SAFEX Newsletter

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SAFEX INTERNATIONAL
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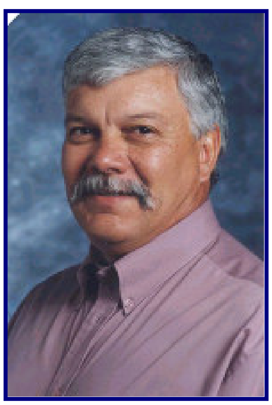
About this Newsletter

In our last Newsletter we appealed for greater participation by our readers in this quarterly publication. We are grateful to those who responded by contributing snippets for use in this edition. In the run-up to our next triennial Congress in Madrid, 2008 our Newsletters will increasingly feature preparations for the Congress. The idea is not only to inform members but also encourage them to let us have their ideas and suggestions.

The Governor we meet in this Newsletter is Piet Halliday. After summarising the feedback we received from our first SAFEX Alert, we look at our incident reporting performance with particular emphasis on members who contributed incidents so far this year. In our regular 2008 Congress Preparation feature we outline the structure and themes of the Open Day. The Board of Governors will consider this at their meeting in November and members are invited to submit ideas and suggestions. Our feature "From CERL's Research Notes" introduces aluminium nanopowders in mixtures with energetic materials. These materials are still too expensive for use in blasting explosives, but may be of interest to makers of propellants and materials for military applications. We conclude this issue of the Newsletter with a briefing by an Expert Panel member as he orientates us on Security Sensitive Ammonium Nitrate in "Our Experts at Work".

Meet the Governors

Piet Halliday



After completing a PhD on the synthesis of high energy sensitisers for explosives, Piet started his explosives career in 1980 at African Explosives Ltd (AEL) – then known as AECI. He was appointed as Research Officer to initiate the first research and development work on emulsions. 16 patents, mainly around chemical gassing and pumpable explosives, were filed as result of this work. In the mid 80's he built and commissioned as Project Manager the first packaged emulsion plants and pump trucks in South Africa.

During the time ICI Explosives owned AEL, he moved back to the Research & Development department as Technical Manager and became the Chairman of the Global Packaged Explosives Business which included global packaged explosives technology. He also managed the same product portfolio for the AEL business in Africa. Piet is currently the AEL Executive Director responsible for research, technology and products. In this capacity he looks after the AEL global technical portfolio covering its whole product offering. His duties include research and development, plant and field support, decontamination and remediation of NG sites as well as international liaison on products, systems and technology.

Piet's experience and expertise is sought after by a number of institutions. During the early 90's he became chairman of the National Institute of Explosives Technology (NIXT) which serves the explosives manufacturers in Southern Africa. Besides being a Governor of SAFEX International, Piet has also served on the board of the ISEE from January 2003. Other involvements include the Southern African Society of Rheology (SASOR) and the National Council for Explosives.

You may well ask whether he has time for any personal interests and hobbies. "I love sailing and motorcycling," says Piet. "And if you see a guy driving around Johannesburg in an AC Cobra over weekends, look carefully it may just be me."

SAFEX Alert

Members tell us what they think

SAFEX introduced its first **SAFEX Alert** (#A01/2007) in July. The **SAFEX Alert** must not be confused with the former Incident Alert which is now called an Incident Notice. The **SAFEX Alert** focuses on good practices regarding a specific health, safety or environmental (HS&E) issue that has been identified. The idea is that members to whom this issue applies can compare their own practices against the recommended actions in the **Alert**. Where members believe they can improve on the actions the **Alert** recommends, they should provide us with feedback so that we can improve the **Alert**. In this way the **Alert** becomes a dynamic document that constantly reflects good practice. A "library" of **Alerts** on the Intranet can provide members with a valuable resource for good HS&E practices in their operations.

After issuing the first Alert, we invited member feedback and comment. We received responses from **60%** of our members for which we are most grateful. The feedback from those that responded can be summarised as follows:

1. Do you think the purpose of the SAFEX Alert service is clear enough?
   YES: 98% NO: 2%
2. Did you find SAFEX Alert #A01/2007 useful?
   YES: 98% NO: 2%
3. How can we improve SAFEX Alert #A01/2007?
   - Note the first step in decontamination is to absorb/clean any free explosives
   - Greater emphasis on the environmental impact of disposal practices
   - Add specific information on secondary cleaning agents
4. Suggestions or topics for future SAFEX Alerts (This is merely a sample of the ideas members sent in. We will consider every idea we received as each one is important)
   - Destruction of explosives and explosives waste – Burning grounds
   - On-site waste management especially on customer sites
   - Explosives transport safety
   - Pump safety
   - Safe separation distances for stored energetic materials
   - Overheating of explosives in bore holes (pyrolytic ores)
   - Environmental issues
   - Security issues
   - Heating of vessels and pipelines carrying oxidiser solutions
   - Key protective devices
5. Other comments
   - Provide hyperlinks to the references used for Alerts
   - Notify members of next topic and invite them to contribute to the content before publication of the Alert.
   - Incorporate Alerts in the Newsletter
   - Develop a User Manual based on the Alerts
   - Frequency of Alerts.

