37: 3463-3469.
- Kakoi, T.; Goto, M.; Nakashio, F. (1994). Solvent Extraction of Palladium with Bis(2,4,4,-trimethylpentyl)dithiophosphinic Acid and Bis(2,4,4,-trimethylpentyl) monothiophosphinic Acid. *Solvent Extraction and Ion Exchange*. 12(3): 541-555.
- Kakoi, T.; Goto, M.; Nakashio, F. (1996a). Separation of Platinum and Palladium by Liquid Surfactant Membranes Utilizing a Novel Bi-functional Surfactant. *Journal of Membrane Science*, 120: 77-88.

- Kakoi, T.; Goto, M.; Nakashio, F. (1997). Separation of Palladium and Silver from a Nitric Acid Solution by Liquid Surfactant Membranes. *Separation Science and Technology*, 32(8): 1415-1432.
- Kakoi, T.; Horinouchi, N.; Goto, M.; Nakashio, F. (1996b). Recovery of Palladium from Industrial Wastewater Using Liquid Surfactant Membranes. *Separation Science and Technology*, 31(3): 381-399.
- Kaminski, W.; Modrzejewska, Z. (1997). Application of Chitosan Membranes in Separation of Heavy Metal Ions. *Separation Science and Technology*, 32: 2659-2668.
- Kawamura, Y.; Mitsuhashi, M.; Tanibe, H. (1993). Adsorption of Metal Ions on Polyaminated Highly Porous Chitosan Chelating Resin. *Industrial & Engineering Chemistry Research*. 32: 386-391.
- Kinniburgh, D.G. (1986). General Purpose Adsorption Isotherms. *Environmental Science and Technology*, 20(9): 895-904.
- Ko D.C.K.; Porter, J.F.; McKay G. (1999). Correlation-Based Approach to the Optimization of Fixed-Bed Sorption Units. *Industrial & Engineering Chemistry Research*, 38: 4868-4877.
- Koyama, Y.; Taniguchi, A. (1986). Studies on Chitin X. Homogeneous Crosslinking of Chitosan for Enhanced Ion Adsorption. *Journal of Applied Polymer Science*, 31: 1951-1954.
- Kumar, A.; Sastre, A. (2000). Hollow Fiber Supported Liquid Membranes for the Separation-concentration of Gold(I) from Aqueous Cyanide Media: Modelling and Mass Transfer Evaluation. *Industrial & Engineering Chemistry Research*, 39: 146-154.
- Kumar, S.; Verma, R.; Venkataramani, B.; Raju, V. S.; Gangadharan, S. (1995). Sorption of Platinum, Palladium, Iridium and Gold Complexes on Polyaniline. *Solvent Extraction and Ion Exchange*, 13(6):1097-1121.
- Kurita, K.; Koyama, Y.; Chikaoka, S. (1988). Studies on Chitin XVI. Influence of Controlled Side Chain Introduction to Chitosan on the Adsorption of Copper (II) Ion. *Polymer Journal*, 20:1083-1089.
- Levenspiel, O. (1999). *Chemical Reaction Engineering*. 3rd edition. New York: John Wiley & Sons.
- Lokhande, T.N.; Anuse, M.A.; Chavan, M.B. (1998). Extraction and Separation Studies of Platinum (IV) with N-N-Octylaniline. *Talanta*, 47: 823-832.

- Lokhande, T.N.; Kolekar, G.B.; Anuse, M.A.; Chavan, M.B. (2000). Extraction of Ruthenium(IV) from Hydrochloric Acid Medium with N-Octylaniline and its Determination Spectrophotometrically with Pyrimide-2-thiol. *Separation Science and Technology*, 35(1): 153-168.
- Lyman, C.E.; Goldstein, J. I.; Romig, A.D.; Echlin. P.; Newbury, D.E.; Williams, D.B.; Armstrong, J.T.; Fiori, C.E.; Lifshin, E.; Peters, K-R. (1990). *Scanning Electron Microscopy, X-Ray Microanalysis, and Analytical Electron Microscopy, A Laboratory Workbook*. New York: Plenum Press.
- Maruca, R.; Suder, B.J.; Wightman, J.P. (1982). Interaction of Heavy Metals With Chitin and Chitosan. III. Chromium. *Journal of Applied Polymer Science*, 27: 4827-4837.
- Masri, M.S.; Randall, V.G.; Pittman, A.G. (1978). Removal of Metallic Ions by Partially Polyamine Polymers. *Polymer Preprints-America*. 19: 483-488.
