Safety & Health News

AIChE
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

SAFETY AND HEALTH DIVISION
www.shdiv.aiche.org

SUMMER 2008

PREVENTING DUST EXPLOSIONS

John F. Murphy, PE

While I was at the Chemical Safety Board (CSB), the CSB investigated three catastrophic dust explosions that occurred in 2003, killing 14 workers and causing significant property damage and business interruption: West Pharmaceuticals, CTA Acoustics, and Hayes Lemmerz International. Because of these incidents the CSB initiated a study of dust explosions in general industry. The CSB study identified 281 dusts incidents occurring between 1980 and 2005 that killed 119 workers, injured 718 and caused significant property damage and loss of business. Even more recently, a dust explosion occurred February 7, 2008 at Imperial Sugar's Port Wentworth, GA, sugar refinery that killed 11 employees and injured another 42, many with serious burns. Clearly dusts explosions are a serious safety risk for people and property.

In the wake of these catastrophic dust explosions that have occurred recently and in the past, there has been increased regulatory activity related to combustible dust. On October 18, 2007, OSHA issued a National Emphasis Program (NEP) on combustible dust. The combustible dust NEP provides instructions for OSHA's compliance officers to evaluate combustible dust hazards during programmed inspections. The NEP also provides instructions for OSHA Area Offices to select a certain number of workplaces to inspect in listed SIC codes.

Following the tragic February 7, 2008, dust explosion at Imperial Sugar, regulatory focus on combustible dust increased even more. Representative George Miller introduced HR 5522, Worker Protection Against Combustible Dust Explosions and Fires Act of 2008, on March 4, 2008. This bill, which was the focus of discussion at a Congressional Hearing on March 12, 2008, would require the Secretary of Labor to issue an interim standard protecting workers from the hazards of combustible dust within 90 days with a final standard to follow within 18 months. HR 5522 was passed by the U.S. House of Representatives on April 30, 2008, and is currently being reviewed by the U.S. Senate.

Meanwhile, OSHA refocused and reissued the Combustion Dust NEP on March 11, 2008. The revised NEP refocused on higher hazard SIC codes, and requires each OSHA Area Office to conduct programmed inspections focusing on combustible dust hazards in at least 4 workplaces. This will result in a total of 300 programmed inspections nationwide focusing on combustible dust.

But companies that handle combustible dusts should not wait for regulatory requirements. Preventing dusts explosions is clearly in the business interest of those companies. The hazards of

combustible dusts and fire and explosion prevention measures are well known. Inherent Safety is one approach to process risk reduction that involves the elimination or reduction of a hazard rather than the control of a hazard by administrative or engineering means. Inherently safer approaches are more reliable than administrative or engineering controls. Inherent safety can be applied effectively to combustible dust hazards.

The incidents cited were primarily caused by the accumulation of combustible dusts outside of process equipment inside of buildings. Several approaches can be taken to reduce the risk of dust explosions inside of buildings. Ignition sources can be controlled with electrical area classification, equipment and structural grounding, hot work permits other administrative controls. Ventilation can be engineered to increase air flow and reduce confinement. Explosion venting can be engineered to control the effects of an explosion. One inherently safer approach is to implement good house keeping eliminating the accumulation of combustible dust in the first place.

Dust hazards also exist inside process equipment. The hazard is often controlled by inerting (less than 10% oxygen), explosion venting, and explosion suppression systems. A passive approach would be to design the process equipment to contain a dust explosion (ten times the operating pressure) and eliminate the hazard of vessel failure. Another inherently safer approach is to avoid combustible dust by controlling particle size if possible. Fine dusts are easier to ignite (require less energy) than larger particles. In practice dust hazards are controlled by inherently safer approaches as well as administrative and engineering controls.

Guidance for preventing dusts explosions can be found in NFPA 654-Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, NFPA 61-Standard for the Prevention of Fires and Dusts Explosions in Agricultural Food Processing Facilities, NFPA 484-Standard for Combustible Metals, NFPA 655-Standard for the Prevention of Sulfur Fires and Explosions, NFPA 664-Standard for the Prevention of Fires and Explosions in Woodworking Facilities, NFPA 68- Standard for Explosion Protection by Deflagration Venting, NFPA 69 Standard for Explosion Prevention Systems, and NFPA 70-The National Electric Code. The AIChE Center for Chemical Process Safety has published “Guidelines for Safe Handling of Powders and Bulk Solids”, AIChE, New York, NY (2005).

We know what to do. Why don’t we just do it!

SAFETY & HEALTH DIVISION UPDATE

Bob Johnson, Chair

After a successful Global Congress on Process Safety in New Orleans, a wonderful Safety & Health Division Dinner aboard the Creole Queen with Dr. Sam Mannan as our guest speaker, and a well-attended Executive Committee meeting, I’d like to update you on other Division news and upcoming events.