We thank every respondent for his/her interest and commitment to SAFEX. The time you took to help us with your feedback is much appreciated.

Incident reporting

Positive feedback on Incident Notices

Members and Associates have been positive in their feedback on the "re-packaging" of incident notifications using the Incident Notice format. Since the beginning of July, when we started issuing these, members have told us that they find the format helpful. The standard layout better highlights the pertinent issues and facilitates the circulation of the information within member organizations. We also thank members for the suggestions we received. One such suggestion was to provide a brief summary of the incident in the covering note. This will help PDA users who cannot readily access attachments.

SAFEX applauds the way members have taken to this change and thanks everyone for their support.

Scoring our incident reporting performance

We use the following charts to track our performance:

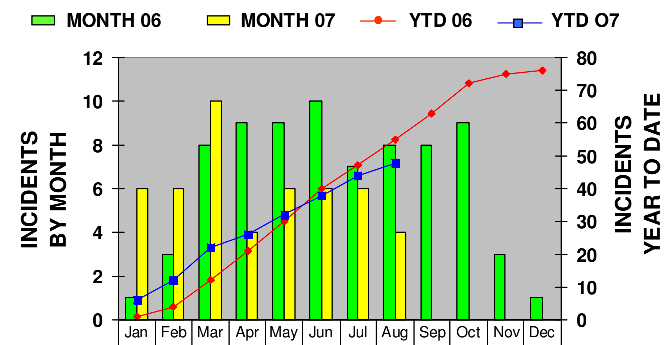
All the incidents reported. This chart shows the sum of non-member and member incidents of which we were notified by month this year and compares it to the previous year.

According to the chart there is a distinct drop in the number of incidents reported so far compared to last year. If this is due to fewer incidents taking place, it is good. If, however, we are being less diligent in our reporting, it is a cause for concern

Member incidents reported. We track the number of incidents of which members notify us separately as this gives us an indication of the Incident Reports we can expect. Members analyse each of their incidents in an Incident Report and identify learning points from that incident for themselves and other members. An important indicator in this chart is the gap between the number of incidents we receive and those we believe are occurring but go unreported. According to this chart we have only been notified of about 50% of the explosives incidents we believe could have taken place this year.

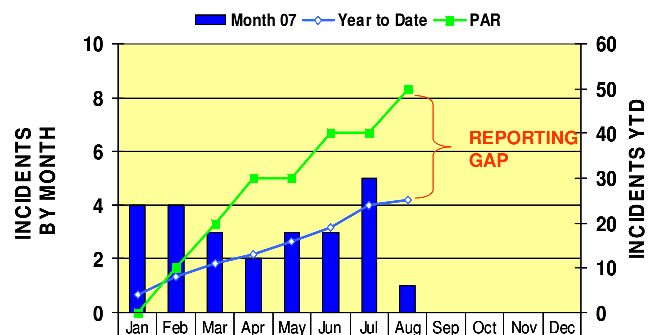
Contributors of member incidents. Because member incidents give us the maximum value in terms of learning experiences, we identify those members who have taken the trouble to report their incidents in this chart. It shows the number of incidents each of those members have reported relative to the total number of reports received. The chart distinguishes between Groups and single Companies merely to indicate the performance of the two membership categories. Each category has about the same number of operating units. We have seen a welcome increase in the number of single company members that have reported incidents up to the end of August.

ALL INCIDENTS REPORTED: 2007 v 2006



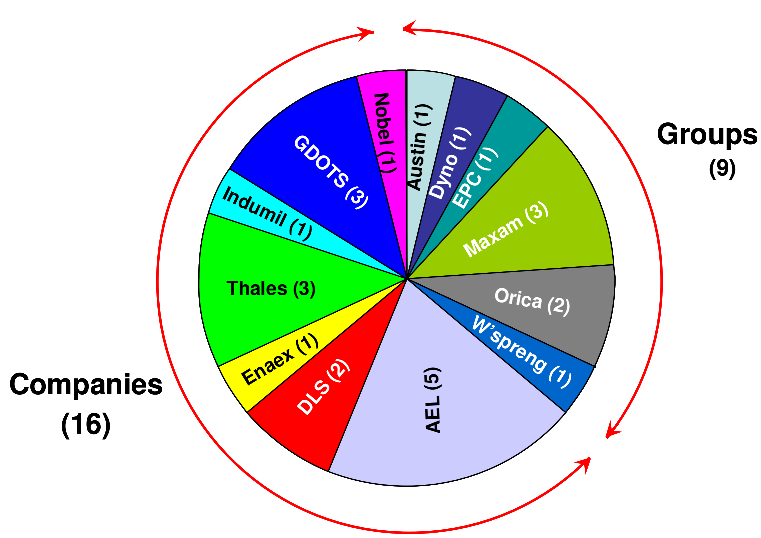
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Month 06	1	3	8	9	9	10	7	8	8	9	3	1
Month 07	6	6	10	4	6	6	6	4				
YTD 06	1	4	12	21	30	40	47	55	63	72	75	76
YTD 07	6	12	22	26	32	38	44	48				