- Mathur, J.N.; Murali, M.S.; Natarajan, P.R.; Badheka, L.P.; Banerji, A. (1992). Extraction of Actinides and Fission-Products by Octyl(Phenyl)-N,N-diisobutylcarbamoylmethylphosphine Oxide from Nitric-Acid Media. *Talanta*, 39: 493-496.
- McKay, G.; Poots, V.J.P. (1980). Kinetics and Diffusion Processes in Colour Removal from Effluent Using Wood as an Adsorbent. *Journal of Chemical Technology and Biotechnology*, 30: 279-292.
- Milot, C.; McBrien, J.; Allen, S.; Guibal, E. (1998). Influence of Physicochemical and Structural Characteristics of Chitosan Flakes on Molybdate Sorption. *Journal of Applied Polymer Science*, 68: 571-580.
- Mimura, H.; Ohta, H.; Hoshi, H.; Akiba, K.; Onodera, Y. (2001). Uptake properties of Palladium for Biopolymer Microcapsules Enclosing Cyanex 302 Extractant. *Separation Science and Technology*, 36(1): 31-44.
- Mojski, M. (1980). Extraction of Platinum Metals from Hydrochloric Acid Medium with Triphenylphosphine Solution in 1,2-Dichloroethane. *Talanta*, 27(1): 7-10.
- Mooiman, M.B. (1993). The Solvent Extraction of Precious Metals - A Review. In: Mishra, R.K. (ed.). *Precious Metals 1993*. Allentown: IPMI, 411-434.
- Moore, G.K., Roberts, G.A.F. (1980). Chitosan Gels: 1. Study of Reaction Variables. *International Journal of Biological Macromolecules*, 2.
- Morris, J.C.; Weber, W.J. (1964). Removal of Biologically-Resistant Pollutants from Waste Waters by Adsorption. *Advances in Water Pollution Research*. 2: 231-266.

- Muzzarelli, R.A.A. (1973). *Natural Chelating Polymers*. Oxford: Pergamon Press, 254 p.
- Muzzarelli, R.A.A. (1974). Chitosan Membranes. *Ion Exchange and Membranes*, 1: 193-196.
- Muzzarelli, R.A.A. (1977). *Chitin*. Oxford: Pergamon Press.
- Muzzarelli, R.A.A. (1985). Removal of Uranium from Solutions and Brines by Derivative of Chitosan and Ascorbic acid. *Carbohydr. Polym.*, 5: 85-89.
- Muzzarelli, R.A.A.; Rochetti, R. (1986). Metal Adsorption by Modified Chitins. In: Thompson, R. (ed.). *Trace Metal Removal from Aqueous Solution*. Chessington: Borax Holdings Ltd, 44-57.
- Muzzarelli, R.A.A.; Tanfani, F. (1982). N-(o-carboxybenzyl) chitosan, N-carboxymethyl Chitosan and Dithiocarbamate Chitosan : New Chelating Derivatives of Chitosan. *Pure & Applied Chemistry*, 54(11): 2141-2150.
- Muzzarelli, R.A.A.; Tanfani, F.; Emanuelli, M. (1984). Chelating Derivatives of Chitosan Obtained by Reaction with Ascorbic Acid. *Carbohydrate Polymers*, 4: 137-151.
- Muzzarelli, R.A.A.; Tubertini, O. (1969). Chitin and Chitosan as Chromatographic Supports and Adsorbents for Collection of Metal Ions from Organic and Aqueous Solutions and Sea-Water. *Talanta*, 16: 1571 -1577.
- Myasoedova, G.V.; Shcherbinina, N.I.; Zakhartchenko, E.A.; Kolobov, S.S.; Lileeva, L.V.; Komozin, P.N.; Marov, I.N.; Belyaeva, V.K. (1997). Sorption of Platinum Group Metals and Gold Chlorocomplexes by Amine Polymeric Sorbents. *Solvent Extraction and Ion Exchange*, 15(6): 1107-1118.
- Ni, C.; Xu, Y. (1996). Studies on Syntheses and Properties of Chelating Resins Based on Chitosan. *Journal of Applied Polymer Science*, 59: 499-504.
- Nishi, H.; Maekita, Y.; Nishimura, S.; Hasegawa, O.; Tokura, S. (1987). Highly phosphorylated derivatives of chitin, partially deacetylated chitin and chitosan as new functional polymers: metal binding property of the insolubilized materials. *International Journal of Biological Macromolecules*, 9: 109-114.
- Nishide, H.; Deguchi, J.; Tsuchida, E. (1976). Selective Adsorption of Metal Ions on Crosslinked Poly(vinylpyridine) Resins Prepared with a Metal-Ion as a Template. *Chemistry Letters*, 2: 169-174.
