

# Recovery of Fermentation Products

## Engineering Foundation Conference

### Co-chairs

Charles L. Cooney, Massachusetts Institute of Technology, USA  
Kenneth G. Taksen, Pfizer, Inc., USA

The Cloister, Sea Island, Georgia, USA  
29 January - 3 February, 1984

Sunday, 29 January

### Plenary Lectures

#### **Separations Technology: Achilles Heel of the Bioprocess Industries**

E. Gaden, University of Virginia, USA

#### **Innovation in Separations: Key to Success in Adapting Modern Biology to Industrial Practice**

A. Michaels, USA

Monday, 30 January

### Cell Disruption and Harvesting

#### Session Chairs

J. Sinskey, Massachusetts Institute of Technology, USA  
C.G. Rosen, Alfa Laval, Sweden

#### **Centrifugal Separation in Biotechnology**

A. Larsson, Alfa Laval Separation, Sweden

#### **Genetic Solutions to Cell Disruption Problems**

A. J. Sinskey, Massachusetts Institute of Technology, USA

#### **Production and Reaction Kinetics of Microbial Cell-Lytic Enzyme Systems**

J. Asenjo, B. A. Andrews and J. B. Hunter, Columbia University, USA

#### **Mechanical Disruption of Cells**

C. Engler, Texas A & M University, USA

### Purification Methods: Membrane Process

#### Session chair

R. Tutunjian, Amicon Corp., USA

#### **Evaluation of Current Ultrafiltration Membranes in Biotechnology**

W. C. McGregor, Hoffman-La Roche, Inc., USA

#### **Cross Flow Filtration for Protein Recovery**

K.H. Kroner, Gesellschaft für Biotechnologische Forschung, Germany

#### **Recovery of an Extracellular Antibiotic by Ultrafiltration**

D.P. Gravatt and T. E. Molnar, Merck & Co., USA

Tuesday, 31 January

### Purification Methods: Chromatography and Adsorption

#### Session Chairs

Saxena, Bio Rad Laboratories, USA

M. Ladisch, Purdue University, USA

#### **Scale-Up Considerations in Process HPLC**

V Saxena, BioRad Laboratories, USA

#### **Purification of Pharmaceutical Compounds by Process HPLC**

W. Skea, Millipore Corp., USA

#### **Scale-up of Affinity Chromatography**

H. W. Blanch, University of California, USA

#### **Protein Recovery from Unclarified Cell Homogenates**

P. Hedman, Pharmacia Fine Chemicals, Sweden

#### **Selective Recovery of Polar Organics by Solvent Regenerated Adsorptive Processes**

C. J. King, University of California, USA

#### **Column Design Factors in Aqueous Liquid Chromatography of Fermentation Substrates and Products**

M. R. Ladisch, Purdue University, USA

### Purification Methods: Extraction

#### Session chair

J. King, University of California, USA

#### **Strategy, Tactics and Constraints in Applying Liquid-Liquid Extraction to the Biotechnology Field**

R. Blumberg, Miles Laboratories, Israel

#### **Continuous Extraction of Enzymes in Aqueous Phase Systems**

M -R. Kula, Gesellschaft für Biotechnologische Forschung, Germany

#### **Ion-Pair Extraction of Penicillin**

K. Schugerl, University of Hannover, Germany

#### **Super Critical Fluid Extraction: State of the Art**

R. Reid, Massachusetts Institute of Technology, USA

#### **Super Critical Fluid Extraction of Lipids from Fermentation Products**

V. Krukonis, Phasex, USA

Wednesday, 1 February

## **Purification Methods: Electrokinetic**

### **Session Chairs**

P. B. Reed, Ionics, Inc., USA

A. Ramel, Genentech, USA

### **Electrodialysis in the Separation of Chemicals**

W. A. McRae, Ionics, Inc., USA

### **The Use of Electrodialysis and Recycling Isoelectric Focusing for the Purification of Proteins including Interferon**

