

Engineering Foundation Conferences

**MIXING XII**

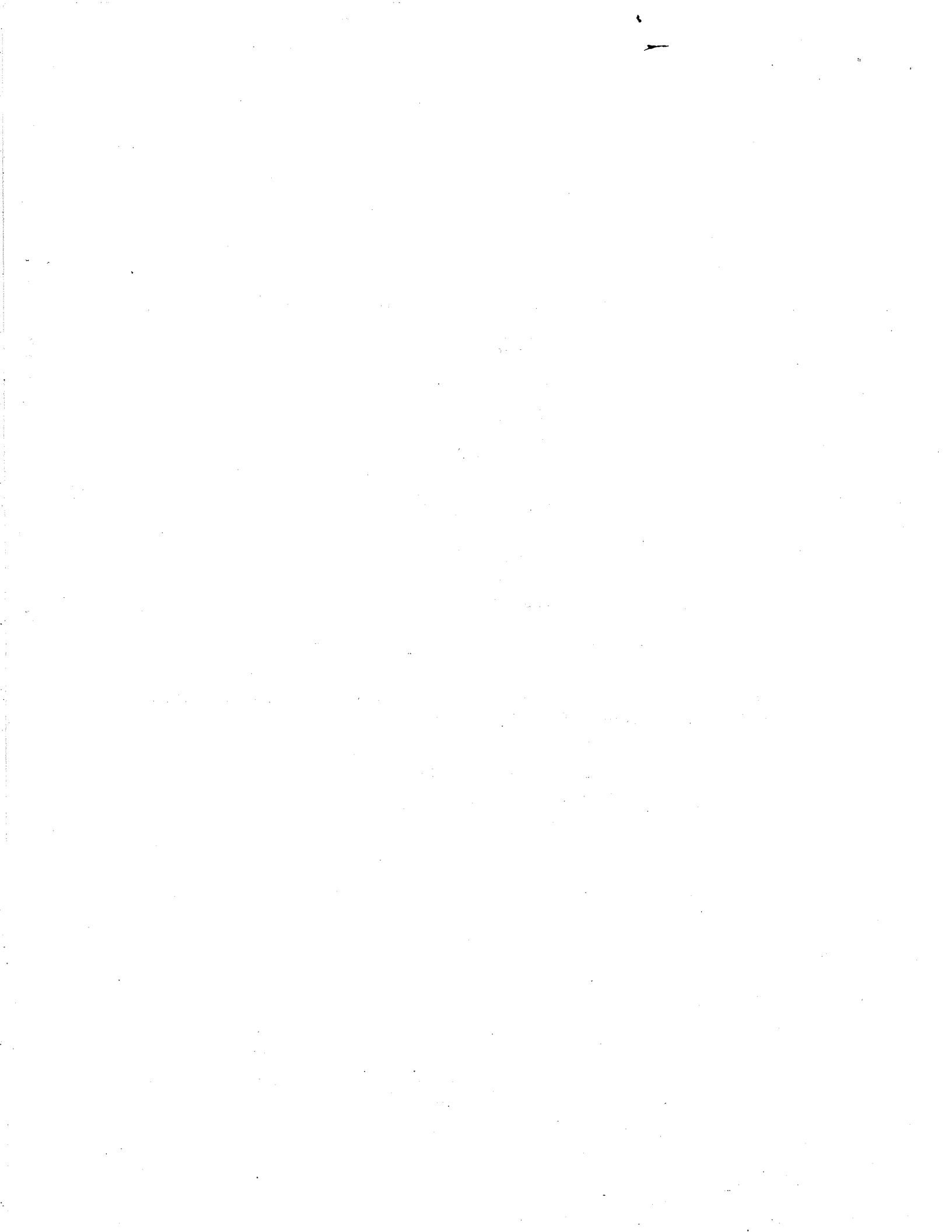
*Trout Lodge  
Potosi, Missouri  
August 6-11, 1989*

**FINAL PROGRAM**

Chairman:  
Ed Paul  
Merck & Company

Engineering Foundation greatly appreciates the financial support toward the conduct of this conference provided by the following companies:

Merck & Company  
Mixing Equipment Company  
Monsanto



Engineering Foundation Conference

**MIXING XII**

Trout Lodge

Potosi, Missouri

August 6-11, 1989

**FINAL PROGRAM**

**Sunday, August 6, 1989**

3:00 p.m.-9:00 p.m. REGISTRATION AND CHECK IN

6:00 p.m. DINNER

9:00 p.m.-11:00 p.m. SOCIAL HOUR

**Monday, August 7, 1989**

7:30 a.m. BREAKFAST

9:00 a.m.-12:00 noon

**CHARACTERIZATION OF MIXING**

Chairman: J. Oldshue, Mixing Equipment Co.

