

Polyurethanes Technical Conference 2023

San Antonio, Texas, USA
25 - 27 September 2023

ISBN: 978-1-7138-9246-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2023) by American Chemistry Council
All rights reserved.

Printed with permission by Curran Associates, Inc. (2024)

For permission requests, please contact American Chemistry Council
at the address below.

American Chemistry Council
700 Second St., NE
Washington, DC 20002
USA

Phone: (202) 249-7000

www.americanchemistry.com

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

PAPERS:

APPLIANCE BLOWING AGENTS

Improved Thermal Insulation of Closed Cell, Rigid Polyurethane Foams Using High Efficiency HCFO Technology.....	1
<i>B. Parks, G. Thomaz, J. Guizoni</i>	
The Impact of Long-Term Aging on the Insulation Performance of a Rigid Polyurethane Foam Using a Coblwing Agent with HFO-1233zd(E)	7
<i>J. Costa, M. Sharp, B. Koo, B. Chen, N. Biber, L. Clarkson</i>	
High Performance Surfactants for Rigid Polyurethane Foams for Use in Domestic Appliance Formulations.....	22
<i>M.P. Palomo, M. Niu, P. Chaffanjon</i>	
Long Term Thermal k-Factor of Appliance Foam.....	41
<i>P. Stehley, J. Ling, M. Bogdan</i>	

AUTOMOTIVE COMPOSITES

Polyurethane-based Thermal Runaway Barrier Materials for Li+ Battery Packs in Electric Vehicles	55
<i>C. Shen, G. Shen, J. Jiang, S. Zhang</i>	
Evaluating the High Temperature Performance of Polyurethane Systems in HP-RTM for Composite Manufacturing	68
<i>A. Zolali, E. Shakour</i>	
Predictive Technology for Material and Flow Modeling to Manufacture Class A Parts Utilizing Polyurethane Products	76
<i>E. Shakour, J. McGuire, M. Lambi</i>	

AUTOMOTIVE SUSTAINABILITY

New Generation in Water Based Release Agents for Flexible Cold Cured PU with Dry Finish	85
<i>A.R. Guitart, J.N. Soy</i>	
Sustainable Polyester Polyol-Based Systems for Flexible Molded Polyurethane Foams in Automotive Applications.....	100
<i>T. Bates, A. Vandavelde, K. Xi, P. Berthels</i>	
Comparison of Test Methods for Determining the Concentration of Aromatic Amines in TDI Based Flexible Slabstock and Molded Foams: VDA 278 vs. CertiPUR-US®	107
<i>D.J. Kelley, A.R. Fortney, J.R. Sebroski, J.W. Miller, J.E. Hayes</i>	
Comparison Study on the Use of Sustainable Polyols for Automotive Seating	122
<i>E. Emmrich-Smolczyk, M. Vidakovic, A. Terheiden, R. Borgogelli, R. Stiltoner</i>	

CASE COATINGS

Novel High Performance, Sustainable Waterborne 2K and 1K Floor Coating Solutions.....	138
<i>L. Luo, J. Stanga</i>	
Polyurethane and Polyurea Coatings - A primer on the Nomenclature, Technology, Properties, and In-Market Use.....	149
<i>S. Reinstadtler</i>	
Innovative Polyisocyanate for Polyaspartic Coating Applications	160
<i>J. Stanga, L. Luo</i>	
A High Efficiency Metal-Free Catalyst for Silane-Modified Polyurethane (SPUR) Applications	170
<i>J. Shen</i>	

CASE ELASTOMERS BINDERS ADHESIVES

A Structure-Property Study of the Use Caprolactone Technology in Reactive Hot Melt Adhesives.....	178
<i>A. Cowell, N. Keane, A. Hodgson</i>	
Rethinking Foam with Energy-Damping, Strain-Rate Sensitive Elastomers	186
<i>H. Wu, K. Kirkwood, G. Policastro, W. Wong, J. Rolland, L. Heist</i>	
Investigation of Additives for MDI-Based Composite and Binder Applications	194
<i>J.H. Stengel</i>	
Hybrid Networks for High-Strength Polyurethane Applications.....	213
<i>A. Dhyani, B. Krishnan, A. Shete</i>	
The Effect of Annealing Procedure on the Morphology and Properties of TPU and TPU/CNS Nanocomposite Obtained by In-Situ Polymerization	221
<i>R. Rahimzadeh, J. Grondz, L. Barros, I. Manas-Zloczower</i>	

