

31st Annual Conference of the North American Thermal Analysis Society 2003

**Albuquerque, New Mexico, USA
22-24 September 2003**

Volume 1 of 2

Editor:

Michael J. Rich

ISBN: 978-1-5108-1023-5

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© (2003) by the North American Thermal Analysis Society
All rights reserved.

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact the North American Thermal Analysis Society
at the address below.

North American Thermal Analysis Society
P.O. Box 4961
Louisville, KY 40204

Phone: (502) 456-1851
Fax: (502) 456-1821

info@natasinfo.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: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

PHARMACEUTICALS SESSION 1

Theory and Thermodynamics of Polymorphism	1
<i>David J. W. Grant</i>	
Characterization and Evaluation of Crystalline Dispersion System of a Poorly Water Soluble Compound	2
<i>Shufeng Li, Sophia Boniello, Sonali Bose, Bruno Galli, Steven Krill</i>	
Preformulation Studies To Meet The Challenges In The Manufacture Of Betaine Solid Dosage Form	6
<i>Cletus Nunes, Jun Han, Donald C. Monkhouse, Raj Suryanarayanan</i>	
FDA Compliant Thermal Analysis Software for the Pharmaceutical Industry	7
<i>Rudolf Riesen, Urs Jörnemann, Steve Sauerbrunn</i>	
Mg(II) Complexes with Heterocyclic Bioactive Ligands:Synthesis, and Thermal, Spectral and Biological Properties	12
<i>S. C. Mojumdar, B. Chowdhury</i>	

THERMAL HAZARDS/HIGH ENERGY MATERIALS SESSION 1

The Thermal Decomposition of Nitrocellulose	22
<i>David E. G. Jones, Richard Turcotte, Barbara Acheson, Queenie S. M. Kwok, Marie Vachon</i>	
Hazard Characterization of Mixtures of Ammonium Nitrate with Swimming Pool Chemicals	33
<i>David E. G. Jones, Christopher M. Badeen, Queenie S. M. Kwok, Marie C. R. Vachon, Richard Turcotte</i>	
Decomposition Pathways Of The Nitrogen-Rich Energetic Materials BTT And DAAT Investigated By Evolved Gas Analysis	43
<i>Stefan Loebbecke, Heike Schuppler, Wenka Schweikert</i>	
Henkin Critical Temperature Test as an Indication of the Violence of an Explosive during Thermal Decomposition	53
<i>Mary S. Campbell, Danielle A. Armijo</i>	
Evaluations of Kinetic Parameters and Critical Runaway Conditions under the Reaction Condition of Nitric Acid Mixed with Acetic Acid to Produce HMX in A Non-isothermal Batch Reactor	59
<i>Deng-Jr Peng, Cheng-Ming Chang, Chi-Min Shu</i>	
High-Speed Photography And Spectroscopy In Determining The Nature, Number And Evolution Of Hot-Spots In Energetic Materials	70
<i>William G. Proud, Carys E. Lloyd, John E. Field</i>	

THERMOPLASTIC POLYMERS

Evidence Of Pre-Order In Polymer Melts Revealed From Dielectric Spectroscopy	71
<i>Andreas Wurm, Ragab Soliman, Christoph Schick</i>	
Glass Transitions by DSC, TMA and DMA	81
<i>Steve Sauerbrunn, Rudolf Riesen, Michael Zemo</i>	
Thermoanalytical and Spectroscopic Evaluation of Readily Available Reference Polymers	89
<i>Alan T. Riga, Tim Nock, Anthony Malone, Michael Golinar</i>	
Is Devitrification Of The Rigid Amorphous Fraction Of Semicrystalline Polymers A Prerequisite For Reversing Melting?	98
<i>S. Adamovsky, Q. Chen, C. Schick</i>	
Investigation of the Rigid Amorphous Phase of Nylon 6/Montmorillonite Nanocomposites by Temperature-Modulated DSC	99
<i>Gunes Inan, Ceyhan Celik, Prabir K. Patra</i>	

GENERAL TOPICS

Products and Materials of Different Indian Cultures	109
<i>Hans. G. Wiedemann, Claudia Marcolli</i>	
Chain Length Dependence of the Thermodynamic Properties of Linear and Cyclic Alkanes	116
<i>Dinghai Huang, Sindee L. Simon, Gregory B. McKenna</i>	
Investigating The Thermal Conductivity Of Hydrocarbon And Petroleum Media Using A One-Sided Transient Thermal Conductivity Method	122
<i>Betty Catalina Rostro, Scott Selinger, Felipe Chibante, Enrique Barrera</i>	
Modulated Thermomechanical Analysis - Measuring Expansion and Contraction at the Same Time	123
<i>Roger L. Blaine</i>	
Limitations of DSC for the Measurement of Polymer Crystallinity	130
<i>Leonard C. Thomas</i>	
Thermal Conductivity Measurements of Conductive Epoxy Adhesives by MDSC	135
<i>Els Verdonck, Roger L. Blaine, Gunther Dreezen</i>	

Fictive Tg: Fact or Fiction	141
<i>Leonard C. Thomas</i>	

KINETICS

Stock-Taking in the Kinetics Cupboard	145
<i>Michael E. Brown</i>	
The Meaning of Activation Energy Values for Solid State Reactions Obtained from Thermogravimetric Measurements	146
<i>Bob A. Howell</i>	
Model-free Kinetics: Staying Free of Multiplying Entities without Necessity	153
<i>Sergey Vyazovkin</i>	
Self-heating and Determination of Kinetics Using ASTM Method E698	163
<i>Robert Behme, Jim McCarty</i>	
Application of Model-Free Kinetics to Some Pharmaceutical Stability Problems	172
<i>Deliang Zhou, Eric A. Schmitt, Geoff G. Z. Zhang, Devalina Law, Charles A. Wight, Sergey Vyazovkin, David J. W. Grant</i>	