First, if you haven’t done so yet, put a browser bookmark at the Division’s website, www.shdiv.aiche.org. If you’ve been to our website before, you might not recognize it at first. It has

been given a fresh makeover to look like the main AIChE website, and its content has also been updated. Posted on the website are our Division's bylaws, officers, publications, newsletters, committee minutes, award winners, upcoming symposia, calls for papers and various internet links. Thanks go to Emil Groth, our Michigan Tech webmaster, for facilitating the updates. Let me know if you have any further suggestions for what you would like to see on your Division's website (rjohnson@unwin-co.com).

Second, upcoming symposia include the Ammonia Conference on September 8-11, 2008, and the next Global Congress on Process Safety on April 27-29, 2009. The programming committee of our Division that arranges the annual Ammonia Conference always does a great job of picking its venues. This year's Conference will be at San Antonio's Hyatt Regency Riverwalk. A full program with many international presenters is already in place; you can find it along with registration information as part of the Specialty Conferences listing on www.aiche.org. Whether your area of interest is ammonia, urea, nitric acid, ammonium nitrate, or methanol, this conference will provide you with new information and lessons learned related to ammonia plant safety.

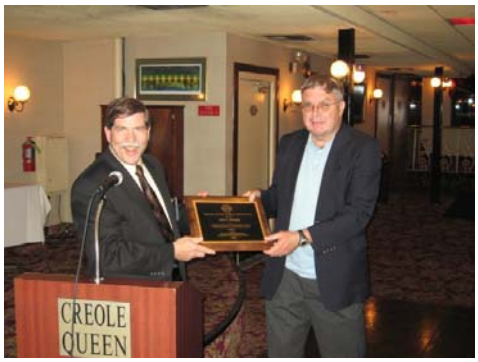
Next year's Global Congress on Process Safety will be at the Tampa Convention Center in sunny Florida. As has been the case for the last four years, the Global Congress will include parallel sessions from CCPS, the Process Plant Safety Symposium, and the Loss Prevention Symposium. The Call for Papers, which is now open, can be found both on the Division's website and later in this Newsletter. Please consider submitting an abstract to one of the symposium chairs or session chairs.

The Norton H. Walton/Russell L. Miller Award is given by the Safety and Health Division of AIChE as our highest award, in recognition of outstanding chemical engineering contributions and achievements in the Loss Prevention, Safety, and Health fields. Last year, the Division's Executive Committee voted to increase the monetary award to $1,000. Starting this year, the Executive Committee moved up the nominations deadline to October 15th to give plenty of time for its voting. The nomination form, along with an award description and past winners, is on the Awards page of the Division's website.

And finally, be forewarned (and encouraged) that the average age of our Division's members may soon take a downward step. As of this writing, BP, Rohm & Haas, DuPont, Praxair, Merck, Dow and UOP have sponsored a new AIChE ScaleUp initiative to support student members' ongoing involvement in Institute activities by inviting them to join one or two of AIChE's eighteen Divisions free of charge. The Safety & Health Division has elected to participate in this initiative, and we hope to have a genuine beneficial impact on young engineers interested in safety-related careers.

Bob Johnson

NORTON H. WALTON-RUSSEL L. MILLER AWARD



The Norton H. Walton/Russell L. Miller Award is given by the Safety and Health Division of AIChE in recognition of outstanding chemical engineering contributions and achievements in the Loss Prevention, Safety, and Health fields. At the Safety and Health Division Dinner in New Orleans on April 7, 2008, the 2008 Walton-Miller Award was presented to Mr. John Murphy by Division Chair Bob Johnson.

Mr. Murphy received his Bachelors Degree in Chemical Engineering from Tufts University and an MBA degree in Management from Central Michigan University. Mr. Murphy spent most of his working career at the Dow Chemical Company, where he rose from a senior production engineer through several successively more responsible positions to that of Senior Process Safety Associate. After retirement from Dow, he held positions at RMT, Inc., and Wilfred Baker Engineering, Inc., specializing in process safety and risk assessment. He then took a position as Chemical Incident Investigator at the U. S. Chemical Safety and Hazard Investigation Board. He has since retired and is now an independent process safety consultant. Mr. Murphy serves as a staff consultant to the Center for Chemical Process Safety, where he previously was a member of several CCPS subcommittees. He is a member of the Editorial Board of Process Safety Progress and a member of the AIChE Safety and Health Division Executive Committee, where he has held positions of Director, Vice-Chair, and Chair, from 1998 to 2001. He is an active member of the AIChE Area 11A Loss Prevention Symposium Programming Committee, having been Session Chair or Co-Chair numerous times, as well as 2003 Symposium Chair and Chair of the Committee in 2005. Mr. Murphy has also been a member of the National Fire Protection Association's Flammable and Combustible Liquids Code Committee and is a member of the Reactivity management Roundtable. He is also the author or co-author of a number of papers, including several published through AIChE presented at the AIChE Loss Prevention Symposium.