- Ogawa, K. (1991). Effect of Heating and Aqueous Suspension of Chitosan on the Crystallinity and Polymorphs. *Agricultural and Biological Chemistry*, 55(9): 2375-2379.

- Ogawa, K.; Yui, T. (1993). Crystallinity of Partially N- Acetylated Chitosans. *Bioscience Biotechnology and Biochemistry*, 57 (9): 1466-1469.
- Ohga, K.; Kurauchi, Y.; Yanase, H. (1987). Adsorption of Cu^{2+} or Hg^{2+} Ion on Resins Prepared by Crosslinking Metal-Complexed Chitosans. *Bulletin Chemistry Society Japan*, 60: 444-446.
- Ortiz, I.; Galan, B.; Irabien, A. (1996). Membrane Mass Transfer Coefficient for the Recovery of Cr(VI) in Hollow Fiber Extraction and Back-Extraction Modules. *Journal of Membrane Science*, 118: 213-221.
- Pearson, R.G. (1963). Hard and Soft Acids and Bases. *Journal of the American Chemical Society*, 85(22): 3533-3539.
- Peng, C.; Wang, Y.; Tang, Y. (1998). Synthesis of Crosslinked Chitosan-Crown Ethers and Evaluation of These Products as Adsorbents for Metal Ions. *Journal of Applied Polymer Science*, 70: 501-506.
- Piron, E.; Accominotti, M.; Domard, A. (1997). Interaction Between Chitosan and Uranyl Ions. Role of Physical and Physicochemical Parameters on Kinetics of Sorption. *Langmuir*, 13: 1653-1658.
- Renner, H. (1997). Platinum Group Metals. In: Habashi, F. (ed.). *Handbook of Extractive Metallurgy*. Weinheim. Chichester: Wiley-VCH, p. 1269-1326.
- Roberts, G.A.F. (1992). *Chitin Chemistry*. London: Macmillan, 350 p
- Roberts, G.A.F.; Taylor, K.E. (1989). The Formation of Gels by Reaction of Chitosan with Gluteraldehyde. *Macromolecules Chemistry*, 190: 951-960.
- Rorrer, G.L.; Hsien, T.Y.; Way, J.D. (1993). Synthesis of Porous-Magnetic Chitosan Beads for Removal of Cadmium Ions from Waste Water. *Industrial & Engineering Chemistry Research*, 32: 2170-2178.
- Rovira, M.; Cortina, J.L.; Arnaldos, J.; Sastre, A.M. (1998). Recovery and Separation of Platinum Group Metals Using Impregnated Resins Containing Alamine 336. *Solvent Extraction and Ion Exchange*, 16(5): 1279-1302.
- Rovira, M.; Cortina, J.L.; Arnaldos, J.; Sastre, A.M. (1999a). Impregnated Resins Containing Di-(2-ethylhexyl)thiophosphoric Acid for the Extraction of Palladium(II). II. Selective palladium(II) recovery from hydrochloric acid solutions. *Solvent Extraction and Ion Exchange*, 17(2): 351-366.
- Rovira, M.; Cortina, J.L.; Sastre, A.M. (1999b). Selective Liquid-Liquid Extraction of Palladium(II) from Hydrochloric Acid Media by Di-(2-ethylhexyl)thiophosphoric Acid (DEHTPA). *Solvent Extraction and Ion Exchange*, 17(2): 333-349.

- Rovira, M.; Sastre, A.M. (1998). Modelling of Palladium(II) Permeation in a Supported Liquid Membrane Containing Di-(2-ethylhexyl)thiophosphoric Acid as Carrier. *Journal of Membrane Science*, 149: 241-250.
- Rozen, A.M.; Karlasheva, N.A.; Nikolotova, Z.N. (1995). Extraction of Nitrosoruthenium by Tributyl-Phosphate. *Radiochemistry*, 37: 213-219.
- Sánchez-Loredo, M.G.; Grote (2000). Carboxyl-Substituted Derivatives of S-Decyl Dithizone as Solvent Extractants for Precious Metal Ions. *Solvent Extraction and Ion Exchange*, 18(1): 55-76.
- Sastre, A.; Madi, A.; Cortina, J.L.; Miralles, N. (1998). Modelling Mass Transfer in Facilitated Supported Liquid-Membrane transport of gold(III) Using Phospholene Derivatives as Carriers. *Journal of Membrane Science*, 139: 57-65.
- Saucedo, I.; Guibal, E.; Roussy, J.; Le Cloirec, P. (1993). Chitosan and Derivatives: Application to Uranium Sorption. In: Torma, A.E.; Apel, M.L.; Brierley, C.L. (ed). *Biohydrometallurgical Technologies*. The Minerals & Materials Society, 45-54.