POSTER PAPER ORAL SUMMARIES

Effect of Starch on the Thermal, Kinetics, and Transmittance Properties of Lysozyme	179
<i>Abdellatif Mohamed, Patricia Rayas-Duarte, Sanghoon Kim</i>	
Kinetic of Thermal Decomposition of Bixin Derived Seeds of Urucum (<i>Bixa orellana L.</i>) using Dynamic Thermogravimetry	189
<i>Marta C. D. Silva, Antonio G. Souza, Marta M. Conceição, Bruno F. Lira, José R. Botelho, Aderson De F. Dias</i>	
Kinetic Study of Mesoionic Compounds	196
<i>Renato F. Dantas, Maria F. S. Trindade, Antonio G. Souza, Marta M. Conceição, Anderson S. M. Simões, Soraya A. Moraes, Petrônio F. A. Filho</i>	
Thermal Degradation Kinetic Parameters of Heavy Petroleum Fractions Using Thermogravimetry	205
<i>Maria Luisa A Gonçalves, Ana Maria Rangel Teixeira, Deusá Angélica Pinto Da Mota, Marco Antonio Gomes Teixeira</i>	
Synthesis and Characterization of Nanometrics Tungstates using Pechini Method	211
<i>Sayonara L. Porto, Marta M. Conceição, Severino J. Guedes Lima, Fenelon M. L. Pontes, Elson Longo, Iêda M. G. Santos, Maria A. M. Maurera, Antonio G. Souza</i>	
The Use of Thermogravimetry to Study Thermal Behavior of Acetylsalicylic Acid in Tablet Mixtures	218
<i>Maria Luisa A Gonçalves, Damiana Cláudia Nunes Lopes, Ana Maria Raangel Teixeira, Deusá Angélica Pinto Da Mota, Luiz Felipe Lessa Oliveira</i>	
Kinetic Study from Different Tablets of Furosemide for DTA and TG Isothermal	224
<i>José W. E. Veras, Ticiano G. Do Nascimento, Fábio S. De Souza, Ana F. O. Santos, Rui O. Macêdo</i>	
Study of Thermal Degradation of Aspartame and its Products of Conversion in Sweetener using Isothermal Thermogravimetry and HPLC	230
<i>Marta M. Conceição, Antonio G. Souza, Maria F. S. Trindade, Ticiano G. Nascimento, Cícero F. S. Aragão, Rui O. Macêdo</i>	
Compatibility Studies Glyburide Drug - Adjuvant Pharmaceutical Using Dissolution and DSC Correlation and DSC and DSC-Photovisual System	239
<i>Rui O. Macêdo, Fábio S. De Souza, Severino A. L. Neto, Irinaldo D. B. Júnior, José W. E. Veras</i>	
Thermal Studies of Acetaminophen Drug by DSC Cooling and Photovisual	246
<i>Nadábia A. B. De Souza, Ana C. D. Medeiros, Ana F. O. Santos, Rui O. Macêdo</i>	
Thermal Characterization of Two Solvates Forms of Indinavir Sulfate Using TG, DSC and DSC-Photovisual	247
<i>Rosalí M. F. Silva, Ticiano G. Do Nascimento, Juliana S. Alencar, José W. E. Veras, Pedro J. R. Neto, Rui O. Macêdo</i>	
Characterization Studies Albendazole Drug by Dissolution and DSC Correlation and DSC and DSC-Photovisual System	254
<i>Rui O. Macêdo, Fábio S. De Souza, Irinaldo D. B. Júnior, Ana F. O. Santos</i>	
C_p Signal from MTDSC in Non-isothermal Conditions As a Tool to Obtain Morphological Information During Reaction-induced Phase Separation	255
<i>Steven Swier, Bruno Van Mele</i>	
A Study on Determination of Decomposition Characteristics	256
<i>Takaaki Mizutani</i>	
Thermal Behavior of Polyester/Phenolic Resins by TG/DTG/DTA	258
<i>Cheila G. Morhé, Priscila S. T. Amaral</i>	
The Growth of Fluoroapatite Bio-Glass-Ceramics, Precipitated in Lithium Disilicate Glass: Thermoanalytical and Morphological Study	265
<i>S. C. Majumdar, J. Kozankova, J. Chocholusek, J. Majling, D. Fábryová</i>	
Comparison of Purity Analyses of a Hindered Phenol Antioxidant Using HPLC and DSC Methods	275
<i>Michael K. Goodin, Roger C. Ayotte, John J. Tria</i>	
Characterization of Sustained release Ritalin®, Methylphenidate Hydrochloride, by Isothermal Thermal Mechanical Analysis	280
<i>Michael Tetelman, Alan T. Riga, Marcia Williams, Kenneth S. Alexander</i>	
An Overview Of The Dynamic Mechanical Analysis Of Elastomers	285
<i>Juergen E. K. Schawe</i>	