WILLIAM H. DOYLE AWARD

The William H. Doyle Award is presented by the Loss Prevention Committee to the presenter of the best paper given at each Symposium. The committee considers both technical content and presentation effectiveness. At the opening session of the 4th Annual Global Congress on Process Safety in New Orleans, Chris Hanauska, Chair of the 2007 Loss Prevention Symposium, presented the 2008 Bill Doyle Award to Lisa Long (currently with the US Department of Labor) for the paper “Vinyl Chloride Monomer Explosion,” presented in the Case Histories and Lessons Learned session of the 41st Loss Prevention Symposium in Houston, TX, in April, 2007. This paper was published in the March 2008 issue of *Process Safety Progress* (pp. 72-78).

PROCESS PLANT SAFETY SYMPOSIUM BEST PAPER AWARD

In 2008, the Process Plant Safety Symposium presented its first award for the best paper given at the annual symposium. Phil Myers, Chair of the 2007 Process Plant Safety Symposium, presented the award for the best paper at the 2007 PPSS to Bruce K. Vaughen for the paper "A revised program for operational discipline". You can read this paper in the March 2008 issue of *Process Safety Progress* (pp. 58-65).

CENTER FOR CHEMICAL PROCESS SAFETY UPDATE

Personnel Changes

Please join us in wishing Karen Person the best of luck as she leaves CCPS in August to attend Columbia Business School. Karen has been integral to the success of CCPS in the past 5 years, and her dedication and commitment will be surely missed.

And please welcome Roxy Schneider to CCPS. Roxy, who will start in mid-June, received her BS Chem E degree in May from Princeton University and was the former President of Princeton's AIChE student chapter. Roxy will assume most of Karen's responsibilities, and will be launching a few new CCPS activities as well – stay tuned for more information.

Latin America Conferences

The first CCPS Latin America conference was held on May 27-29 in Buenos Aires, Argentina, with nearly 300 attendees, mainly from Argentina and Brazil, but also from Peru, Mexico, Chile, and Venezuela. There was also a good US contingent. Paper quality was excellent, and simultaneous Spanish-English translation was provided. The second CCPS Latin America conference will be held in mid-June 2009 in San Paolo, Brazil, with simultaneous Portuguese, Spanish, and English translation. Check the CCPS website in the next month for the call for papers. The CCPS Latin American conference we will return to Buenos Aires in 2010.

The flight to South America is long, but not too expensive, and best of all – no jet lag!

New Books

CCPS has recently released three important new books:

Guidelines for Hazard Evaluation Procedures, 3rd Ed.
The latest edition of this classic CCPS book incorporates new hazard analysis tools such as HAZOP-LOPA, bow-tie diagrams, updated examples, and more.

Guidelines for the Management of Change for Process Safety
This book provides guidance on the implementation of effective and efficient MOC procedures, which are essential to maintaining a robust process safety management system.

Incidents that Define Process Safety
This CCPS book describes approximately 50 incidents that have had a significant impact on the chemical and refining industry approach to process safety. The book is an excellent reference from which to prepare safety meetings and learn process safety by example.

Check the CCPS publications website www.wiley.com/go/ccps for the upcoming release announcement for Guidelines for Chemical Transportation Safety, Security, and Risk Management, and don't forget to request the 20% AIChE member discount.

Process Safety Metrics

Support is growing worldwide for the CCPS metrics for process safety performance. We encourage you to download the document from the CCPS homepage www.aiche.org/ccps and test the metrics in your facilities.

Process Safety Beacon

We would like to remind you again about the Process Safety Beacon. Remember that the power of the Beacon is YOU! So please help the circulation and usage of the Beacon grow. Here are some ways:

- Photos of accidents or unsafe conditions are always welcome. All photos will be rendered anonymous before publishing
- All translation is voluntary, and we can always use more translators, both for new languages and as back-ups for current translators
- Please reexamine your Beacon forwarding lists to make sure they are effective. Anyone new in the company or plant to add, as new employees or a new facility manager? Are you forwarding to suppliers and customers, especially those at smaller companies who may not otherwise know about this resource?

Join CCPS

Are you thinking about putting CCPS participation in your budget for 2009? Contact us at 212-591-7319 or ccps@aiche.org for a dues quote and information about membership benefits.