"*Mixing Due to Surface Tension Effects Study Under Micro Gravity Conditions*"

H. C. J. Hoelsloot and L. P. B. M. Janssen, Univ. of Groningen

"*Mixing and Segregation in Fluidized Beds of Binary Mixtures*"

A. C. Hoffman, L. P. B. M. Janssen and J. Prins, Rijksuniversiteit Groningen

"*Mixing Characterization in a Slab Tank*"

R. V. Calabrese, C. M. Stoots and A. M. Gavlik, Univ. of Maryland

"*Mixing and Suspension Capabilities of Vibrating Agitators in a Slab Tank*"

C. J. Ramsey, Texas A&M, E. A. Kyer III, G. B. Tatterson, Savannah River Lab.

"*The Role of Chemistry on Mixing Requirements*"

G. R. Goodley, DuPont

"*Mixing of Viscous Newtonian Liquids*"

L. Smit, F. Moens, Dutch State Mines Res.

"*Micromixing with Little Shear*"

U. Mann, Texas Tech.

12:00 noon LUNCH

2:00 p.m.-5:00 p.m. AD HOC SESSION

5:00 p.m.-6:00 p.m. SOCIAL HOUR

6:00 p.m. DINNER

7:00 p.m.-8:30 p.m.

**CRYSTALLIZATION AND PRECIPITATION**

Chairman: M. Midler, Merck & Co.

"*Mixing in Crystallizers: An Old Fashioned View*"

A. Nineow, Univ. of Birmingham

"*On the Mechanism of Secondary Nucleation in Suspension Crystallization*"

P. A. Shamlou, A. G. Jones, K. M. Djamarani, Univ. College London

**Monday, August 7, 1989 (continued)**

*"Production of High Purity, High Surface Area Crystalline Solids by Turbulent Contacting and Controlled Secondary Nucleation"*  
M. Midler, E. L. Paul, E. F. Whittington, Merck & Co.

**8:45 p.m.-10:00 p.m.**

**REPORT ON 3A MIXING WORKSHOP**

G. Tatterson, R. V. Calabrese

**10:00 p.m.-11:00 p.m.**

**SOCIAL HOUR**

**Tuesday, August 8, 1989**

**7:30 a.m.**

**BREAKFAST**

**12:00 noon**

**LUNCH**

**2:00 p.m.-5:00 p.m.**

**VISCOUS MIXING**

Chairman: Victor Atiemo-Obeng

*"The Relation Between Mixing Time and Circulation Time of Pseudoplastic Liquids in a Helical Ribbon Agitator"*

K. Takahashi, T. Yokoto and H. Konno, Yamagata Univ.

*"The Mixing of Viscous Liquids in a Counter Rotating Twin Screw Extruder"*

K. J. Ganzeveld and L. P. B. M. Janssen, Univ. of Groningen

*"Alternatives of HELAX Static Mixer Geometry and Some Applications"*

P. Ditzl and J. Kabatek, Czech Technical Univ.

*"The Use of Fluidfoil Impellers in Viscous Mixing Applications"*

R. J. Weetman, Mixing Equipment Co.

*"The ROSS PowerMix: A Revolutionary Design in Mixer Technology"*

D. M. Cohen, Ross & Son Co.

*"The Effect of Fluid Elasticity on Power Consumption in Agitated Vessels Equipped with Helical Ribbon-Screw Impellers"*

T. Merquiol and L. Choplin, Laval Univ.

*"Mixing Features of Extruders for Reactive Extrusion"*

D. B. Todd, Polymer Processing Institute

**5:00 p.m.-6:00 p.m.**

**SOCIAL HOUR**

**6:00 p.m.**

**DINNER**

**7:00 p.m.-10:00 p.m.**

**TURBULENCE AND MIXING**

Chairman: Piero M. Armenante, New Jersey Inst. of Tech.

Co-Chairman: I. Midey Chang-Mateu and Donald J. Koestler, Rohm & Haas

*"Local Wall Heat Transfer Coefficients Determined from Measurements with Heat Flux Sensors"*

Seungjoo Haam and Robert S. Brodkey, Ohio State Univ. and Julian B. Fasano, Chemineer, Inc.