Polymer and Cement Based Composite Materials: Synthesis, Moisture Resistance, Thermal, SEM, Chemical and Magnetometric Analysis .	295
<i>S. C. Majumdar, A. Ray, F. Hanic, M. Drabik, K. G. Varshney, B. Chowdhury, R. C. T. Slade</i>	
Thermal Analysis for Materials Characterization, Design, and Processing	305
<i>Denise N. Bencoe, Christopher Hammeter, Christopher B. Diantonio</i>	
Towards Improved Models to Rationalize and Estimate Decomposition Temperatures of Nitroalkanes, Nitramines and Nitric Esters	306
<i>Eric Theerlynck, Didier Mathieu, Philippe Simonett</i>	
The Microstructure and Optical Transmittance Thermal Analysis of Sodium Borosilicate Bio-Glasses	316
<i>S. C. Majumdar, J. Kozankova, J. Chocholusek, J. Majling, V. Nemecek</i>	
WETSYS : An Automated Relative Humidity Device For The Calvet Calorimeters . Applications To The Stability Of Pharmaceutical Materials	326
<i>Pierre Le Parlouer, Christophe Mathonat, Iggy Chan</i>	
Development and Evaluation of a TG/DTA/Raman System	327
<i>Wendy J. Collins, Corey Dubois, R. Thomas Cambron, Nancy L. Redman-Furey</i>	
Surface Free Energy Prediction of Crystals in Polymers by Thermal Analysis.....	336
<i>Nobuyuki Tanaka</i>	
A Study of the Value of Thermal Mechanical Analysis in Assessing Disintegrants in Pharmaceutical Tablets	340
<i>M. A. Williams, K. S. Alexander, A. T. Riga</i>	
Dynamic Mechanical Analysis of Plastic Bonded Explosives	341
<i>Mary S. Campbell</i>	
Synthesis, Chemical, Thermal, Electrical and X-Ray Diffraction Analysis, and Hydration of Portland Cement - Zeolite Mortar in Water and Sulphate Solution	347
<i>S. C. Majumdar, I. Janotka, L. Krajci, A. Ray</i>	
Use of a TG/DTA/Raman System to Monitor Desolvation and Phase Conversions	357
<i>Wendy J. Collins, Adrienne S. Bigalow-Kern, R. Thomas Cambron, Nancy L. Redman-Furey</i>	
OIT Measurement of Standard Motor Oils by Pressure DSC	365
<i>Rudolf Riesen, Matthias Wagner, Michael Zemo</i>	
Kinetic Parameter of Reject Co-Processing by Thermal Analysis	366
<i>Cheila G. Mothé, Valéria C. De Almeida, Lídia Yokoyama, Heitor F. Mothé Filho</i>	
Fire Resistance of Laponite and Montmorillonite Based Nylon 6 Nanocomposites	373
<i>Gunes Inan, Prabir K. Patra, Yong K. Kim, Steven B. Warner, Nicholas A. Dembsey</i>	

PHARMACEUTICALS

Thermal Behavior the Ampicillin Drug Substance in Human Plasma Using DSC-Cooling.....	374
<i>Mônica O. Da Silva Simões, A. P. Barreto Gomes, Nadabia A. B. Souza, Alan Riga, Rui Oliveira Macêdo</i>	
Determination Of The Vapor Pressure-Temperature Relationship Of The Drug Metronidazole Using Thermogravimetry	384
<i>Lori Burnham, Kenneth S. Alexander</i>	
HyperDSC™ and Its Applications on Pharmaceutical and Bio Materials	390
<i>Lin Li, Svenja Goth, Krista Swanson Fiorini</i>	
Investigation of Pharmaceuticals Using Coupled Thermoanalytical Methods (TG-MS, TG-FTIR).....	391
<i>Csaba Novak, J. M. Rollinger, Zs. Ehen, O. Bene, K. Marthi, V. J. Fernandes Jr.</i>	

THERMAL HAZARDS/HIGH ENERGY MATERIALS

A Study on Kinetic Model for Thermal Decomposition of MEKPO	392
<i>Min-Hao Yuan, Chi-Min Shu, Kun-Yue Chen, Arcady Kossoy</i>	
A New Source of Evidence: Explosive Traces in Hair	399
<i>Jimmie Oxley, James Smith, Louis Kirschbaum, Kajal Shinde, Suvarnashore Maringanti</i>	
Thermal Decomposition of Explosives in Soil	405
<i>Junqi Yue, Jimmie C. Oxley, James L. Smith</i>	
Adiabatic Self Heating and Isothermal Heat Generation Rate of Rocket Propellant Formula-tions Containing ε-HNIW (ε -CL20) and GAP Binder	411
<i>Manfred A. Bohn</i>	
Thermal Decomposition of Hexanitrohexaazaisowurtzitane (CL-20)	421
<i>Yan Liu, Zi-Ru Liu, Cui-Mei Yin</i>	

BIOCALORIMETRY/CALORIMETRY

Introduction Of A Very High Pressure Microdsc : Applications To The Charcaterization Of Gas Hydrates Formation	428
<i>Pierre Le Parlouer, Christine Dalmazzzone, Benjamin Herzhaft, Christophe Mathonat, Iggy Chan</i>	
The Use of Calorimetric Methods in the Investigation of the Toxicity of Propolis Against Insects and Mites	434
<i>Assegid Garedew, Erik Schmolz, Ingolf Lamprecht</i>	
CTD2156 Is Basis For The Designing Of Multi-Channel Capillary Differential Titration Calorimeter	435
<i>Grigory V. Kotelnikov, Sophia P. Moiseyeva, Eugene V. Mezhburd, Eugene I. Maevsky, Elena V. Grishina</i>	

Is the Entropy Change for Growth by Aerobic Respiration Really Negative?	438
<i>Lee D. Hansen, Nicole McKinnon, Michael R. Phillips, Bracken M. Webb, Bruce N. Smith</i>	
Thermodynamics of Extremely Diluted Solutions.....	444
<i>Vittorio Elia, Marcella Niccoli</i>	