CHEME CAR COMPETITION – INSPECTORS NEEDED

The ChemE Car competition is one of the highlights of the annual student conference, held in conjunction with the AIChE Annual Meeting each year. The 2008 Annual Meeting will be in Philadelphia in November (celebrating the 100th Anniversary of AIChE, which was founded in Philadelphia in 1908). To ensure safety in the competition, and also to teach students about the

importance of considering safety in the design of any chemical process (including the ChemE car), students entering the competition are required to provide a safety analysis of their design, and the design must be reviewed by safety inspectors. Dr. Dan Crowl of Michigan Technological University is coordinating the inspections this year. We will need safety inspectors for the ChemE car competition in Philadelphia this year. The inspections will occur during the afternoon of Saturday, Nov. 15. If you are going to be in Philadelphia for the annual meeting, please consider volunteering to help with these inspections – it is a great opportunity to meet and talk with some great students about the interesting designs for their cars. If you are interested, please contact Dan Crowl via email at crowl@mtu.edu.

"A CENTURY OF PROCESS SAFETY" AT THE 2008 AICHE ANNUAL MEETING

Dan Crowl will be chairing a session on "A Century of Process Safety" at the Annual Meeting in November in Philadelphia. This will be a panel discussion format with presentations by experts on the history of process safety. No date or time has been assigned yet. You are all invited to attend.

CALL FOR PAPERS FOR 5th GLOBAL CONGRESS ON PROCESS SAFETY – APRIL 2009

The 5th Global Congress on Process Safety will be held at the AIChE 2009 Spring National Meeting, at the Tampa Convention Center, Tampa, FL, April 26 - 30, 2009. Once again, the Global Congress will include the 11th Process Plant Safety Symposium (PPSS), the 24th Center for Chemical Process Safety (CCPS) Conference, and the 43rd Annual Loss Prevention Symposium (LPS). Calls for papers are included at the end of this newsletter.

ARTICLES AND PAPERS OF INTEREST

Thanks to Stan Grossel for providing the following list of papers potentially of interest to Division members:

1. "Development of the HarsMeth Methodology for Hazard Assessment of Highly Reactive Systems: HarsMeth New Process" by Nomen, R. et al, J. Loss Prev. Process Ind., Vol. 21, pp. 29-37 (January 2008).

This paper presents the evolution of the HarsMeth methodology for the assessment of chemical reaction hazards in process plants. This tool is intended to help small and medium enterprises with the safety analysis of their chemical processes, and it is a result of the European Commission funded network HarsNet, which was active between 1998 and 2002, when the latest version of HarsMeth was published. The methodology has been improved by adapting its structure to the logical evolution in the development of a chemical process. The objective is to perform the assessment on a step-by-step basis, starting with the preliminary analysis of different synthesis

paths, followed by a bench scale analysis of the selected route at the laboratory, and finishing with the necessary safety considerations in order to implement the process at plant scale. The methodology has been tested with a real process in order to check its efficiency. The reaction chosen is the production of macrocyclic peroxides from catalytical oxidation of cyclohexanone with hydrogen peroxide. Recent investigations have determined the conditions under which this reaction may lead to a runaway, which makes it suitable to determine how HarsMeth can help in the assessment of such reactions.

2. "Geometry Influence on Safety Valve Sizing in Two-Phase Flow" By Boccardi, G. et al, J. Loss Prev. Process Ind., Vol. 21, pp. 66-73 (January 2008).

In the case of two-phase vapor-liquid flow, especially for low vapor quality (< 10%), pressure safety valves (PSV) design becomes very difficult due to complex thermal-hydraulic phenomena occurring between the two phases. Currently, there are some calculation methods, based on simplifying hypotheses, trying to predict the two-phase flow rate through a PSV knowing inlet fluid conditions (pressure, quality or temperature) and the outlet pressure. However, none of them is acknowledged as being reliable for al situations, and, therefore, there is still a lacking of standards for PSV design under two-phase conditions. The PSV size is one of the most important parameters used for choosing between the two main prediction models, homogeneous equilibrium model (HEM) and homogeneous non-equilibrium model (HNE). This paper shows the results of an experimental research carried out with steam-water two-phase flow through two PSVs having the same orifice diameter (10 mm), but different discharge coefficients and inlet geometry. The experimental results are compared with the predictions obtained using a calculation method based on a homogeneous model with non-equilibrium hypotheses and another method proposed in API RP 520, developed with equilibrium hypotheses. The results show that the PSV geometry and the discharge conditions are important factors for choosing the more suitable model for sizing of a small PSV.

3. "Runaway Reaction and Thermal Hazards Simulation of Cumene Hydroperoxide by DSC" by Chen, K-Y et al, J. Loss Prev. Process Ind., Vol. 21, pp. 101-109 (January 2008).