MEMBER INCIDENTS REPORTED: 2007



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Month 07	4	4	3	2	3	3	5	1				
Year to Date	4	8	11	13	16	19	24	25				
PAR	0	10	20	30	30	40	40	50				

CONTRIBUTORS: MEMBER INCIDENTS YTD



XVI Congress in 2008, Madrid

Congress Open Day

Introduction.

The Board of Governors (BoG) asked Frank Barker, himself a Governor, to convene the first day of Congress (Thursday, 29 May 2008). In contrast to previous Congresses, the Board decided to make the first day an Open Day by inviting visitors from outside the SAFEX community to participate in the proceedings of that day. By doing so we hope to enrich the Congress for our members as well as promote networking with others who contribute to SAFEX's objectives. After consultation with other Governors, Frank has prepared the following outline and invites members' comments and suggestions.

Structure.

It is proposed to retain the two plenary sessions before Lunch as in the past. Rather than run parallel sessions after lunch as we did at the last Congress, we propose to keep the full group together for two successive afternoon plenary sessions (one before and one after afternoon tea). The advantage would be that delegates will not miss any of the presentations and related discussion, which was one of the criticisms at the last Congress.

Themes.

Having considered the suggestions we received, 4 themes have emerged. Each of these can be covered in one of the four plenary sessions with the Session Chair summarising the salient features prior to each break.

1. **Ammonium Nitrate (AN) Safety and the Environment.**
   With the importance of AN to the industry, this could be one theme. Papers on AN emulsion truck design and AN detonability have been presented in other forums and might be of interest to delegates. The Security Sensitive AN issue is growing exponentially. There have been significant incidents with AN recently. We do not want to go overboard on AN transport incidents but rather find papers on realistic AN testing, the behaviour of AN in practical situations, hazard testing etc. This is a broad topic and it may be necessary to focus on particular aspects of AN. Do let us have your thoughts on this.

2. **Training - the People side.**
   This theme would focus on what the industry is doing to deal with the loss of skills and experience that is mentioned frequently as a concern. EUExcert is a training initiative that aims at establishing a qualification framework and educational models for the explosives industry in Europe. The initiative aims to accommodate the loss of corporate memory in the industry and it would be interesting to hear EUExcert's proposals. There may be other initiatives that members are adopting such as fast track training on explosives safety and "emersion" training. Such a session on training systems and critical skills development from member companies might be of interest.

3. **Process Safety - the Plant side.**
   This refers to safety inherent in the design and operation of plant and equipment. It deals with the "high consequence/low probability"

Freak accident or preventable occurrence?

Andy Begg sent us the newspaper article below. It provides an example of what some would call a freak accident. "They are not so much freak accidents as preventable dangerous occurrences," says Andy. "Most of our major incidents start with some unusual occurrence, followed by another and so on. That is why it is important to do a good investigation of the unusual occurrence." This incident could have been a disaster and we hope they looked at why the line fractured. Do you think they conducted a risk assessment?

Aussie fertiliser ship 'a floating bomb'

www.stuff.co.nz/inl/index/4124450a10.html

By JANO GIBBS - SMH | Wednesday, 11 July 2007

Fire crews have set up a one-kilometre exclusion zone around a cargo ship in Newcastle after a crane leaked a potentially explosive mix of hydraulic oil onto hundreds of bags of ammonium nitrate. As well as being used as a fertiliser for agricultural purposes, ammonium nitrate has been an ingredient in improvised bombs, such as those used in Oklahoma City in 1995 and Bali in 2002. Emergency crews were called to Newcastle Port's Kooragang Island about 1am today after a hydraulic line on the ship's crane, which had been loading 1.2-tonne bags of the fertiliser, burst. An estimated 150 litres of oil spilled into part of the ship's hold, where about 350 bags of the fertiliser had been loaded. The bags are being unloaded one at a time before being inspected and cleaned, he said. It could take several hours to remove the affected bags, at which time the area would be declared safe, he said. A further 1150 bags had already been placed in other parts of the ship.

incidents as opposed to the typical occupational safety programs which focus on the other ("low consequences/high probability") end of the spectrum. There is a tremendous amount of learning coming out of process incidents that do not necessarily occur in the explosives industry. The BP incident in Texas is an example that has generated a large amount of concern around how we manage process safety.

This theme overlaps with Good Explosives Practice and Basis of Safety, which we welcome.