GENERAL TOPICS

Thermal Analysis of Polyamidoamine (PAMAM) Dendrimers and Derivatives	445
<i>Xiaodong Liu, Anne Jurek, Claire Hartman-Thompson, Petar R. Dvornic</i>	
The Measurement Of the Physical Properties of Various Rubbers as it Relates to Elasticity and Hysteresis by Thermal Analysis and Other Methods.....	446
<i>Joseph F. Greenbeck Jr., C. Greg Abney, Gilbert I. Vial</i>	
Advantages Of Fast Thermal Analysis For Polymer Characterization	455
<i>Juergen E. K. Schawe</i>	
Compatibility Testing of Polymeric Materials for the Urine Processor Assembly (UPA) of International Space Station (ISS)	462
<i>Charles D. Wingard</i>	
Thermal Behavior and Morphology of Two Thermoplastic Vulcanates, Potential Candidate Materials for Polymer Electrolyte Membrane Fuel Cell Components	469
<i>Joan T. Muellerleile, Jay R. Sayre</i>	

KINETICS

Using Kinetic Models to Predict Thermal Degradation of Fire-Retardant-Treated Plywood Roof Sheathing.....	476
<i>Patricia K. Lebow, Jerrold E. Winandy</i>	
Kinetic Analysis of Plastic Bonded Explosives Using Multivariate Non-Linear Regression and Critical Temperature Tests.....	486
<i>Mary S. Campbell</i>	
Thermal Study of Hexanitrohexaazaisowurtzitane (CL-20).....	496
<i>Marie C. R. Vachon, Queenie S. M. Kwok, David E. G. Jones, Richard Turcotte, Robert C. Fouchard</i>	
Evaluation of the Curing Kinetic for a Geopolymer using Differential Scanning Calorimetry	506
<i>A. Burl Donaldson, Benjamin Varela</i>	
Oxidative Behavior of ASTM Reference Engine Oils by Thermal Analytical Techniques.....	514
<i>Alan T. Riga, Peter Balint, Tara Kirchner, Steve Sauerbrunn, Bryan Biddlecom</i>	
Mechanistic Modeling of the Epoxy-amine Reaction in the Presence of Polymeric Modifiers by Means of Modulated Temperature DSC.....	524
<i>Steven Swier, Bruno Van Mele</i>	

PHARMACEUTICALS

Use of Humidity Controlled DSC (HC-DSC) as a Technique to Generate Rapid Physical Stability Phase Diagrams of Hydrates	535
<i>Chitra Telang, Jun Han, Raj Suryanarayanan</i>	
Amorphous Pharmaceutical Compound Molecular Mobility Assessment and Excipient Influence	543
<i>Rama A. Abu Shmeis, Zeren Wang, Steven L. Krill</i>	
DSC Method to Determine the Kauzmann Temperature, The Temperature of Zero Mobility In Amorphous Systems.....	551
<i>R. Bruce Cassel</i>	
Clustered and Unbound Water in the Excipient Microcrystalline Cellulose Determined by DSC and TGA	555
<i>Sumit Majumdar, Kenneth S. Alexander, Alan T. Riga</i>	
Characterization of Physiologically Relevant Fatty Acids by Differential Scanning Calorimetry and Dielectric Thermal Analysis	561
<i>Jason Gamez, Alan T. Riga</i>	
Kinetic Study of the Drug Metoprolol Tartrate Using Thermogravimetry.....	573
<i>Lori Burnham, Kenneth S. Alexander</i>	
Thermal Characterization Of The Amorphous Form Of Sulfapyridine-The Effect Of Humidity And Excipients.....	579
<i>Sandipan Sinha, Kenneth S. Alexander, Alan T. Riga</i>	
Evaporation Characteristics of Essential Oils in Relation to their Major Component Used in Aromatherapy by Thermogravimetry	585
<i>Pradyot Nandi, Kenneth S. Alexander, Alan T. Riga</i>	

THERMAL HAZARDS/HIGH ENERGY MATERIALS

Thermal Behavior of Hexanitrohexaazaisowurtzitane and 1,3,5-trinitro-1,3,5-triazacyclohexane Binary System.....	595
<i>Zi-Ru Liu, Cui-Mei Yin, Yan Liu, Xi-Ping Fan</i>	
Thermal Decomposition Kinetics of PDADN-RDX-CMDB Propellant at High Pressure	596
<i>Cui-Mei Yin, Yan Liu, Zi-Ru Liu, Feng-Qi Zhao, Gang Qiu, Chao Yuan</i>	

Interaction of HTPB with RDX and AP	600
<i>Feng-Qi Zhao, Zi-Ru Liu, Yan Liu, Xi-Ping Fan</i>	
Physical Characterization Of Tetryl By Modulated Differential Scanning Calorimetry.....	601
<i>Randall K. Weese</i>	
Correlating Explosive Properties to DSC Parameters	610
<i>Sanjeev R. Saraf, William J. Rogers, M. Sam Mannan, Glenn T. Bodman, Sima Chervin</i>	
Development of In-House Thermoanalytical Tools and Testing Techniques	618
<i>Linda D. Tuma</i>	
Application of Thermal Analytical Techniques in Development of A Safe and Robust Process.....	624
<i>Thientu T. Lam, Carl Bagner, Linda Tuma</i>	
Development Of A New Analytical Method For The Evaluation of Hazards From Slow Decomposition Of Waste Streams And Process Solutions.....	634
<i>Thomas P Vickery</i>	
The Self-Reactivity of Vinylacetylene via Adiabatic Calorimetry	640
<i>N. O. Gonzales, L. W. Zimmerman, M. E. Levin, N. Y. Vassiliev</i>	

THERMOSETS AND COMPOSITES

Microthermomechanical Probing of Composite Polymer Surfaces.....	641
<i>Vladimir V. Tsukruk</i>	