A simplified self-heating rate equation was developed to simulate the adiabatic thermal hazards of 88 mass% cumene hydroperoxide (CHP) in cumene. CHP has been predominantly used in producing phenol and acetone by catalytic cleavage and as initiator in the acrylonitrile-butadiene-styrene (ABS) copolymer polymerization process. In this study, we acquired experimental data, such as the heat of decomposition and exothermic onset temperature (To) by differential scanning calorimetry (DSC). The data were, in turn, used to simulate a runaway reaction and thermal analysis on 88 mass% CHP under various scenarios. The thermal safety software (TSS) series was employed to evaluate reaction kinetics, to simulate the runaway excursion of interest and to allow determination of critical conditions or thermal explosion of the tank. The liquid thermal explosion (TLE) model to simulate thermal explosion of CHP is aimed at ensuring safe storage or transportation. The reliability of both simulations was assessed by experimentally comparing the thermal hazards with DSC. This simple methodology is a sound, efficient tool for thermal hazards assessment of energetic chemicals.

4. "Avoid Chemical Reactivity Incidents in Warehouses" by Chastain, J. W. et al, Chem. Engng. Prog., Vol. 104, No. 2, pp. 35-39 (February 2008).

This article focuses on reactivity issues in venues where chemicals are stored. The methods set forward here assume that the storage facility is properly designed in accordance with NFPA warehouse housing standards, and that no intentional processing of the materials is being done. The method is based on work done by members of the CCPS Reactivity Management Roundtable (RMR) and the heart of this method is the evaluation matrix which is discussed and an example is presented of how this is used. Additional tools and future enhancements are also discussed.

5. "Reaction Inhibition in the Control of Exothermic Runaway" By Middle, K. V. et al, Trans. Wessex Institute, (December 7, 2007)(available from http://library.witpress.com/pages/PaperInfo.asp?PaperID=15134)

A research program has been undertaken into the use of chemical inhibition techniques as a basis of safety for the control of exothermic runaway reaction hazards. The principal element of the research has been the design and running of a series of pilot scale trials at the Health and Safety Laboratories into the inhibition of an uncontrolled styrene monomer polymerization with associated laboratory and analytical work to plan the tests safely. Pilot scale experiments on the uncontrolled polymerization of styrene have demonstrated the effectiveness of the injection of the inhibitor para-tertiary butyl catechol at two different agitation speeds and under conditions immediately following agitation failure. Modeling of the experiments using a network-of-zones approach has shown some inadequacies with the reproduction of the pilot scale data, notably in the inability to simulate the jet mixing effects that dominate in small scale plant with the conditions employed. The present modeling results do, however, under predict the mixing efficiency, thereby leading to a more conservative design for the cases studied.

6. "Accuracy of Safety Valve Two-Phase Mass Flow Capacity Sizing" by Derlien, H. and Friedel, L., Chem. Engng. Technol., Vol. 29, Issue 1, pp. 87-96 (January 5, 2006).

The method specified in ISO/CD 4126-10 exhibits the highest accuracy compared to other methods used in industry and academia. At the same time it allows for an over sizing of the necessary relief area under all test conditions. The average of statistical reproductive accuracy is characterized by an unacceptable logarithmic scatter of about 80 %.

7. "Explicit Critical Pressure Ratio for Choked Two-Phase Homogeneous Nozzle Flow" by Moncalvo, D. and Friedel, L., Chem.Engng. Technol., Vol. 30, Issue 4, pp. 530-533 (March 21, 2007).

The throat-to-stagnation critical pressure ratio for a frictionless and adiabatic nozzle flow of a homogeneous, non-flashing two-phase mixture can only be expressed as the numerical solution of a transcendental equation. A simple, physically plausible approximation is herein proposed, which fits well over a wide range of mass flow qualities.

8. "Pressure Relief of High Pressure Devices" by Luft, G., Broedermann, J., and Scheele, T., Chem. Engng, Technol., Vol. 30, Issue 6, pp. 695-701 (May 30, 2007).

Pressure relief systems are used to protect pressure vessels and related equipment against situations of excess pressure. In an emergency situation, they should vent sufficient mass to reduce the pressure to a safe level. The effective discharge area of a pressure relief valve is calculated with the theory of flow through convergent-divergent nozzles taking into account a correction factor. The international standard ISO 4121 and that of API 520 are recommended for sizing. In order to

examine the validity of these methods of sizing valves for use at very high pressures, relief experiments should be performed over a wide range of pressures and temperatures. Because of their industrial importance, high pressures of 150-300 MPa and large reactor capacities of up to 300,000 t/a, were selected for the polymerization of ethylene as an example reaction.

9. "Advanced Kinetics-Based Simulation Method for Determination of the Time to Maximum Rate Under Adiabatic Conditions (TMRad)" by Roduit,B. et al, Paper presented at the NATAS2007 Conference, August 25-29, 2007 at Michigan State University.