4. **HS&E Outside the Factory.** This theme would be around the impact of our products and services outside the factory and the associated exposure to risk. Included could be papers on an explosives perspective of underground safety, recent incidents, perchlorate and NOX issues in mining, potential sustainability (biodiesel) issues, and others. A typical example is the incident in which an operator was fatally asphyxiated/poisoned when he fell into a cavity that contained high levels of post blast NOx fumes.

Non-member involvement

Besides the revised structure of the Open Day in which we will do away with parallel sessions, the other major implication is that we will be inviting non-members who are specialists in their respective fields to participate on this day. We feel that the nature of the themes and the desirability to broaden our network on HS&E issues:

- Necessitate the involvement of non-members
- Does not require the "safe environment" for openly sharing incident experiences as required for the Closed Day on the Friday.

What do we want you to do?

We want to hear from members about both the proposed structure and the suggested themes for the Open Day. The Board of Governors will be finalising this at its meeting in November and we would be very happy to table your thoughts at that time. In the mean time we ask you to think about how you can contribute to these themes and to let us have your proposals.

Are you interested in the Congress Training Session?

In the last Newsletter we invited members to indicate possible interest in the Training Session that Andy Begg is organizing. He will be covering Risks Assessments in Explosives in a practical hands-on way. Because we will only be able to accommodate 30 participants in the two-day session which will be run before Congress, can we urge you to indicate your interest by e-mailing the secretariat@safex-international.org if you have not already done so. **The sooner you do so the better your chances are of being accepted for the Training Session.**

From CERL's research notes

Aluminium Nanopowders and their Mixtures with Energetic Materials

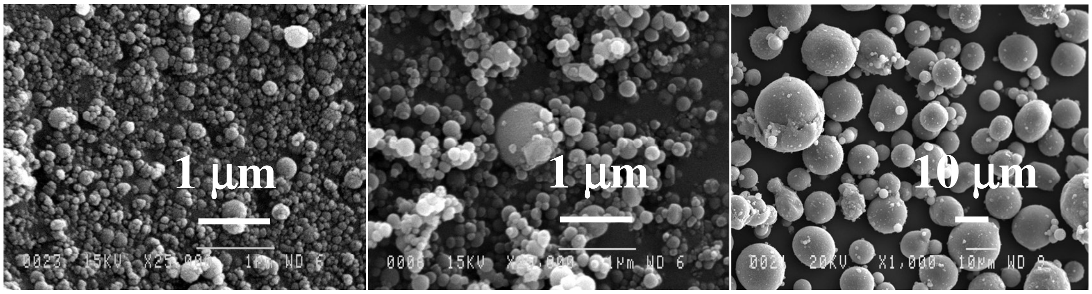


Figure 1. Examples of two Al nanopowders and one micron-sized powder. Left, a nanopowder produced by a plasma process (“Als” d = 90 nm); centre “Alex” d = 180 nm, produced by an electro-explosive process; right, “H-15”, d = 12 µm, produced by conventional atomization.

Introduction

Aluminium (Al) powder is commonly added to explosives and propellant compositions to modify their performance. Conventional Al powder is typically micron-sized. Over the last few years, advances in metal processing technology have allowed Al nanopowders to become commercially available. There is now quite a variety of nanopowders available, made using different techniques; average particle sizes vary from 20 to 200 nm. This has led to a great deal of interest in the potential use of Al nanopowders in high-value energetic materials, owing largely to their high surface area and consequent enhanced reactivity [1]. Of course, there is a trade-off for this enhanced reactivity, in the form of difficulties caused by increased hazards, accelerated aging and compatibility issues. Figure 1 shows examples of two Al nanopowders and one conventional, micron-sized powder.

At CERL, we have been actively engaged in research on Al nanopowders for almost ten years, resulting in close to 30 technical reports, conference presentations and publications [see Refs. 2-4, as examples]. Much of the work we have done has been carried out in collaboration with Defence Research and Development Canada, or industrial partners. We have characterized the properties of a number of nanopowders and their mixtures with energetic materials. Most of our work has been related to the safety of the nanopowders and their mixtures with energetic materials.

The purpose of this short article is to summarize some of the findings of our work, with particular emphasis on the safety aspects of working with Al nanopowders, and how their properties can differ from those of micron-sized powders.