VOLUME 2

Evaluation of Different Methods of Measurement for the Isotropic Stress Development in Curing Thermosets	642
<i>Mikhail Merzlyakov, Yan Meng, Sindee L. Simon, Gregory B. McKenna</i>	
In Situ Monitoring of Reaction-induced Phase Separation with Modulated Temperature DSC: Comparison Between High-T_g and Low-T_g Modifiers.....	649
<i>Steven Swier, Bruno Van Mele</i>	
Kinetic Modeling of a Dicyanate Ester/glass Fibers Composite: Parameter Estimation Using Modulated DSC - Validation in Process Like Conditions Using Macrocalorimetry.....	N/A
<i>Jérôme Dupuy, Eric Leroy, Abderrahim Maazouz, Martin Raynaud, Emmanuel Bournez</i>	
Dynamic Mechanical Analysis Of Thermosetting Material During Curing Reaction	659
<i>Juergen E. K. Schawe</i>	
Future Materials Challenges	669
<i>C. Michael Garner, Paul Koning, Gary Brist, Rahul Manepalli</i>	
Thermo-mechanical Characterization of Electronic Packaging Materials.....	676
<i>Shalabh Tandon, Paul Koning</i>	
Characterization of Outgassing for EUV Technology.....	677
<i>Vani Thirumala, Wang Yueh, Heidi Cao, Hokkin Choi, Victoria Golovkina, John Wallace</i>	

SHAPE MEMORY MATERIALS

A Review Of Nickel-Titanium Shape Memory Alloys.....	678
<i>William Brantley</i>	
A Review Of The Use Of Conventional And Temperature-Modulated DSC To Investigate Phase Transformations In Nickel-Titanium Orthodontic Wires	688
<i>William Brantley, Masahiro Iijima, Thomas Grentzer, Wenhua Guo</i>	
A Review Of The Use Of Conventional DSC To Study Phase Transformations In New And Used Nickel-Titanium Rotary Endodontic Instruments	698
<i>William Brantley, Timothy Svec, Masahiro Iijima, John Powers, Thomas Grentzer, Satish Alapati</i>	
Thermal Analysis of Nickel-Titanium Shape Memory Ribbon Material for Thermal Fuse	708
<i>John Wu, Prasad S. Khadkikar</i>	

KINETICS (AFTER BREAK)

Chemical And Diffusion Control In Isothermal Curing Kinetics	718
<i>Juergen E. K. Schawe</i>	
Kinetic Analysis of a Fast Reacting Thermoset System	725
<i>R. Bruce Prime, C. Michael Neag, Candace Michalski</i>	
Characterization of Curing Behavior of Phenolic Resins by Differential Scanning Calorimetry: Model-Free Kinetics Compared to Conventional Kinetics	731
<i>Guangbo He, Bernard Riedl</i>	

POLYMORPHIC MATERIALS

Nucleation and Crystal Growth of Polymorphs Relevant to Screening	741
<i>David J. W. Grant, Chong-Hui Gu</i>	

Thermally Stimulated Current (TSC) A Spectroscopy Technique To Explore The Structural Organization Of Materials.....	742
<i>Pierre Le Parlouér, Christine Mayoux, Iggy Chan</i>	
Polymorphism Involving a Racemic Conglomerate and a Racemic Compound.....	748
<i>David J. W. Grant, Geoff G. Z. Zhang, Sophia Y. L. Paspal, Raj Suryanarayanan</i>	
The Role of TG/DTA in the Initial Evaluation of the Solid State Forms for Pharmaceutical New Chemical Entities, Part I: Evaluation of New Forms.....	749
<i>Wendy J. Collins, Michael L. Dicks, Nancy L. Redman-Furey, Jane Godlewski, Dana C. Vaughn</i>	
The Role of TG/DTA in the Initial Evaluation of the Solid State Forms for Pharmaceutical New Chemical Entities, Part II: Evaluation of Mixed Forms.....	758
<i>Wendy J. Collins, Michael L. Dicks, Nancy L. Redman-Furey, Jane Godlewski, Dana C. Vaughn</i>	
Physical Stability of Pharmaceutical Hydrates – Impact on Chemical and Pharmaceutical Development.....	766
<i>Jun Han</i>	

PHARMACEUTICALS

Use Of DSC And XRD To Characterize Phase Transitions During Freeze-Drying	767
<i>Abira Pyne, Rahul Surana, Raj Suryanarayanan</i>	
Application of Humidity Controlled DSC-XRD in Studying the Dehydration Behavior of Carbamazepine Dihydrate.....	768
<i>Jun Han, Geoff G. Z. Zhang, Devalina Law, Weili Wang, Michelle A. Long, Akira Kishi</i>	
Solid State Characterization of Anhydrous and Hydrous Forms of Aminophylline and their Drug Release Pattern	775
<i>Rajesh Vadlapatla, Kenneth S. Alexander, Alan T. Riga</i>	
Stability Studies of Mebendazole Drug, Pre-formulated and Tablets for TG and DSC Coupled to the Photovisual System	781
<i>Rui O. Macedo, Irinaldo D. B. Júnior, Fábio S. De Souza, Aline M. De Macedo, Thaise M. B. Soares, Ana F. O. Santos</i>	
Evaluation Of Eutectic Temperature And Eutectic Composition Of Some Of The Binary Mixtures Of Local Anesthetics And Terpenes And Their Pharmaceutical Application	787
<i>Lalit M. Oberoi, Kenneth S. Alexander, Alan T. Riga</i>	
DSC Study Of The Low Temperature Properties Of Vegetable Oils	794
<i>Paroma Chakravarty, Kenneth S. Alexander, Alan T. Riga</i>	
Thermal Characterization of Polylactic Acid.....	802
<i>Bhaswati Datta Chowdhury, Kenneth S. Alexander, Alan T. Riga</i>	