An adiabatic calorimeter is very often used for the investigation of runaway exothermic reactions. However, the ideal adiabatic environment is a theoretical state, which during laboratory scale testing cannot be obtained, but may only be approached. Deviation from the ideal adiabatic state comes from (1) the thermal inertia of the test system or heat gain into the sample container, and (2) the loss of heat from the container itself to the environment that reflects the "operational adiabaticity" of the instrument. In addition to adiabatic testing, advanced kinetic approach based on the kinetic parameters determined from DSC data performed under different heating rates can be applied. It enables one to simulate what may happen on a large scale by testing and up-scaling results obtained from a small amount of sample. For the up-scaling of DSC data, two important factors have to be considered, (1) the application of advanced kinetics, which properly describes the complicated, multistage course of the decomposition process, and (2) the effect of heat balance in the energetic system. As the sample mass is in-creased by a few orders of magnitude compared to the thermo-analytical experiments, the heat evolved (or consumed) during reaction cannot be exchanged with the surroundings and has to be considered as an important factor influencing reaction rate. The validity of the obtained kinetic description can be checked by comparing predicted adiabatic runaway profiles with experimental results obtained by means of the adiabatic calorimeters. Thus, advanced kinetics-based simulation methods can be used to evaluate the impact of different experimental conditions such as various phi-factors and process temperature on the decomposition behavior. The variation of the runaway time for any phi-factor can then be plotted as a function of any initial process temperature in a thermal safety diagram. Commonly accepted as the safety limit on the industrial scale, the critical temperature corresponding to a Time to Maximum Rate under adiabatic conditions of 24 hours can then be easily calculated assuming a phi-factor of 1 if the runaway has to be predicted for the "ideal" adiabatic conditions. The possibility of the exact prediction of the thermal behavior of the investigated sample based on the results of DSC data used for advanced kinetic characterization of the reaction and careful heat balance help significantly in interpreting the evaluation of thermal hazard carried out in adiabatic calorimeters. This approach leads to the proper selection of experimental conditions and better exploitation of the versatility of the adiabatic calorimeters.

10. "Evaluating SADT by Advanced Kinetics-Based Simulation Approach" by Roduit, B. et al, Paper presented at the NATAS2007 Conference, August 25-29, 2007 at Michigan State University.

The Self-Accelerating Decomposition Temperature (SADT), introduced into international practice by the United Nations, is an important parameter that characterizes thermal hazard under transport conditions of self-reactive substances. Important features of the SADT is that it is not an intrinsic property of a substance, but "a measure of the combined effect of the ambient temperature, decomposition kinetics, packaging size, and the heat transfer properties of the substances and its packaging." The simulation of the SADT is a complicated task that requires the consideration of two issues: (1) the correct description of the kinetics of the process, i.e., the temperature dependence of

the reaction rate on the temperature, and (2) the precise link between kinetics and thermal behavior of the investigated materials. Both these tasks are strongly related because, without correct heat balance considerations, even the most exact evaluation only of the kinetics based on the experiments carried out in mg scale is of little value for the prediction of the real behavior of materials in kg or Mg scale. On the other hand, the precise knowledge of the thermal properties of the energetic materials when applied with kinetic parameters based on too simplified kinetic description of the decomposition (as e.g., still commonly used simple models such as "zeroth" or "first" order react-ion) will not lead to the correct prediction of the SADT experiments as well. The present study extended the method of the application of the advanced kinetic description of the decomposition of energetic materials combined with the exact heat balance carried out by numerical analysis by introducing into consideration the determination of the SADT. We additionally took into consideration the additional parameters such as the thermal conductivity of the self-reactive substances, the types of containers and insulation layers, and different temperature profiles of the surrounding environment. The results of DSC experiments carried out with different heating rates in the range of 0.25-4°C/min were elaborated by the Thermokinetics software. The application of the Thermal Safety software and the kinetics-based approach lead to proper selection of experimental conditions for SADT testing. The approach enabled the simulation of other scenarios such as the thermal ignition of self-reactive chemicals conditioned previously for 12 hours at 80°C and exposed later isothermally for 8 hours to temperatures between 120-180°C. Described methods can be used for analysis of possible development of runaway during storage or transport of dangerous goods (TDG) and containers, and subsequent choice of conditions that can prevent an accident.

PICTURES FROM NEW ORLEANS

Global Congress Symposium Chairs Dave Clark (LPS), Jack Chosnek (PPSS), Cheryl Grounds (CCPS), and Pete Lodal (Global Congress)

Ron Willey (right) receives a plaque from Bob Benedetti recognizing his service as 2007 Safety and Health Division Chair (and should receive an award for the most ribbons on his name badge!)