Thermal Properties of Al Nanopowders

In the early stages of research into Al nanopowders, there was thought to be evidence that Al nanopowders could store significant amounts of excess energy in the form of crystal defects that were introduced during their production. In our work on many different Al nanopowders, we have seen no evidence for the existence of such excess energy and the consensus now is that it is not likely to be significant. On the other hand, Al nanopowders do show some very interesting thermal properties. For example, while micron-sized Al powders only react with air above the melting point of Al at 660°C, we have observed exothermic reaction at temperatures below 400°C. Figure 2 shows the results of simultaneous thermogravimetric analysis - differential thermal analysis (TG - DTA) of the three Al powders illustrated in Figure 1. In this experiment, a few milligrams of sample are heated up in a flowing air stream, while the instrument monitors heat evolution (ΔT in Figure 2) and mass changes. The micron-sized powder

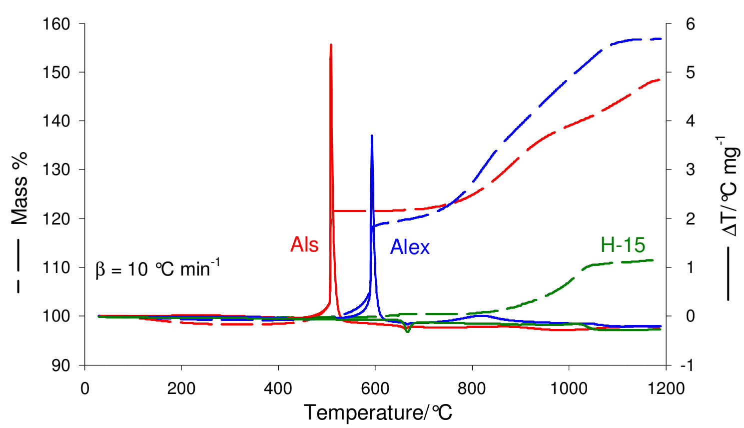


Figure 2. Simultaneous TG-DTA data for two Al nanopowders and one micron-sized powder. Average particle sizes: Als = 90 nm, Alex = 180 nm, H-15 = 12 µm.

displays behaviour typical of conventional Al powders: there is little sign of exothermic behaviour, although the Al melting endotherm at 660°C is visible; there is also a slow, steady mass gain above the melting point of Al, as the metal is converted to the heavier oxide. For the two Al nanopowders, the behaviour is markedly different. They show rapid, exothermic reaction accompanied by a significant mass gain well below the Al melting point. Further mass gains occur as the temperature is raised further. The total fractional mass gain is much greater than for the micron-sized powder, indicating much more complete reaction. Note that the smaller of the two Al nanopowders reacts at lower temperatures.

Aging of Al Nanopowders

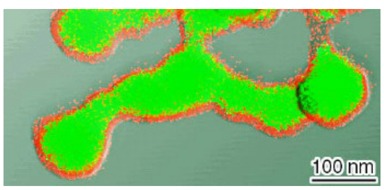


Figure 3. EDS map of a 120-nm Al nanopowder, showing the oxide layer (in red)

It is well known that Al particles rapidly develop a passivating oxide layer when exposed to air. This oxide layer is typically a few nanometres thick. Figure 3 shows an EDS (electron dispersion spectroscopy) map of a transmission electron micrograph of a 120-nm Al nanopowder. The oxide layer is clearly visible and approximately 4-nm thick. For micron-sized powders, the thin oxide layer provides a significant benefit in terms of stability in air and ease of handling, without appreciably reducing the amount of aluminum available for reaction. On the other hand, an oxide layer a few nanometres thick represents a significant volume fraction for a nanoparticle. For example, a 4-nm oxide layer on the surface of a 40-nm particle represents 49% of the total particle volume, compared to less than 0.06% for a 40-μm particle. Clearly, it is important to minimize the thickness and growth of this external layer if possible. The rapid aging of some Al nanopowders has led to the development of a number of coated powders. We have studied Al nanopowders coated with fluoropolymers, polyethylene, Viton and polypropylene, as examples.

Figure 4 demonstrates the susceptibility of Al nanopowders to storage conditions. In this case, we kept a 90-nm Al nanopowder ("Als" as shown in Figures 1 and 2) in humid air (RH > 85%) at ambient temperature. Before storage, the TG-DTA behaviour is that shown in Figure 2 for "Als". After 47 days, the exothermic reaction with air is much less sharp, but there is still a significant oxidative mass gain, demonstrating that a substantial amount of Al metal remains intact. However, after 74 days there is no sign of exothermic behaviour or mass gain when heated in air. In fact, the only change in mass on heating is an initial mass loss, corresponding to the evaporation of a water vapour from the surface of the corroded material. The aged material was also visibly degraded, going from grey to white in appearance. Our work has shown that the aging process is significantly accelerated at temperatures even slightly above ambient, and slowed considerably in the absence of water vapour, or polymer coatings.

Hazards

As might be expected, Al nanopowders can present a significant dust explosion hazard, so great care should be taken when handling any significant quantities. Our work on Alex (d = 180 nm) showed that it belonged to the highest hazard class for explosible dusts (St 3), with a very low minimum ignition energy (1-3 mJ) [3].