*"Study of Impingement Mixing Using Laser Speckle Metrology"*

R. Chella, R. N. Sharma and T. R. Hanley, FAMU/FSU College of Engineering

*"Effect of Impeller Clearance on Complete Solid Dispersion in Two and Three-Phase Agitated Systems"*

Piero M. Armenante and Jessyca Susanto, New Jersey Inst. of Tech.

**Tuesday, August 8, 1989 (continued)**

*"The Trailing Vortex System Behind a Rushton Turbine Blade"*

Carl M. Stoots and Richard V. Calabrese, Univ. of Maryland

*"Flow Visualization Techniques on Rotating Impellers"*

Julian B. Fasano, Chemineer, Inc.

*"Solids Suspension in Stirred Tanks"*

R. N. Sharma, S. S. Peri and T. R. Hanley, FAMU/FSU

**10:00 p.m.-11:00 p.m.**

**SOCIAL HOUR**

**Wednesday August 9, 1989**

**7:30 a.m.**

**BREAKFAST**

**9:00 a.m.-12:00 noon**

**MULTIPHASE MIXING I LIQUID-LIQUID SYSTEMS**

Co-Chairman: L. Tavlarides, Syracuse Univ.

Co-Chairman: R. V. Calabrese, Univ. of Maryland

*"How Small Can a Dispersion Be"*

E. Bruce Nauman, Rensselaer Polytechnic Inst.

*"Drop Size Dependence of Coalescence Frequencies in Stirred Liquid-Liquid Dispersions"*

T. Tobin, H. A. Wright, R. Muralidhar and D. Ramkrishna, Purdue Univ.

*"Analysis of Transient Drop Size Distributions in Dilute Agitated Liquid-Liquid Systems"*

K.-C. Chang and R. V. Calabrese, Univ. of Maryland

*"Minimum Agitation for Complete Liquid-Liquid Dispersions"*

P. M. Armenante and D.-H. Tsai, New Jersey Inst. of Tech.

*"Analytical Instrumentation of Hydrodynamic Parameters and Concentrations of Liquid-Liquid Dispersions"*

L. L. Tavlarides and C. Tsouris, Syracuse Univ.

**12:00 noon**

**LUNCH**

**2:00 p.m.-4:00 p.m.**

**POSTER SESSION**

Chairman: G. Tatterson

*"Circulation Time Distribution in a Turbine - Stirred Tank"*

A. M. Gerlak and R. V. Calabrese, Univ. of Maryland

*"Gas-Liquid Reactors with Axially Pumping Impellers"*

A. Bakker, H. E. A. van der Akker, Laboratorium von Fysische Technologie

*"Study on Mixing Time and Turbulence Parameters in Fermenters for Culturing Mammalian Cells"*

Z. Zhibing and D. Gance, East China Univ. of Chem. Tech.

*"3-Dimensional Modeling of Mixing with Helical Ribbon-Screw Impeller"*

R. Lacroix, E. Brito de la Fuente, P. A. Tanguy and L. Choplin, Laval Univ.

*"Analytical Solutions Using Local Turbulence Models for Predicting Circulation and Mixing in Bubble Columns"*

R. G. Rice and K. G. Anderson, Louisiana State Univ.

**5:00 p.m.-6:00 p.m.**

**SOCIAL HOUR**

**6:00 p.m.**

**DINNER**

Wednesday, August 9, 1989 (continued)

7:00 p.m.-10:00 p.m.

MULTIPHASE MIXING II

GAS-LIQUID, SOLID-LIQUID, GAS-LIQUID EMULSIONS

Co-Chairman: L. Tavlarides, Syracuse Univ.

Co-Chairman: R. V. Calabrese, Univ. of Maryland

"Gas-Liquid Mass Transfer and Scale-up for Reactors Containing Non-Newtonian Liquids"

D. W. Hubbard and M. K. Wierenga, Michigan Tech. Univ.

"Enhancement of Gas-Liquid Mass Transfer in Agitated Tanks"

U. Mann, H. Zinuwadia and C. Forster, Texas Tech Univ.

"Power Draw in Agitated Gas-Liquid Tanks"

D. Ridgway, R. N. Sharma and T. R. Hanley, Florida State Univ.

"Solids Concentration Distribution in Slurry Reactors Stirred with Multiple, Axial Impellers"

F. Magelli, D. Fajner, M. Nocentini, Univ. of Bologna and P. Ditl and V. Marisko, Czech Tech Univ.

"Aeration of Agitated Emulsions"

T. Schneider and R. Vettermann, EKATO-Ruhr-und Mischtechnik

"Solid-Liquid Mixing with Two Distinct Solid Phases"

J. A. Von Essen, Philadelphia Mixers

Thursday, August 10, 1989

7:30 a.m.

