Thirteenth International Symposium on the Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres

Sponsored by ASTM Committee G04 on the Compatibility and Sensitivity of Materials in Oxygen-Enriched Atmospheres

Symposium Chairs: Samuel Edgar Davis  
National Aeronautics and Space Administration  
George C. Marshall Space Flight Center  
Huntsville, Alabama, USA

Theodore A. Steinberg, Ph.D.  
Queensland University of Technology  
School of Engineering Systems  
Brisbane, Queensland, Australia

ABOUT THE SYMPOSIUM
The purpose of this symposium is to provide a forum for the exchange of ideas and recent accomplishments in the area of the safe use of materials and processes with oxygen-enriched systems. These systems are inherently dangerous and new information is necessary for safety improvement for users of oxygen-enriched liquids and gases.

Session papers will reflect the latest technologies and concerns in the following areas:
- Metallic and polymeric materials used in oxygen-enriched systems
- Risk management in oxygen system designs
- Recent data on the compatibility of materials with oxygen gas and cryogenic liquid oxygen
- Oxygen system cleaning
- Recent accident investigations involving oxygen systems and handling procedures
- Most current data on materials compatibility with oxygen
- ASTM standards developments

The symposium is designed to expand the knowledge and awareness of design engineers, project managers, safety professionals, manufacturers, suppliers, and end users of oxygen or oxygen-enriched fluids and delivery system components.
WEDNESDAY, SEPTEMBER 19, 2012

9:00 AM  
**Opening Remarks**  
Eddie Davis, Symposium Co-Chairman

9:30 AM  
**Development of a Liquid Oxygen Facility for Rocket Engine Testing**  
H. W. Mulkey, University of Alabama Huntsville, Huntsville, Alabama, USA

10:00 AM  
**BREAK**

10:30 AM  
**Rudimentary Cleaning Compared to Level 300A**  
C. Pena Arpin, NASA – White Sands Test Facility, Las Cruces, New Mexico, USA

11:00 AM  
**Flow Friction or Spontaneous Combustion**  
J. M. Stoltzfus, NASA – White Sands Test Facility, Las Cruces, New Mexico, USA

11:30 AM  
**Ignition Tests with Oil- and Particle-Contaminated Aluminum Pipes in High Pressure Oxygen**  
M. Meilinger, Linde Corporation, Pullach, Germany

12:00 PM  
**LUNCH (On Your Own)**

2:00 PM  
**Fire without Cause of an Oxygen Component with an Aluminum Seal**  

2:30 PM  
**Ignition of Aluminum in High-Pressure Gaseous Oxygen**  
L. Sun, Air Liquide Engineering, Champigny-sur-Marne, France

3:00 PM  
**BREAK**

3:30 PM  
**Auto-Ignition and Combustion Properties of Iron/Steel Micro-Particles in Oxygen Atmospheres Heated by Rapid Compression**  
J. C. Rostaing, Air Liquide E&C Cryogenics Standard Plants, Vitry-sur-Seine, France
4:00 PM
**Another Dangerous Practice in the SCUBA Diving Community**
W. Ciscato, Gentoo Divers, International, Duebendorf, Switzerland

4:30 PM
**Safe for Oxygen but not for Oxygen-Enriched Gas Mixtures in SCUBA Diving?**

5:00 PM
One-On-One Meetings with Authors and Adjourn

6:30 PM
**Reception and Welcome Dinner**
[Le Centre Sheraton Montreal Hotel Dining Room]

**THURSDAY, SEPTEMBER 20, 2012**

9:00 AM
**Welcome Again**
Eddie Davis, Symposium Co-Chairman
Ted Steinberg, Symposium Co-Chairman

9:30 PM
**Burning of CP Titanium (Grade 2) in Oxygen-Enriched Atmospheres**
J. M. Stoltzfus, NASA – White Sands Test Facility, Las Cruces, New Mexico, USA

10:00 AM
**BREAK**

10:30 AM
**Flammability Evaluation of Metals in Piping Configuration under Flowing Conditions: Hollow Vessel Promoted Ignition Test**
J. C. Rostaing, Air Liquide E&C Cryogenics Standard Plants, Vitry-sur-Seine, France

11:00 AM
**Non-Flammable Control Valves for Oxygen Service by Utilizing the Concept of Situational Non-Flammability**
C. Dobinson, OXYCHECK PTY LTD, Brisbane, Queensland, Australia

11:30 AM
**Combustion Products of Bulk Aluminum Rods Burning in High-Pressure Oxygen**
O. Plagens, Queensland University of Technology, Brisbane, Queensland, Australia

12:00 NOON
**LUNCH (On Your Own)**
2:00 PM  
**A Comparison of Fire Reaction Effects of Halogenated Versus Non-Halogenated Non-Metals in High Pressure Oxygen Components**  
B. Forsyth, Wendell Hull and Associates, Las Cruces, New Mexico, USA

2:30 PM  
**Risk Evaluation Approach for Polymers in Oxygen Breathing Systems**  
G. Chiffoleau, Wendell Hull and Associates, Las Cruces, New Mexico, USA

3:00 PM  
**BREAK**

3:30 PM  
**Development of Burn Curves to Assist with Metals Selection in Oxygen**  
E. Forsyth, Oxygen Safety Consultants, Incorporated, Tulsa, Oklahoma, USA

4:00 PM  
**Final Comments and Adjournment of Formal Program**  
Eddie Davis, Symposium Co-Chairman  
Ted Steinberg, Symposium Co-Chairman

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**FRIDAY, SEPTEMBER 21, 2012**

All Day  
One-On-One Meetings with Authors as Agreed Upon by Participants