We have also demonstrated that Al nanopowders can be sensitive to electrostatic discharges without being dispersed as an airborne dust. For example, a 90-nm Al nanopowder ("Als") could be ignited with a spark energy of 6 mJ. This means it could easily be ignited by an electrostatic discharge from a person. In comparison, a 180-nm Al nanopowder did not ignite at a spark energy of 156 mJ. We attribute the sensitivity of the small nanopowder to the ease in which it could be partially dispersed by the spark, creating an airborne suspension of dust that is easily ignited [3]. We have also found that mixing Al nanopowders into

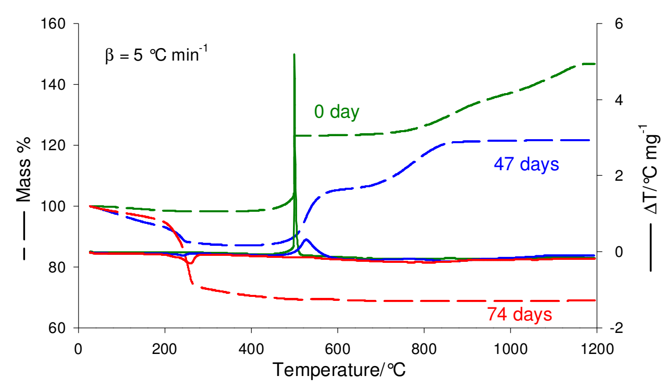


Figure 4. Aging of Al nanopowder in humid air by DTA-TG.

insensitive energetic materials can render them very sensitive to electrostatic discharges.

One important result from our work has been the demonstration of a potentially very hazardous interaction between Al nanopowders and water. The susceptibility of Al nanopowders to aging in humid environments was described above. We have studied the reactivity of a number of Al nanopowders with water. The measurements were carried out using the Accelerating Rate Calorimetry (ARC) technique that we described in the June 2007 issue of the SAFEX newsletter. In most cases, when mixed directly with water, Al nanopowders can undergo violent runaway reactions beginning at temperatures as low as 30-40°C. Polymer coatings do not appear to help, presumably as the polymer coverage is not without gaps. This result has important consequences for the handling of Al nanopowders: water-based slurries are often used to make mixtures of energetic materials, for example.

Mixtures of Al Nanopowders with Energetic Materials

When considering the potential use of new energetic mixtures, it is very important to establish the compatibility of the components. We have investigated the compatibility of a number of Al nanopowders with a wide range of energetic materials, using a variety of techniques. It is generally very difficult to make predictions around the compatibility of mixtures and experimental measurement is usually necessary. Figure 5 shows the effect of a variety of Al nanopowders on the thermal stability of RDX, as measured by ARC. The Al nanopowders vary from 90 to 180 nm in average particle size. Some are polymer coated; others are not. While most of the Al nanopowders have only a small effect on the thermal onset temperature, a polypropylene-coated nanopowder (Al120PP, d = 120 nm) reduces the onset temperature by 20°C. One bare nanopowder ("Als," d = 90 nm) reduces the onset temperature by over 60°C. We have done similar work with a number of other energetic materials such as TNT, GAP, ADN, Comp B.

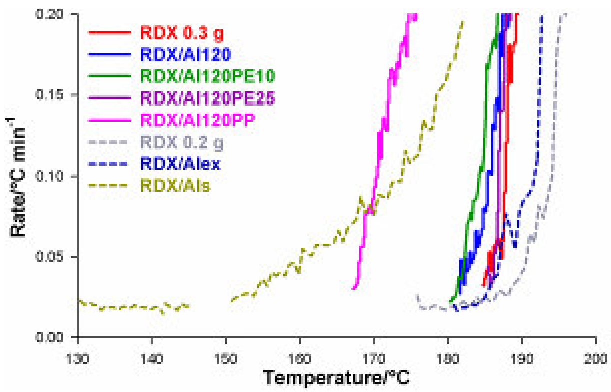


Figure 5. Compatibility of aluminum nanopowders with RDX

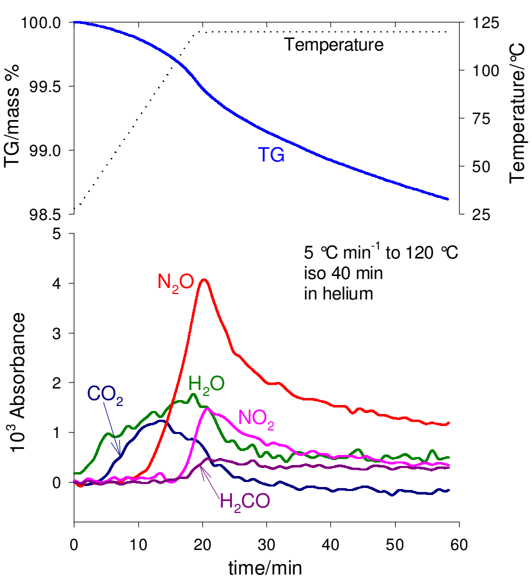


Figure 6. Outgassing from a mixture of RDX and an Al nanopowder

It is also possible to investigate the interaction between Al nanopowders and energetic materials by looking at the gases that are produced when the mixtures are heated. At CERL, we accomplish this using a "hyphenated" technique (TG-DTA-FTIR-MS). The gases evolved in the TG-DTA apparatus described earlier are analysed using Fourier Transform Infrared (FTIR) spectrometry and mass spectrometry. Figure 6 shows a typical result: on heating a mixture of RDX and "Als" (d = 90 nm) to 120°C and holding it there for 40 minutes, a mass loss is observed, as gas is evolved. A number of gas-phase species were observed by FTIR, the most important of which is nitrous oxide. No nitrogen-containing species were observed when the individual components of the mixture were tested, so it is clear that some chemical interaction is occurring. This kind of interaction is important to the long-term stability of energetic mixtures and the useful lifetime of devices made with them.

