

ION EXCHANGE AT THE MILLENNIUM

Editor: **J A Greig**

Contents

Water Treatment

A Historical Perspective of Ion Exchange Technology	1
<i>R. Kunin</i>	
Ion Exchange, Membranes and Combined Technologies. Choices for the Millennium.....	12
<i>M. Dyson and D. Threlfall</i>	
The Effect of Cation Resin Properties on Mixed Bed Performance in Condensate Systems	19
<i>S. Fisher, H. Hamann, L. Dey and M. Donnelly-Kelleher</i>	
The Technology of Rinsing in Ion Exchange Systems	27
<i>G. J. Crits</i>	
A Review of the Morpholine Form Condensate Polishing System at Oldbury-on-Severn Nuclear Power Station	35
<i>J. A. Richardson and S. G. Price</i>	
Continuous Electrodeionisation: Module Design Considerations for the Production of High Purity Water	44
<i>J. H. Wood, G. C. Ganzi and P. A. Springthorpe</i>	
New Advances in the Production of Ultra Low TOC Effluents with Virgin Resins	52
<i>M. C. Gottlieb and P. S. Meyers</i>	
Ion Exchange Modeling of Borates for Ultrapure Water Applications	61
<i>J. Lee, D. F. Hussey and G. L. Foutch</i>	
How to Handle Suspended Solids within Ion Exchange Resin (IER) Packed Bed Systems. System Analysis, Field Experience and Actual Solutions	69
<i>A. Medete</i>	
Lewatit - MonoPlus The Latest Generation of Monodisperse Ion Exchange Resins with Outstanding Properties for Optimising Water Treatment Systems	77
<i>A. Scheffler</i>	

The Eliminate Project Zero Effluent Nitrate Removal and Destruction from Drinking Water Sources.....	85
<i>M. J. Waite, P. M. Tucker, D. Wilson and D. Foster</i>	
The Microbiological Quality of Ion Exchange Softened Water.....	93
<i>S. A. Parsons, J. Quarumby and J. S. Hubble</i>	
Removal of Arsenic from Potable Water by Ion Exchange Resins	101
<i>A. Berdal, D. Verrié and E. Zaganianis</i>	
Nuclear	
Titanium Antimony Oxides: Synthesis and Ion Exchange Properties for Radioactive Caesium, Strontium and Cobalt.....	109
<i>P. Karhu, T. Möller, R. Harjula and J. Lehto</i>	
Development of an Advanced Ion Exchange Process for the Reprocessing of Spent Nuclear Fuels Outline of the Process and Separation Behavior of U(VI) and Pu(IV) from Fission Products	116
<i>Y. -Z. Wei, T. Arai, M. Kumagai, Y. Takashima, A. Bruggeman and M. Gysemans</i>	
Modelling the Ion Exchange Properties of Geological Materials and Implications for Radionuclide Mobility.....	124
<i>J. S. Small, M. G. Randall, P. K. Abraitis and P. N. Humphreys</i>	
Inorganic	
The Enhancement of Ammonium Ion Removal onto Columns of Clinoptilolite in the Presence of Nitrifying Bacteria.....	133
<i>L. R. Weatherley and R. J. McVeigh</i>	
A New Polymeric/Inorganic Hybrid Sorbent for Selective Arsenic Removal.....	142
<i>A. K. SenGupta, M. DeMarco and J. Greenleaf</i>	
Preparation and Utilisation of Synthetic Zeolite from PFA Waste.....	150
<i>C. Poole, H. Prijatama and N. M. Rice</i>	
Utilization of Sardinian Natural Clinoptilolites for Heavy Metals and Ammonium Removal.....	158
<i>R. Orrù, N. Lai, A. Cincotti, G. Cao, P. L. Accardo, M. Boi and R. Lonis</i>	
Clay Supported Extractants for the Removal of Copper (II) from Aqueous Solutions	166
<i>M. Cox, J. Rus-Romero and T. S. Sheriff</i>	
Selective Adsorption of Palladium on Insoluble Copper Ferrocyanides	175
<i>H. Mimura, M. Kimura, K. Akiba and Y. Onodera</i>	

Fundamentals

Sorption of Trace Heavy Metals by Hypersol-Macronet Polymer and Weakly Acidic Ion Exchanger: Characterisation and Application of Surface Complexation Theory	183
<i>B. Saha and M. Street</i>	
Potentiometric Titration of Polyfunctional Ion Exchangers	193
<i>V. S. Soldatov</i>	
Computerized Description of the Concentration Waves in Nonlinear Multicomponent Ion Exchange Systems on the Basis of the Surface Complexation Model	201
<i>A. I. Kalinichev and W. H. Höll</i>	