THERMAL HAZARDS/HIGH ENERGY MATERIALS

Correlation of the Flammability Limits of Hydrocarbons with the Equivalence Ratio	810
<i>A. Burl Donaldson, Ahmad Shouman</i>	
Thermodynamic Analysis of the Flammability Limits of Fuel, Oxygen and Inert Mixtures	819
<i>Ahmad Shouman, A. Burl Donaldson</i>	
Molecular Design of New Energetic Materials: Calculation of Performances and Thermal Stability.....	826
<i>P. Simonet, E. Bouton, D. Mathieu</i>	
Simulations of Isothermal Oven Tests of Impregnated Activated Carbons in Cylindrical and Cubic Sample Holders Based on Kinetics derived from Isothermal DSC Measurements	827
<i>Hubert Fortier, Shugao Zhang, J. R. Dahn</i>	
Interlaboratory Kinetic Studies Using ASTM Standards E2041 and E698 and Trityl Azide	837
<i>Roger L. Blaine</i>	
Fast Tools to Monitor Potential Dangerous Reactions	843
<i>Rudolf Riesen, Cyril Darribère, Michael Zemo, Ni Jing</i>	
An Improved Automatic Pressure Tracking Adiabatic Calorimeter for Chemical Process Safety, Hazard Screening, Counter-Terrorism and Battery Safety	851
<i>Peter Ralbovsky, Simon Chippett, Sk Singh, Raphael Kotherithara</i>	
The Investigation on the Relationship of Dynamic and Ultimate Compression Properties for Solid Propellant.....	861
<i>Xi-Ping Fan, Zi-Ru Liu, Li-Xia Sun, Jin-Fang Bai</i>	

THERMOSETS AND COMPOSITES

Thermoanalytical Characterization of Thermoset Polymers for Chemical Mechanical Polishing.....	867
<i>M. Moinpour, A. Tregub, G. Ng, J. Soroochian</i>	
Thermal Properties of Hybrid Polymer-Inorganic Nanocomposite Materials.....	868
<i>Catherine A. Kennedy, Bi-Zeng Zhan, Mary Anne White, Champika Samarasekera</i>	
Thermophysical and Mechanical Properties of Epoxy/Silica Nanocomposites	876
<i>Hiroaki Miyagawa, Michael J. Rich, Lawrence T. Drzal</i>	
Characterization of PMMA-OLS Nanocomposites Prepared by Emulsion Polymerization	886
<i>Laura L. Wells, Nathan Whately, Wei-Ping Pan</i>	
Thermal Analysis Applications in Microelectronics Industry.....	891
<i>Indira Adhihetty, Brian Moreira, Paddy Padmanabhan</i>	

Directional Properties of the In-situ Glass Transition of Lignin Evaluated by Submersion DMA	892
<i>Marie-Pierre G. Laborie</i>	

KINETICS

Reactions within the System, 2SrCO₃-Fe₂O₃	898
<i>Patrick K. Gallagher, John P. Sanders</i>	
Transmission Electron Microscopy(TEM) In-situ Experiments Coupled with Differential Scanning Calorimetry(DSC) as Characterization Tools for Thin Film Reactions on the Nanoscale	899
<i>Jack M. McCarthy, Fabian Radulescu, Eric Stach</i>	
Kinetics of the Thermal Decomposition the Erbium(III) Complex with β-diketone ligands and 1,10-Phenanthroline or 2,2-dipyridine	908
<i>Crislene R. Da S. Morais, Wilton S. Lopes, Antônio G. De Souza, Petrus D'A. Santa-Cruz, Laura H. Carvalho</i>	
Thermal Analysis Applied to Characterization of the SBA-15 Nanostructured Material	913
<i>Ana Carla S. L. S. Coutinho, Joana M. F. B. Aquino, Marcelo J. B. Souza, Antonio O. S. Silva, Marcos E. A. Silva, Valter J. Fernandes Jr., Antonio S. Araujo</i>	
Degradation of Polyethylene Over Nanostructured Catalysts Evaluated by TG and Pyrolysis-GC-MS.....	920
<i>Sulene A. Araujo, Massao Ionashiro, Antonio S. Araujo, Valter J. Fernandes Jr.</i>	
Synthesis and Characterization by Thermal Analysis of Copper and Nickel Supported on Silica and Alumina Catalysts	921
<i>José A. Moura, Antonio S. Araújo, Antonio O. S. Silva, Marcelo J. B. Souza Valter J. Fernandes Jr.</i>	
Thermogravimetric Determination Of Crystallinity Degree Of ZSM-12 Zeolite Synthesized With Different Si/Al Ratio	922
<i>Antonio S. Araujo, Valter J. Fernandes Jr. Joana M. F. B. Aquino, Antonio O. S. Silva, Marcelo J. B. Souza</i>	
Kinetic Parameters of Surfactant Remotion Occluded in the Pores of the AIMCM-41 Nanostructured Materials	930
<i>Marcelo J. B. Souza, Antonio O. S. Silva, Joana M. F. B. Aquino, Valter J. Fernandes Jr., Antonio S. Araujo</i>	

POLYMORPHIC MATERIALS

Spontaneous Helical Superstructure Formation of Achiral Liquid Crystals Invesigated by Thermal Analysis	938
<i>Kwang-Un Jeong, Jason J. Ge, Shi Jin, Brian Knapp, Frank W. Harris, Stephen Z. D. Cheng</i>	
Differential Scanning Calorimetry to Crystallize Metastable Polymorphs and Construct Free-Energy Temperature Diagrams.....	947
<i>Robert J. Behme</i>	
An Integral Approach To Solid State Issues, Highlighting High Throughput Screening.....	952
<i>Rolf Hilfiker</i>	
Implementing Best Practices for Controlling Polymorphism of Chiral Drugs	953
<i>Chong-Hui Gu, David J. W. Grant</i>	