CIRCULAR ECONOMY RECYCLING

Enabling Cleaner Feedstock of Post-Consumer-Use Mattress Foams for Recycling.....	234
<i>D. Iyer, F. Wirawan, L. Willey, P. Goh, H. Senebandith, S. Srivastava</i>	
The Emergence of a Circular Economy for Flexible Polyurethane Foam and What is Needed to Accelerate its Establishment.....	237
<i>P. De Kort, M. Baumgartner, T. Mardas</i>	
Pathways to Circular Economy - A Co-Created Vision by and for the Polyurethane Foam Industry.....	244
<i>M. Abadian, J.D. Russell</i>	

CIRCULAR ECONOMY RENEWABLE

Application of CO ₂ Based Polyol; a Route to Sustainable Polyurethanes	249
<i>M. Kember, R. Stevenson, W. Lindeboom</i>	
Unique features of Plasticizer-Free Soft-TPU Made with Bio-Based Polyol from 3-Methy-1,5-Pentanediol and Sebacic Acid.....	259
<i>S. Okura, H. Tran, K. Mayahara</i>	

Non-alkoxylated Mannich Polyol for Increased Reactivity and High Renewable Content..... 268
D. Rhubright, J. Maxwell

Key Considerations for Improving the Sustainability of Automotive Flexible Foams..... 274
S. Kotaji, J. Wimble, F. Seyedkalal

FLEXIBLE FOAM

Developments in Viscoelastic Foam Formulations..... 280
M. McBride, T. Smiecinski

Novel Polyol for MDI Based Viscoelastic Foam with Double Tg LR Technology 289
M. Miura, T. Kunihiro, T. Yamamoto, H. Matsuda, H. Nakagomi

Modeling of Foam Composition and Properties for Viscoelastic Technology Development 300
A. Nunez, X. Tong, M. Springs, F. D'Ottaviano, C. Thiede

Next Generation Low Emission and Low-Density Furniture Foam Formulations from BASF 308
A. Alsaiee, J. Brutman, Z. Byrne

Monitoring of Diisocyanates and Aromatic Amine Concentrations in Key Areas of Slabstock
Production Facilities 315
P. De Kort

GLOBAL REGULATORY ROUNDTABLE

HFC Phasedowns, PFAS legislation, and Their Impact on Foam Blowing Agents 323
I. Choiniere, L. Massaro-Kustuch

RIGID FOAM

An HFO-Stable Catalyst for Polyurethane Foam 329
Y.S. Liu, D.T. Pham, J. Zhou, S. Kelley

Advances in Aromatic Polyester Polyols for Rigid Polyiso Industry 338
K. Xi, L. Wu, L. Yamato, S. Singh, J. Eubank, F. Pinto

Cashew Nut Shell Liquid-Based Polyols: Efficient, Sustainable Tools for Rigid Polyurethane
Foams Formulations 350
Y.M. Kim, P. Campaner, A. Natesh, F. Tavares

New Class of Non-Ionic Surfactant Compatibilizers for Complex Components of Polyol Streams in
Polyisocyanurate Foam Syntheses..... 366
R. Varadaraj, O. Normand, K. Fontenot

Unlocking Carbon Savings with Plastic Insulation Materials 377
A. Schmidt, A. Chertack

SPRAY FOAM

Environmental and Process Parameter Impacts on Spray Polyurethane Foam VOC Emission
Behavior 392
E.B. Wysong, S. Schweiger, M. Singh, B. Brown, J. Tobias, R. Wood

Unlocking the Performance of Opteon™ Foam Blowing Agents in Spray Foam Using Renewable Polyols.....	417
<i>J. Sowder, S. Ata, A. Blemings</i>	
Next Generation Amine Catalyst for Improved Spray Foam System Stability with Low GDP/OPD Hydrofluoroolefin (HFO) Blowing Agent.....	428
<i>M.P. Singh, J.D. Tobias, T.J. Miller, D. Brown</i>	
Effect of Introducing the Novel Aromatic Triazine Polyol in SprayFoam	449
<i>M. Rizmanova, Z. Zhong, G. Viswanathan</i>	

SUSTAINABILITY

Evaluation of 1,3-PDO Based Polyols in Polyurethane Water Dispersions (PUDs) for Synthetic Leather Applications.....	464
<i>S. Gahan, I. Sendjarevic, A. Sendjarevic</i>	
AI-Assisted Troubleshooting: Rare, Low-Hanging Fruit in Chemical Production.....	483
<i>O.A. Talib, M. Zweben</i>	
Production of High Bio-Content Waterborne Polyurethane Dispersions and Their Application in Synthetic Leather Production	490
<i>A.A. Vasileiou, A.R. Kakroodi, G. Sacripante, R. Vicol, N. Heidarzadeh, J.J. Robinson</i>	
New Polyester Polyol Dispersion for VOC-Compliant 2-Component Waterborne Coatings: Comparison of High-Performance Near-Zero-VOC Aliphatic Polyurethane/urea Floor Coating Technologies.....	499
<i>A. Zore, T. Scicchitano, C.D. Thomas</i>	