- Sole, K. (1999). *Process Experience*. Chemical and Industrial Applications. II International Solvent Extraction School (ISES'99). Barcelona, Spain. 12-16 July 1999.
- Tavlarides, L.L.; Bae, J.H.; Lee, C.K. (1987). Solvent Extraction, Membranes, and Ion Exchange in Hydrometallurgical Dilute Metals Separation. *Separation Science and Technology*, 22(2&3): 581-617.
- Tien, C. (1994). *Adsorption Calculations and Modeling*. Oxford, U.K.: Butterworth-Heinemann.
- Tong, P.; Baba, Y.; Adachi, Y.; Kawazu, K. (1991). Adsorption of Metal Ions on a New Chelating Ion-Exchange Resin Chemically Derived from Chitosan. *Chemistry Letters*, 1529-1532.
- Tsezos, M. (1986). Adsorption by Microbial Biomass as a Process for Removal of Ions Process or Waste Solutions. In: Eccles, H. and Hunt, S. (ed.). *Immobilization of Ions by Bio-sorption*. Chischester, UK: Ellis Horwood, p. 201-218.
- Uragami, T.; Matsuda, T.; Okuno, H.; Miyata, T. (1994). Structure of Chemically Modified Chitosan Membranes and Their Characteristics of Permeation and Separation of Aqueous Ethanol Solutions. *Journal of Membrane Science*, 88: 243-251.
- Urano K.; Tachikawa H. (1991). Process Development for Removal and Recovery of Phosphorus from Wastewater by a New Adsorbent. 2. Adsorption Rates and Breakthrough Curves. *Industrial & Engineering Chemistry Research*, 30: 1897-1899.

- Villaescusa, I.; Salvadó, V.; de Pablo, J. (1997). Solid-Liquid Extraction of Au(III) from Aqueous Chloride Solutions by Tri-n-dodecylammonium Chloride Impregnated in Amberlite XAD-2 Resin. *Reactive & Functional Polymers*, 32: 125-130.
- Virginia Tech Intellectual Properties, Inc. (1999). Method of Making Magnetic, Crosslinked Chitosan Support Materials and Products Thereof. United States Patent, nº 5864025, 1999-06-26.
- Volesky, B. (1999). Biosorption for the Next Century. In: Amils, R.; Ballester, A. (ed.). *Biohydrometallurgy and the Environment toward the Mining of the 21st Century*. Amsterdam, The Netherlands: Elsevier, p. 161-173.
- Wan Ngah, W.S.; Liang, K.H. (1999). Adsorption of Gold(III) onto Chitosan and N-carboxymethyl Chitosan: Equilibrium studies. *Industrial & Engineering Chemistry Research*, 38(4): 1411-1414.
- Warshawsky, A.; Strikovskiy, A.G.; Jerabek, K.; Cortina, J.L. (1997). Solvent-Impregnated Resins Via Acid-Base Interaction of Poly(4-vinylpyridine) Resin and Di(2-ethylhexyl)dithiophosphoric Acid. *Solvent Extraction and Ion Exchange*, 15(2): 259-282.
- Wase, J.; Forster, C. (1997). *Biosorbents for metal ions*. London: Taylor & Francis.
- Watanabe, S. (1991). A History of Precious Metals. In: Benner, L.S.; Suzuki, T.; Meguro, K.; Tanaka, S. (ed.). *Precious Metals Science and Technology*. Allentown, U.S.A: IPMI, p. 8-11.
- Wolborska, A. (1989). Adsorption on Activated Carbon of p-Nitrophenol from Aqueous Solution. *Water Research*, 23(1): 85-91.
- Yagi S.; Kunii D. (1961). Fluidized-Solids Reactors with Continuous Solids Feed-II: Conversion for Overflow and Carryover Particles. *Chemical Engineering Science*, 16: 372-379.
- Yang, T.C.; Zall, R.R. (1984). Adsorption of metals by natural Polymers Generated from Sesfood Processing Wastes. *Ind. Eng. Chem. Prod. Res. Dev.*, 23: 166-172.
- Yiacoumi, S.; Tien, C. (1995). Modeling Adsorption of Metal Ions from Aqueous Solutions. I. Reaction-Controlled Cases. *Journal of Colloid and Interface Science*, 175: 33-346.
- Zolotarev, P.P.; Dubinin, M. M.; Nikolaev, K. M.; Poljakov, N. S.; Radushkieich, L. W. (1972). Investigation of Adsorption Dynamics in a Broad Range of Breakthrough Concentrations. Part 3. *Izv. Acad. Nauk. SSSR Ser. Khim.*, 7: 1484-1489.