KEYNOTE SPEAKER

Applications of Differential Scanning Calorimetry in Pharmaceutical Development.....	954
<i>Raj Suryanarayanan</i>	
Rheological Analysis of Tack	955
<i>Charles L. Rohn</i>	
Measurement of Viscoelastic Properties of PEEK/IM7 by Dynamic Mechanical Analysis (DMA)	956
<i>John H Suwardie, Jose Daniel Diniz Melo</i>	
How Rheology Touches Our Lives	961
<i>Ross Clark</i>	
Rheology Analysis of Chewing Gum	972
<i>John H Suwardie</i>	
The Physical Aging Response of a Polymer Glass after CO₂ Pressure Jumps	977
<i>Lameck Banda, Mataz Alcoutabi, Gregory B. McKenna</i>	
Measuring Bulk Modulus With A Densitometer	985
<i>Eric Brown, Joe Harris</i>	
Rheological Measurements in Thin Films Plasticized by Solvents: An Application of the Quartz Crystal Microbalance.....	986
<i>Allan L. Smith</i>	
Characterization of Pressure Sensitive Adhesives by Rheology.....	995
<i>Fred Mazzeo</i>	

THERMAL HAZARDS/HIGH ENERGY MATERIALS

The Investigation on Estimation of Physical Aging Life for Energetic Materials by DMA.....	1003
<i>Li-Xia Sun, Xi-Ping Fan, Zi-Ru Liu, Cui-Mei Yin, Shu-Yun Heng, Pei Zhang, Yang-Hui Kong</i>	
The Characterization of the Components of Pyrotechnic Systems by Sample Controlled Thermogravimetric Analysis.....	1009
<i>Edward. L. Charsley, James. J. Rooney, Helen. A. White, Beat. Berger, Trevor. T. Griffiths</i>	

Shelflife Prediction of a Rocket Motor Igniter by Thermal Analysis	1017
<i>Wim De Klerk, Beat Berger, Heinz Brechbuhl</i>	
Kinetics of a Thermite Reaction: Effect of Particle Size at the Nanoscale.....	1023
<i>Michelle L. Pantoya, Paul Bernazzani, Sindee L. Simon</i>	
The Investigation on Thermal Properties and Water Resistance of Primer Mixtures using Thermal Techniques.....	1030
<i>Kuen-Shan Jaw, Jinn-Shing Lee</i>	
Thermal Investigation of IA Metal Perchlorate.....	1031
<i>Kuen-Shan Jaw, Jinn-Shing Lee</i>	
The Investigation of the Relationship Between DSC Characteristic Parameters and Burning-rate of Solid Propellant	1032
<i>Yan Liu, Zi-Ru Liu, Feng-Qi Zhao, Cui-Mei Yin</i>	

THERMOPLASTIC MATERIALS

Quantitative Temperature-modulated Calorimetry.....	1033
<i>Bernhard Wunderlich</i>	
Crystallization and Melting Behaviors of PEO Nano-layer Crystals Confined in between Two PS nano Glassy layers.....	1039
<i>William Y Chen, Lei Zhu, Ping Huang, Christopher Y Li, Roderic P Quirk, Bernard Lotz, Stephen Zd Cheng</i>	
Analyzing Close Laying Melting Transitions with IsoStep® DSC.....	1041
<i>Steve Sauerbrunn, Rudolf Riesen, Blaine Weddle</i>	
Thermal and Physical Properties of Poly-L-Lactic Acid by Differential Scanning Calorimetry.....	1046
<i>Alan Riga, John F. Turner II, Anne O'Connor, Jing Zhang, Jennifer Collis</i>	
Reversing and Nonreversing Heat Capacity of Poly(Lactic acid) in the Glass Transition Region by Temperature-Modulated Differential Scanning Calorimetry	1058
<i>Marek Pyda, Bernhard Wunderlich</i>	
Thermal and Rheological Characterization for Medical Elastomer Development.....	1067
<i>Lecon Woo, Sherwin Shang, Tahu Yang, Craig L. Sandford</i>	
Thermal Properties Of A Model Bio-Polymer Skin: Shedded Snake Skins	1077
<i>Alan T. Riga, Cheila G. Mothé, Tom R. Martin, Kenneth S. Alexander</i>	

POLYMORPHIC MATERIALS

Separation of Polymorphic Forms by DSC	1084
<i>Rudolf Riesen, Ni Jing, Michael Zemo</i>	
The Complementary Role of Calorimetry, Thermal Gravimetry and Variable Environmental Conditions X-ray Diffraction in Pharmaceutical Sciences	1086
<i>Angeline Zakrzewski</i>	
Pharmaceutical and Polymer Applications of High Throughput Thermal Analysis.....	1087
<i>Rakesh Jain</i>	

GENERAL TOPICS

More on the Effects of Inorganic Salts on Thermal Decomposition of Cellulose.....	1088
<i>Bruce E. Waymack</i>	
Thermal Stability of Some Phosphorus Oxyacid Derivatives Studied by TGA and TGA-MS.....	1089
<i>John J. Tria, Michael K. Goodin, Doris A. Culberson, Kanda Kumar Balasubramanian</i>	
Characterizing and Predicting Sintering Shrinkage of a Glass/Ceramic System	1099
<i>Christopher B. Diantonio, Kevin G. Ewsuk, Denise N. Bencoe</i>	
Characterizing and Predicting Organic Decomposition for Ceramic Processing.....	1109
<i>Christopher B. DiAntonio, Kevin G. Ewsuk, Denise N. Bencoe</i>	
Baseline Calculation When Weight Loss Processes Take Place	1118
<i>Ramón Artiaga, Ricardo Cao, Salvador Naya, A. García</i>	
Ultra Fast Calorimetry on Controlled Cooling and Heating Up to 10,000 K/s and Isothermally with Millisecond Time Resolution	1125
<i>S. Adamovsky, A. Minakov, C. Schick</i>	