Division Chair Bob Johnson hosts the Safety and Health Division on the “Creole Queen” on the Mississippi River in New Orleans

Sam Mannan of the Mary Kay O’Connor Process Safety Center addresses the Division dinner

The annual Division dinner at the AIChE Spring Meeting

Vince Van Brundt and Dan Crowl at the Division dinner

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Preliminary

5th Global Congress on Process Safety

AIChE 2009 Spring National Meeting
Tampa Convention Center
Tampa, FL
April 26 - 30, 2009

Process Safety: The Next Generation

Papers are being accepted for session presented by:

11th Process Plant Safety Symposium (PPSS)
24th Center for Chemical Process Safety (CCPS)
43rd Annual Loss Prevention Symposium (LPS)

The 11th PPSS Sessions include:

- Applications of Risk Analysis Techniques
- SIS - Problems and Innovative New Solutions
- State of the Art in Mechanical Integrity
- Operational Discipline and Safety Culture
- Management's Role in Process Safety
- Contractors and Process Safety

The 11th PPSS Chair and contact is:
John Champion 281-228-8265 JChampion@rohmhaas.com

The 24th CCPS Sessions include:

- Risk Tolerance
- Process Safety Metrics and Culture
- Managing Organization Change
- Transportation Risk
- Auditing---New Frontiers
- Tools to ID Hazards
- Fire, Explosion & Quantitative Analysis
- Implementing PSM Globally

The 24th CCPS Chair and contact is:
Eric Freiburger 412-490-6309 FreibuE@NOVAChem.com

The 43rd LPS sessions include:

- Case History (joint with PPSS and CCPS)
- Hazard Evaluation Procedures – LOPA
- Process Safety Inspection/Audit/DHS Appendix A
- Consequence Analysis
- Process Hazard of Food Industry/Consumer Products
- Fire, Explosion and Reactive Hazards

The 43rd LPS Chair and contact is:
Jean Paul Lacoursiere 450-581-2315 jpla@sympatico.ca

LOSS PREVENTION SYMPOSIUM

Call for Papers

43rd Annual Loss Prevention Symposium (LPS)
5th Global Congress on Process Safety
AIChE 2009 Spring National Meeting
Tampa Convention Center
Tampa, FL
Date: April 26 to 30, 2009

The Loss Prevention Symposium (LPS) is one of three parallel symposia that comprise The Global Congress on Process Safety. Organized by Group 11A of the AIChE Safety and Health (S&H) Division, the LPS has been held annually since 1967. The Symposium promotes process safety by providing a forum for practitioners from the chemical industry, allied industries, academia, and government to share technological advances in process safety, explosion prevention, and fire protection as well as to share the lessons learned from incident investigations.

The Symposium consists of six sessions, each with six 30-minute presentations. Papers are selected by session chairs based on submitted abstracts. Accepted manuscripts must address pertinent process safety issues or useful loss prevention technologies. The papers will be published in the LPS proceedings. If you wish to present a paper please send an abstract to the appropriate session chair (copying the symposium chair) via email for consideration by September 30, 2008.

1 – Fires, Explosions and Reactive Chemicals

The analysis, prevention, protection and mitigation of fire, explosion, and reactivity hazards continue to be important to the loss prevention community. This session invites papers that identify, characterize, or offer design and operational guidance on fire, explosion and reactivity hazards.

Chair	Stanley S. Grossel Process Safety & Design 4 Marble Court, Unit 9 Clifton NJ 07013-2212 973-779-3668 psadi28@aol.com	**Vice-Chair**	Erdem A. Ural Loss Prevention Science & Technologies, Inc. 810 Washington Street, Suite 4 Stoughton, MA 02072 781-818-41141 erdem.ural@lpsti.com

2 - Hazard Evaluations and Layer of Protection Analyses

Process hazard analyses (PHA's) and their extension into LOPAs and Safety Integrity Level (SIL) determinations continue to be central to loss prevention efforts. This session seeks original presentations related to identifying hazards, developing scenarios, determining the adequacy of safeguards, and specifying the integrity of protection layers needed to meet risk goals in the context of team-based reviews.

Chair	Robert W. Johnson Unwin Company 1920 Northwest Boulevard, Suite 201 Columbus, OH 43212 614-486-2245 rjohnson@unwin-co.com	**Vice-Chair**	Mike Moosemiller Baker Engineering and Risk Consultants 1460 Lantern Circle Naperville, IL 60540 630-544-6873 mmoosemiller@bakerrisk.com

3 – Food and Consumer Products Process Hazards

The Food and Consumer Products area has significant hazards and risks from dust and flammable liquid explosions as well as from toxic releases. Moreover, the Montreal Protocol for the removal of Ozone Depleting Substances may result in the use of ammonia refrigerant with its associated risks. This session invites papers on the identification, prevention, control, and management of hazards and risks in the food and consumer products industries. Relevant knowledge extracted from analysis of incident databases is encouraged as well.