Conclusions

Over the last decade, CERL has carried out extensive work on Al nanopowders and their mixtures with energetic materials. The research has often been done with external partners on a shared basis. As a result, we have been fortunate to be able to carry out and publish, in the public domain, interesting safety-related science with very practical applications.

Al nanopowders produced using a number of different techniques, are now available in a range of sizes and with a variety of coatings. Their properties differ markedly from those of conventional, micron-sized Al powders. In particular, the significantly increased reactivity of Al nanopowders is of great interest to the developers of new energetic materials. Unfortunately, their cost is still a barrier to their use in many applications. In addition, there are negative consequences of the enhanced reactivity in terms of increased hazards and compatibility issues, some of which were described in this short article.

One obvious conclusion from our work is that it is very difficult to predict the behaviour of Al nanopowders, as their properties depend on many factors, of which average particle size is only one. Storage conditions, manufacturing process, polymer coating (if used) and size distribution all appear to be important. Of key importance is the need for experimental hazard and compatibility data when looking at new energetic materials based on Al nanopowders.

References

[1] Ivanov, G.V., and Tepper, F., in: Kuo, K.K. (Eds), Challenges in Propellants and Combustion 100 Years After Nobel, Begell House, New York, 1997, p. 636-645.

[2] D.E.G. Jones, P. Brousseau, R.C. Fouchard. A.-M. Turcotte, and Q.S.M. Kwok, *Journal of Thermal Analysis and Calorimetry*, **61** (2000) 805.

[3] Q.S.M. Kwok, R.C. Fouchard, A.-M. Turcotte, P.D. Lightfoot, R. Bowes and D.E.G. Jones, *Propellants, Explosives, Pyrotechnics*, 27 (2002) 229.

[4] Q.S.M. Kwok, C. Badeen, K. Armstrong, V.Y. Gertsman, R. Turcotte and D.E.G. Jones, Journal of Propulsion and Power, 23 (2007) 659

Our Expert Panel at work

Australian Ammonium Nitrate Regulations

While SAFEX recognizes that the security of explosives and related issues is very important to its members, it has consciously excluded security issues from its scope of activities. The SAFEX domain remains the health, safety and environmental (HS&E) impacts of explosives at all stages of the explosives life cycle. We believe there are many country and regional specific matters related to explosives security that industry associations such as FEEM, IME, NIXT and VISFOTAK are better placed to handle on behalf of manufacturers. Many of these matters also require advocacy with local regulators which SAFEX is not equipped to do.

Notwithstanding, we realize Security Sensitive Ammonium Nitrate (SSAN) is becoming more prominent in the industry. Ammonium nitrate is such an important raw material for many of our members we thought members may appreciate some background to developments in this area. One of our Expert Panel members has sent us this overview of the situation in Australia. We publish it to give readers a basic introduction to the SSAN concept.

Introduction

In response to increased awareness of national security and terrorist threats, Australian State and Territory Governments have developed principles regarding the import/export, manufacture, storage, transport and use of what is called Security Sensitive Ammonium Nitrate (SSAN). SSAN is defined as ammonium nitrate (AN) and emulsions and mixtures containing more than 45% AN, excluding AN solutions.

The highest Australian intergovernmental forum, the Council of Australian

Governments (COAG), agreed on a national approach that only allows authorized users to access SSAN. The agreement is aimed at the establishment of a consistent State and Territory-based licensing regime for the use, manufacture, storage, transport, supply, import and export of SSAN. The objective of the licensing regime is to ensure that SSAN is only accessible to people who have demonstrated a legitimate need for the product, have a security clearance and will store and handle the product safely and securely.

COAG Principles for the regulation of SSAN

Broadly, the agreed COAG principles for the regulation and control of SSAN in Australia cover aspects such as:

Authorities (licenses)

Authorisation is required to import, manufacture, store, transport, supply, export, use or dispose of SSAN. Parties seeking authorisation must demonstrate a legitimate need for access to SSAN, provide safe and secure handling and storage and comply with other requirements discussed below.

Security checks

Background security checks are required for people with access to SSAN.

Import and Export of SSAN

Import and export authorities require the regulator (in the appropriate State or Territory) be notified of details of the shipment, storage, transportation etc. Significant documentation about the nature of the product, its destination, authorization details of recipients, etc are required.