RHEOLOGY SESSION 2

Development of a High Pressure Dilatometer for Bulk Modulus Measurements	1126
<i>Paul Bernazzani, Paul A. O'Connell, Gregory B. McKenna, Sindee L. Simon</i>	
A Technique For The Rapid Acquisition Of Rheological Data, And Its Application To Fast Curing Systems	1129
<i>Mark Grehlinger</i>	

ELECTRONIC MATERIALS, INORGANICS, AND MINERALS

Thermal Analyses of Transparent Conducting Films, Part 1: Oxide Formation from Indium 2-Ethylhexanoate Monohydroxide.....	1137
<i>Yutaka Sawada, Kunihiko Shimizu, Emi Shigeno, Shigeyuki Seki, Tadashi Arii, Akira Kishi, Atsuya Yoshinaka, Akinasa Yajima</i>	
Thermal Analyses of Transparent Conducting Films, Part 2: Oxide Formation from Indium Chloride.....	1144
<i>Yutaka Sawada, Takeshi Aoyama, Shigeyuki Seki, Tadashi Arii, Tetsuya Senda, Ritsuo Ozao</i>	
Thermal Analyses of Transparent Conducting Films, Part 3: Evolution of Water Vapor from the Oxide Films.....	1150
<i>Yutaka Sawada, Takeshi Aoyama, Shigeyuki Seki, Makiko Sano, Nobuyoshi Miyabayashi, Koji Ninomiya, Aki Urano</i>	
Heat Capacity, Thermal Conductivity, and Thermal Expansion of Barium Titanate-Based Ceramics	1157
<i>Yi He</i>	
Use of Step Scan DSC to Obtain the Size Distribution of Aluminum Nanoparticles.....	1167
<i>Juan Sun, Sindee L. Simon</i>	
Studies on the Thermal Stability of Nano-SiC Powder with Excessive Free Carbon by Thermal Analysis-Mass Spectrometry Coupling Technique.....	1174
<i>Chang-Wei Lu, Hua-Qing Xie, Hui-Me Yu</i>	
Thermal, Elemental And Spectral Analysis Of Cu(II) Complexes With Halogenosalicylates	1178
<i>S. C. Mojumdar, L. Martiška, D. Valigura</i>	
Synthesis and Thermal Characterization of the Erbium(III) Complex With β -diketone Ligands and 1,10-Phenanthroline or 2,2-Bipyridine	1188
<i>Crislene R. Da S. Morais, Wilton S. Lopes, Antônio G. De Souza, Petrus D'A. Santa-Cruz, Laura H. Carvalho</i>	
Evaluation Of Thermal Properties Of Geopolymeric Materials Of The Na-PSS and Na-PSDS Families	1193
<i>Benjamin Varela, A. Burl Donaldson</i>	

THERMOPLASTIC MATERIALS

Medical Product Performance Alterations During and After Radiation Sterilization Monitored Through Thermal Techniques.....	1199
<i>Lecon Woo, Sherwin Shang, Tahuha Yang, Craig L. Sandford</i>	
Melting of Polymers by TMDSC: Influence of Irreversible Latent Heat to Reversing Heat Capacity.....	1209
<i>Maria Laura Di Lorenzo, Bernhard Wunderlich</i>	
Thermogravimetric Assessment of the Stabilizing Influence of N-Substitutedmaleimides on Vinylidene Chloride/Methyl Acrylate Copolymers	1210
<i>Bob A. Howell, Jin Zhang</i>	
Moisture Diffusion through Bar Soap Wrappers by TGA	1220
<i>Steve Sauerbrunn, Mike Ronga, Michael Zemo</i>	

GENERAL TOPICS

Analysis Of Samples In A Controlled Humidity And Temperature Environment Using The DMA Technique	1225
<i>John C Duncan , Glynn Van-De-Velde, S Sauerbrunn</i>	
Effect of Cations on the Modulus of Immersed Nafion® Film by DMA	1230
<i>Steve Sauerbrunn, John Duncan, Blaine Weddle</i>	
The Principle of Micro Thermal Analysis and Its Implementation.....	1237
<i>Chunhai Wang</i>	
Subtraction of Overlapped Processes in TGA Experiments.....	1247
<i>Ramón Artiaga, Ricardo Cao, Salvador Naya, A. Varela</i>	
Novel Non-Intrusive Thermal Conductivity Technology Enables “Clean” Measurements In Liquids.....	1254
<i>N. Mathis, B. Canney, K. Schmidt, D. Hume, D. Spitzer</i>	
Quality of Microscale Laboratory Synthesis of Organic Crystalline Solids	1263
<i>Alan T. Riga, Mauro Tiso, David G. Hehemann, James Phillips</i>	
Reducing MDSC Errors Arising from Simplifications in the Measurement of Heat Flow Rate	1269
<i>Robert L. Danley</i>	
Comparison of Simulated and Actual DSC Heat Flow Rate Measurements for First Order Transitions	1279
<i>Robert L. Danley</i>	
Thermal Expansion Coefficient Determination by Temperature Modulated Dilatometry	1280
<i>P. Kamasa, P. Myslinski, M. Pyda</i>	

ADDITIONAL PAPER

Thermal Analysis of Thermoset Resins Cured in the Solid State by Electron Beam Irradiation	1286
<i>Don Klosterman, Anish Desai</i>	
Author Index	