Resin Developments

The Use of Selectivity Coefficients to Evaluate the Efficiency of Ion Exchange Resins when Used in Columns	210
<i>J. Irving</i>	
Model Based Comparison of Various Methods for Three Component Separation in Simulated Moving Bed	219
<i>B. Csukás, G. Rossiter and R. Wooley</i>	
Distributor Effect on Expanded Bed Adsorption	230
<i>E. S. Santos, R. Guirardello and T. T. Franco</i>	
Silica Gel Bonded Zwitterionic, Flexible Functional Groups: A Molecular Modeling Supported Investigation of Structure-Property-Relationship	238
<i>G. Damkröger, M. Grote, S. Drees, C. Eppelt and H. Marsmann</i>	
Synthesis and Ion Exchange/Coordinating Properties of Resins with Ketophosphonate Ligands	247
<i>A. W. Trochimczuk</i>	
Thermally Stable Anion Exchange Resins (Diaion® XSA Series): Characteristics and Applications	253
<i>S. Masuda, K. Andou, H. Kubota and J. Watanabe</i>	
Macronet, The Birth and Development of a Technology	261
<i>J. A. Dale, N. V. Nikitin, R. Moore, D. Opperman, G. Crooks, D. Naden, E. Belsten and P. Jenkins</i>	
A Shortcut to Higher Regeneration Efficiency with Shallow Shell Resins	269
<i>J. Sabzali and C. F. Michaud</i>	

Biotechnology

- Separation of Hydroxycitric Acid from Fruit Pectins and Polyhydroxyphenols on Gel-coated Macroporous Polyethylenimine 279
M. Chanda and G. L. Rempel
- Elution Chromatography and Displacement Chromatography of Amino Acids on a Strong Base Resin by Means of an Aqueous Solution of Carbon Dioxide under Pressure 289
Z. Pasztor, A. Zammouri, S. Chanel, L. Muhr and G. Grevillot
- Regeneration of a Styrenic Divinylbenzenic Strong Base Resin for Sugar Decolourisation with Calcium Chloride in a Calcium Saccharate Solution 298
L. S. M. Bento and C. Correia
- Development of a Palatable Liquid Formulation of a Bitter Tasting Drug using Ion Exchange Resins for Taste Masking 306
D. P. Elder, A. Park, P. Patel and N. Marzolini
- Use of Anion Exchangers for the Separation of Two Isoenzymes of Glucoamylase from *Aspergillus niger* 314
R. Soriano, L. F. Bautista, J. F. Escobedo, M. Martínez and J. Aracil
- Surface Molecular Imprinted Resins Recognizable Amino Acid Chirality 322
M. Goto, M. Yoshida, K. Uezu and S. Furusaki

Process Development

- Alternative Ion Exchange Technologies: Synthesis of Sodium Hydroxide from Sodium Chloride and Calcium Hydroxide on Carboxylic Cation Exchanger 330
D. Muraviev, J. Gaona and M. Valiente
- Swollen-State Morphology of Hypersulfonated Ion Exchanger Catalysts 338
K. Jerábek, L. Hanková and Z. Prokop

Hydrometallurgy

- Evaluation of Metal Uptake of Purolite's Novel Weak Base and Chelating Resins 345
P. Outola, H. Leinonen, M. Ridell and J. Lehto
- The Adsorption of Base Metals and Precious Metals on IR200 Ion Exchange Resin 353
E. R. Els, L. Lorenzen and C. Aldrich

Extraction of Gold Cyanide from Leaching Solutions from Auriferous Residues Polluted with Mercury using Fibrous Ion Exchange Resins	361
<i>R. M. Kautzmann, J. L. Cortina, C. H. Sampaio, V. S. Soldatov and A. Shunkevich</i>	
Selective Adsorption of Lead from Aqueous Solutions using Novel Modified Active Carbons and Marine Algal Biomass.....	369
<i>D. J. Malik, V. Strelko (Jr), M. Streat and A. M. Puziy</i>	
Separation of Mixtures of Dissolved Heavy Metals by Means of Parametric Pumping with Variation of pH.....	377
<i>W. H. Höll, C. Stöhr, R. Kiefer and C. Bartosch</i>	

Author Index

Subject Index