BREAKFAST

2:00 p.m.-5:00 p.m.

SCALE-UP PREDICTION AND EXPERIENCE

Chairman: D. Short, DuPont

"Sludge Suspension in Waste Storage Tanks"

B. A. Hamm, W. L. West and G. B. Tatterson, Savannah River Lab.

"Mixing Time Measurement for Four Impellers in a 0.61m Diameter Vessel"

R. K. Grenville, BHRA *Steve*

"Mixing Hydraulics in Continuous Loop Reactors in Light of Experiments"

H. Gladki, Flygt Corp.

"New Materials of Construction for Industrial Mixers"

R. N. Salzman, Mixing Equipment Co.

"Investigation in Mixing in very Large Agitated Tanks with Aerated Slurry"

C. G. Koen, Consultant

"Fundamental Investigation of Special Reactor"

D. F. Ryan, L. P. B. M. Janssen, Univ. of Groningen

"Computing the Effects of Base Shape and Clearance on Flow Patterns in a Stirred Tank: A Case Study"

J. Middleton, M. K. Fitzgerald and J. Sanderson, ICI

5:00 p.m.-6:00 p.m.

SOCIAL HOUR

6:00 p.m.

DINNER

7:00 p.m.-10:00 p.m.

MIXING IN BIOLOGICAL SYSTEMS

Chairman: J. Placek, Enzyme Bio-Systems

Guest Speaker: Caroline McFarlane, Birmingham Univ. - Winner of I Chem.

E. Fluid Mixing Subject Group Paper Contest

**Thursday, August 10, 1989 (continued)**

*"Power Characteristics and the Gas-Liquid Hydrodynamics of the Prochem Maxflow Impeller"*

*"(Subject to be announced)"*

W. R. Tolbert, Invitron Corp.

*"Comparison of Mass Transfer Characteristics of Impeller and Sparge Design"*

J. Y. Oldshue, T. A. Post and R. J. Weetman, Mixing Equipment Co.

*"Mixing and Mass Transfer in Biological Systems"*

P. Forshner, R. Vetterman, Ekato

*"The Effect of Agitation Intensity on Growth and Antibody Production by Hybridoma Cells"*

A. W. Nienow, S. Oh, A. N. Emery and M. Al-Rubeai, Univ. of Birmingham

*"Large Scale Hydrodynamic Studies with Hydrofoil Impellers"*

A. W. Nienow, Univ. of Birmingham, B. Buckland, Merck & Co. and R. Weetman, Mixing Equipment Co.

10:00 p.m.-11:00 p.m.

SOCIAL HOUR

**Friday, August 11, 1989**

7:30 a.m.

BREAKFAST

9:00 a.m.-12:00 noon

**MIXING AND CHEMICAL REACTION**

Chairman: G. K. Patterson, Univ. of Arizona

*"Rapid Micromixing by the Impingement of Thin Liquid Sheets"*

Robert J. Demyanovich, ETH-Zurich

*"Mixing of Reactive Tracers in a Closed Stirred Vessel: Interpretation of Visualization Using Networks-of-Zones"*

R. Mann and S. K. Pillai, UMIST

*"A Model for Mixing, Diffusion and Chemical Reaction in Twin-Screw Extruders During the Derivation of Starches"*

R. T. Pieters and L. P. B. M. Janssen, Univ. of Groningen

*"Effect of Suspended Fibers and Macro-Mixing and Micro-Mixing in a Stirred-Tank Reactor"*

C. P. J. Bennington and J. R. Bourne, ETH-Zurich

*"Utilization of Instantaneous Reaction for Gas-Liquid Mass Transfer Studies"*

D. Ridgway, R. N. Sharma and T. R. Hanley, Florida State Univ.

*"Effects of Mixing and Convection on Chemical Reactions"*

G. K. Patterson and R. P. Zipp, Univ. of Arizona

12:00 noon

LUNCH

ADJOURNMENT

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