POSTERS:

CASE

The Effect of Annealing Procedure on the Morphology and Properties of TPU and TPU/CNS Obtained by In-Situ Polymerization	508
<i>R.R. Bafti, I. Manas-Zloczower</i>	
Novel Cycloaliphatic Cashew Nut Shell Liquid Based Isocyanate Blocking Agent for Lower Deblocking Temperature	509
<i>Y.M. Kim, P. Campaner, A. Natesh</i>	
The Study of pMDI as Binder to Prepare Molded Wood Pallet	510
<i>X. Wang, Q. Chen, S. Tu</i>	
High Performance Polyurethane Elastomers from Bio-Based Polyester Polyols.....	511
<i>G. Kwiatkowski, M. Ling</i>	
Investigating the Role of Phase Segregation and Thermal Conductivity in Polyurethane Thermally Conductive Adhesives	512
<i>R. Quiroz, J.M. Arroyo, H. Henderson, Y. Tang</i>	
Specialty Polyester Diol for Improved Hydrolysis Resistance and Adhesive Properties in Polyurethanes	513
<i>G. Reger, T. Konno</i>	

PPE Polyol Property Enhancements in MDI-Based Polyurethanes at Equivalent Hardness.....	514
<i>T. Banach, A. Cerullo</i>	

FLEXIBLE FOAM

Novel High Efficiency Catalysts for Slabstock Foam	515
<i>P. Evans, C. De Jager, S. Iachini, P. Frenkel</i>	

New Sleeved Test Containers for Measuring the Generation Process of Polyurethane Foam.....	516
<i>E. Hofmann, T. Tizzano</i>	

Molded Polyurethane Foam with Unique Characteristics of Mechanical Strength and Acoustic Performance.....	517
<i>L. Wang, J. Wu, E. Shakour, L. Lu, L. Abbasov</i>	

REGULATORY

HFC Phasedowns, PFAS legislation, and Their Impact on Foam Blowing Agents.....	518
<i>I. Choiniere, L. Massaro-Kustuch</i>	

RIGID FOAM

Graphene; An Affordable Solution for Polyurethane Foams	519
<i>N. Ketabi, V. Livoti, G. Gutierrez, A.K. Diallo, N. Moghimian</i>	

New Polyol for Improved Low Temperature Insulation Performance.....	520
<i>A. Ogunnyi, A. Ottens, A. Hu, K. Aou, R. Taylor, M. Rose</i>	

The Role of Crosslinker, Foaming Agent and Isocyanate Index for the Improvement of Specific Mechanical Properties of Rigid Polyurethane Foams Obtained From Soybased Solyols	521
<i>L.M. Chiacchiarelli</i>	

Effect of Opacifier and Nucleating Agent on the Thermal Performance of PU/PIR Foam	522
<i>S. Shrestha, C. Gainaru, T. Feng, T. Saito, A. Tamraparni, Z. Demchuk</i>	

SUSTAINABILITY

Foam-to-Foam Recycling Process of Thermoset Polyurethane by Exploiting Covalent Adaptable Networks	523
<i>S. Kim, A. Alsaiee, J. Brutman, K. Li, W. Dichtel</i>	

Enabling Cleaner Feedstock of Post-Consumer-Use Mattress Foams for Recycling.....	524
<i>D. Iyer, L. Willey, S. Srivastava, F. Wirawan, H. Senebandith</i>	

Unlocking Carbon Savings with Plastic Insulation Materials	525
<i>A. Schmidt, A. Chertack</i>	

Unique features of Plasticizer-Free Soft-TPU Made with Bio-Based Polyol from 3-Methy-1,5-Pentandiol and Sebacic Acid.....	526
<i>S. Okura, K. Mayahara, H. Tran</i>	

Innovations in the Recycling of Polyurethane for a Sustainable Recovery of Resources	527
<i>J. Cassimon, M. Nees, P. Billen, M. Porters, M. Adeel, C.V. Velde</i>	

Introduction of New Bio-Based Polycarbonate Diols DURANOL	528
<i>Y. Hirose, H. Katayama</i>	

Author Index