T.L. Nagabhushan, Schering Corp., USA

### **New Electrophoretic Methods that give High Capacity Equilibrium Separation**

P. O'Farrell, University of California, USA

### **Electrical Purification of Glutathione and Electrochemical Reduction of Oxidized Glutathione**

Y. Yokoo and S. Noguchi, Kyowa Hakko, Japan

### **Advances in Electrophoretic Separations**

R.S. Snyder, NASA, USA

## **Workshop Sessions on Economics and Scale-up**

### **Cell Harvesting**

D.I. C. Wang, Massachusetts Institute of Technology, USA

### **Cell Disruption**

M.-R. Kula, Gesellschaft für Biotechnologische Forschung, Germany

### **Membrane Processes**

M. Keyes, Pfizer, Inc., USA

### **Chromatography**

S. Builder, Genentech, Inc., USA

Thursday, 2 February

## **Purification Methods: Precipitation/Crystallization**

### **Improvement in Process Design for Protein Purification by Precipitation**

M. Hoare and P. Dunhill, University College, London, UK

## **Integration of Fermentation and Recovery Systems**

### **Session Chairs**

W. Wernau, Pfizer, USA

H. Blanch, University of California, USA

### **Membrane Bioreactors**

J. Quinn, University of Pennsylvania, USA

### **Process Improvement through Integrating Fermentation with Extraction Processes**

H. Y. Wang, University of Michigan, USA

### **By-Product Effects on Fermentation Recycle Systems**

B.L. Maiorella, University of California, USA

## **Integrated Fermentation and Recovery in Membrane Entrapped Cell Cultures by**

M. L. Shuler, Cornell University, USA

## **Plenary Lecture**

### **Interactions between Fermentation and Downstream Protein Processing**

M. Lilly and M. M. Fish, University College, London, UK

Friday, 3 February

## **Integration of Fermentation and Recovery Systems**

### **Session Chairs**

W. Wernau, Pfizer, USA

H. Blanch, University of California, Berkeley, USA

### **Fermentation Process Integration - A New Approach**

A.R. Thomson, Harwell, UK

### **Integration of Fermentation and Separation through Two-Phase Aqueous and Membrane Systems**

B. Mattiason, University of Lund, Sweden

### **Enzyme Production with Insoluble Substrate Recycle**

J. Berke, Institute for Biotechnology, Germany

### **Continuous Hybridoma Growth and Monoclonal Antibody Production in a Hollow Fiber Reactor**

Georges Belfort, Rensselaer Polytechnic Institute, USA

### **Selective Lactose Crystallization from Lactose, Fructose and Galactose Syrups in the Enzymatic Hydrolysis of Whey**

J. Prenosil, ETH Zurich, Switzerland

## **Poster Session**

### **Session Chair**

W. -S. Hu, University of Minnesota, USA.

### **The Rapid Isolation of Protein from Complex Mixtures**

Gary J. Calton, Purification Engineering, Inc., USA

### **Continuous Flow Membrane Plasmapheresis Theoretical Models for Flux & Hemolysis Prediction**

Clark K. Colton and Andrew L. Zydney, Massachusetts Institute of Technology, USA

### **Protein Recovery from Lysates Using Tangential Flow Filtration**

Raymond Gabler and Mary Ryan, Millipore Corporation, USA

### **Primary Particle Formation in Protein Precipitation**

Clark Nelson and Charles Glatz, Iowa State University, USA

### **Purification of Biosynthetic Human Insulin from E. Coli**

P. Tocher, J. Cunningham, W. Bradley, S.A. Cockle and E. James, Connaught Research Institute, Canada

### **Extraction of Insulin-Related Material from Prokaryotes**

Chaim Rubinovitz and Joseph Shiloach, National Institutes of Health, USA

**Purification Process Development Using HPLC and Mass Balance Computer Programs**

M. Thille, Rhône-Poulenc Inc., USA

**Preliminary Investigation on an Enzyme Recovery Process Based on the Principles of the Liquid Membrane Process**

K. Van T Riet, M. Dekker, Wageningen Agricultural University, The Netherlands

**Improvements in Process Design for Protein Purification by Precipitation**

M. Hoare and P. Dunnill, University College London, UK

**Membrane Bioreactors**

John A. Quinn, University of Pennsylvania, USA

**Process Improvement through Integrating Fermentation with Extraction Processes**

Henry Y. Wang, The University of Michigan, USA

**Inhibitor Accumulation and Toxic Effects in Integrated Ethanol Fermentation and Recovery Processes**

B. L. Maiorella, H.W. Blanch and C.R. Wilke, University of California, USA

**Integration of Fermentation and Recovery in Membrane Entrapped Cell Cultures**

M. L. Shuler, P.A. Schamel, J.A. Grzyb, and T. Cho, Cornell University, USA

**Adsorption Equilibrium of Lysine on the Ion Exchange Resin**

Tetsuya Kawakita, Hiromasa Maruyama and Tsutomu Matsuishi, Cornell University, USA

**Recovery of the Immunosuppressant Cyclosporin A from Trichoderma Polysporum**

Argyrios Margaritis, Martin Rieger, and Jeff Tucker, The University of Western Ontario, Canada

**Membrane Processes for Fermentation Product Recovery — Reverse Osmosis and Coupled Transport**

Stephen L. Matson, Bend Research, Inc., USA

**Modeling and Sizing of an Adsorption Column**

B. Siret, Rhône-Poulenc Inc., USA

**Ethanol Recovery by Solvent Extraction**

D.W. Tedder, A. J. Eckles, P. J. Ferster, W. Y. Tawfik and A. S. Myerson, Georgia Institute of Technology, USA

**Membrane Dehydration of Azeotropic Ethanol/Water Vapor**

Mary K. Tripodi, Monsanto Company, USA

**Survey of Isolation Methods of Antibiotics from Complex Media - As Illustrated Ceph C**

Marvin Wildfeuer, Eli Lilly and Company, USA