Manufacture

Authorisation to manufacture requires an approved security plan based on a risk assessment for the manufacturing process, control and traceability of the product, control of authorized people and procedures for reporting theft or loss of product.

Storage

Authorisation to store SSAN requires an approved security plan based on a risk assessment. The principles cover aspects such as control of access to SSAN, inventory control and storage in a locked facility/container (as a minimum security measure).

Transport

Authorisation to transport SSAN requires an approved security plan based on a risk assessment. The risk assessment must include precautions to ensure that the SSAN is under constant surveillance and secure for the entire journey and that there are procedures to ensure that loss or theft of product is reported to authorities. As a minimum, SSAN must be transported in a locked container or vessel.

Supply, use and disposal

The principles require rigorous record keeping of all transactions involving SSAN supply, use or disposal

Reporting of theft, loss or discrepancies

All incidents must be reported to the appropriate regulatory authority and police. The police will be responsible for reporting incidents to a national data base.

Offences

It will be an offence to import, manufacture, store, transport, supply, export, acquire, use or dispose of SSAN without authorisation. It will also be an offence to breach the requirements of an authorization

Implementation of SSAN Principles in State and Territory Law

As part of a federation, Australian State and Territory Governments are responsible for incorporating the COAG principles for the regulation of SSAN into law. Unfortunately progress at implementing the regulations has not been uniform across the country and it has been a challenge for explosives companies and others in the mining and construction industries to develop a consistent national response to the new regulations.

The first set of regulations was enacted in the State of Queensland in late 2004. Other States and Territories are in various stages of enacting their legislation. All allow for a transition period whereby affected parties have certain period of time to comply with the new regulations.

Impact of the SSAN principles and regulations on the explosives industry

Under the COAG principles, all AN, AN emulsions and AN mixtures containing more than 45% AN (excluding Class 1 products and aqueous solutions) have been designated as SSAN. Based on this definition, AN prill and typical emulsion explosives are SSAN and all these types of products imported or manufactured in Australia need to conform with the COAG principles and individual State and Territory regulations promulgated into law. Some fertilizer products, containing more than 45% AN are also classified as SSAN.

SSAN principles and regulations affect the entire supply chain from import or manufacture through to final usage and disposal. The immediate impact on explosives companies has been the need to implement new or improved inventory management, reconciliation processes and upgrades to storage and transport security. Some of these changes have required upgrades to enterprise resource planning (ERP) processes and procedures to enhance traceability in the SSAN chain of custody.

There have also been additional administrative requirements imposed by the need to apply for SSAN licenses as well as the need to get security clearances for employees with access to SSAN

The new SSAN regulations will have a significant impact on all players in the explosives industry, both big and small. The larger, national companies with complex supply chains face significant task in upgrading systems and processes to comply with individual State and Territory Regulations. Smaller, niche players in the industry, with less rigorous or informal supply chain management systems may need significant upgrades to their processes and systems to comply with the SSAN regulations.

Conclusion

Australian SSAN regulations are the direct result of changes in national security threat levels. They are necessary to ensure that these materials, critical to the mining and construction industries, are used for peaceful purposes only. The new regulations will impose administrative and reporting requirements as well as additional costs on explosives companies.

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Something to make your hair stand on end.

The photograph on the next page was published by WorkSafe Victoria in the "Safety Soapbox" as part of their series "Absolute shocker of the Week" and is used with permission in order to promote safer work practices. John Maher (Thales Australia) brought it to our attention as it demonstrates how things can go wrong with the use of explosives – in a quarry on this occasion. The comment that accompanied this picture was:

> "A very dramatic and close call for one of our blasting sub-contractors. Fortunately no one was injured despite the fact that there was extensive fly rock. As shown above, the blasting supervisor was detonating only metres away whilst observing/hiding behind an over-turned wooden frame for a construction sign (see inside the red circle). For what good it could have done, at least he was wearing his PPE."
>
> Some other fact's about the incident:
> - "Photo was taken with a zoom lens"
> - "Fly rock flew about 50 m, smashing a back window on a ute"
> - "Have no other photos, sorry. Everyone was in too much of a rush to see if the blasting subbie was still alive."

There's not much more we can add.

SAFEX International thanks the following for their contributions to this Newsletter:

- **Dr Piet Halliday,** member of the SAFEX Board of Governors
- **Frank Barker,** Governor responsible for convening the Open Day of the 2008 Congress
- **Andy Begg,** Individual Associate member and Governor
- **Dr Phil Lightfoot,** Manager, Canadian Explosives Research Laboratory
- **Michael du Plessis,** member of the SAFEX Expert Panel
- **John Maher,** SAFEX Contact Person for Thales Australia
- **WorkSafe, Victoria** for the photograph we used from "Safety Soapbox"

Boet Coetzee
Secretary General: SAFEX International