Chair	John Going Fike Corporation 704 S 10th St Blue Springs, MO 64013 816-655-4769 john.going@Fike.com	**Vice-Chair**	Nir Keren Dept. of Agricultural & Biosystems Eng'g Iowa State University 102 Industrial Education Building II Ames, IA 50010 515-294-2580 nir@iastate.edu

4 – Audits, Inspection and Regulation In the past few years, we have seen renewed emphasis on PSM through OSHA's National Emphasis Programs, and Homeland Security new Chemical Security's regulations. This session invites papers that discuss regulatory programs in the U.S. and internationally, and companies strategies for complying with them.			
Chair	Lisa Long U. S. Department of Labor - OSHA Office of General Industry Enforcement 200 Constitution Avenue, NW Washington DC 20210 202-693-2409 long.lisa@dol.gov	**Vice-Chair**	John F. Murphy Process Safety Services 2304 Kenya Lane Punta Gorda FL 33983 941-624-0171 hamjfm@embarqmail.com

5 – Consequence Modeling Consequence modeling has evolved as a result of accident investigations. This session will review the state of the art in fire, explosion, and toxic release modeling.			
Chair	David G. Clark E.I. du Pont de Nemours & Co., Inc. Brandywine Building 7248 1007 Market St Wilmington, DE 19898 302-774-8044 david.g.clark@usa.dupont.com	**Vice-Chair**	Brian R. Dunbobbin Air Products & Chemicals, Inc. 7201 Hamilton Boulevard Allentown, PA 18195-1501 610-481-6736 dunbobbr@apci.com

6 - Case Histories and Lessons Learned Reviews of process safety incidents and near misses provide valuable learning opportunities. Papers dealing with incidents, near misses, and the lessons learned are requested.			
Chair	Henry L. Febo FM Global P.O. Box 9102 1151 Boston-Providence Tpke Norwood, MA 02062 781-255-4771 henry.febo@fmglobal.com	**Vice-Chair**	Cheryl A. Grounds BP Exploration & Production, Inc. 501 Westlake Park Boulevard Houston, TX 77079-2696 281-366-4740 cheryl.grounds@bp.com

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2009 Loss Prevention Symposium Chair and Vice Chair			
Chair	Jean-Paul Lacoursiere University of Sherbrooke Department of Chemical Engineering 35 Rue Lemoyne Repentigny, QC, Canada J6A 3L4 450-581-2315 jpla@sympatico.ca	**Vice-Chair**	Ronald J. Willey Northeastern University Department of Chemical Engineering 342 Snell Engineering Center 360 Huntington Avenue Boston, MA 02115-5000 617-373-3962 r.willey@neu.edu

Instructions to LPS Authors

The *Loss Prevention Symposium* covers process safety for engineering professionals. It addresses such topics as incident investigations, management of hazardous chemicals, prevention of hazardous leaks, risk assessment, evaluation of process hazards, industrial hygiene, fire and explosion analysis, preventive maintenance, vapor cloud dispersion, Process Safety Management, regulatory compliance, training, education, and plant/process security.

Papers from the annual *Loss Prevention Symposium* are considered for publication in *Process Safety Progress.* The editors of *PSP* select the best papers for publication - particularly those that are well written, contain new and unique technical content, and address process safety issues or technologies that are immediately useful to the chemical industry.

Papers will be read and evaluated by the respective session chair as well as the symposium chair. The primary author will receive comments to improve the quality of the paper. If specific corrections or changes are requested as a condition of acceptance, the author must incorporate these and resubmit the paper directly to the session chair. Articles are typically no longer than 16 manuscript pages, including tables and figures.

Format: Papers in LPS Proceedings follow the standard technical paper format, using the following sections: abstract, introduction, background, results and discussion, and conclusions. However, authors are free to choose a different format or style if it better illustrates the material being presented. A clear, direct writing style is recommended. Use headings and subheadings to increase the readability. All tables and figures should be numbered and include a short, descriptive caption. A table of nomenclature should be provided for all mathematical terms. All acronyms and terms not commonly known outside of your area of technical specialization must be identified.

Title Page: This should contain the complete title of the manuscript and the names and affiliations of all authors. Include the name, address and telephone, telefax numbers, and e-mail address of the author responsible for correspondence.

Abstract: Each paper should include an abstract of 100-200 words. The abstract should offer a brief account of the contents, conclusions, and the relevance of its findings. The abstract should not be identical to the introductory paragraphs of the paper.

Literature Citations: Any literature directly referenced within the text or in any tables or figures should be notated using brackets with a reference number. Citations should be listed in the order in which they appear in the article. References should be styled in accordance with the reference style shown below:

Journal Article:
[1] B. Grunbaum and G. C. Shephard, Edge-transitive planar graphs, *J. Graph Theory* 11 (1987), 141–156.

Book:
[2] J. L. Gross and T. W. Tucker, *Topological Graph Theory*, Wiley, New York, 1987.

Book Chapter:
[3] R. C. Read and W. T. Tutte, "Chromatic polynomials," *Selected Topics in Graph Theory III* L. W. Beineke and R. J. Wilson, (Editors), Academic Press, New York (1988), pp. 15–42.

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