pinfa

Newsletter for non-halogen fire safety solutions

January 2012 – N° 15



fr Innovation

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Happy New Year!

This is the first pinfa Newsletter of 2012, and the whole pinfa team would like to wish you a happy new year and all the best for 2012. Fire safety is our main concern and the festive season has its own particular danger. Fire safety organisations remind us that Christmas trees can become a significant fire danger. An average 240 home fires per year begin in Christmas trees in the USA: nearly one fifth of home fires over the Christmas period. More than one in twenty of these fires result in death. These figures are from the US National Fire Protection Association (NFPA) updated report on Christmas tree fires, November 2011. The NFPA has also published a video showing has how a dry tree burns much more violently than one which has been regularly watered. We hope that you enjoyed a safe and happy Christmas and New Year celebrations.

NFPA Christmas tree fires: "Home Christmas Tree and Holiday Light Fires", November 2011, M. Ahrens, Christmas tree fire fact sheet, video: http://www.nfpa.org/categoryList.asp?categoryID=296

Mattress and bedding fires continue to kill

Over 370 civilian deaths result from fires starting in mattresses and bedding every year in the USA, according to a recent report from the US National Fire Protection Association (NFPA). Mattress and bedding fires in the US also caused over 1 300 civilian injuries and US$ 380 million property damage. Three quarters of these fires started in the bedding fabrics, including cotton, rayon, wool and blends. Mattresses and bedding rank second, after upholstered furniture, as items first ignited in home fires leading to deaths. The US introduced 'small flame' resistance fire safety requirements for mattresses in July 2007, and the number of fires starting in mattresses and bedding has fallen by 19% from 2006 to 2009, compared to a fall of only 3% from 2003 – 2006. To date, only three countries in Europe have legislation requiring significant fire resistance for mattresses: UK and Ireland: resistance to a small flame and limited rate of burning (mass loss) for mattresses; Czech Republic: small flame resistance for bed bases and interior textiles. A few other countries have ineffective regulations requiring only cigarette ignition resistance (France, Finland, Sweden).

"Home structure fires that began with mattresses and bedding", NFPA (B. Evarts) October 2011:
http://www.nfpa.org/itemDetail.asp?categoryID=423&itemID=18255&URL=Research/Fire%20reports/Major%20causes

PIN flame retardant use expected to accelerate

A global market study on flame retardants concludes that improving fire safety regulations in many countries across the world will result in a growing need for flame retardants, with a particularly rapid growth of 3.5 – 4.5% per year for phosphorus based PIN flame retardants because of the emphasis on environmentally friendly products. Innovation will include developments in nanotechnologies, micro-encapsulation and intumescent systems, and increasingly tailored user- and product- specific formations for particular applications. The most widely used flame retardant, the PIN mineral aluminium hydroxide (ATH) is expected to continue to dominate the market over the coming six years.

Market Study Flame Retardants 2018: Ceresana Research: http://www.ceresana.com/en/market-studies/additives/flame-retardants/ceresana-research-market-study-flame-retardants.html

Approved Cables Initiative

The UK campaign against non-conform cables and wires, Approved Cable Initiative, is reinforcing its action to increase public, industry and regulator awareness of the risks resulting from substandard cables, in particular fire dangers. A video shown on the BBC1's "Fake Britain" programme underlines the fire risks resulting from wires with below specification copper thickness or which do not respect fire performance requirements, including footage of fire testing of cables used in schools, hospitals and other public buildings. The organisation estimates that 20% of cables sold in the UK are non-approved, unsafe or counterfeit, and that problems starting in wiring are the cause of a quarter of electrical fires, resulting in 1 200 injuries and 15 fire deaths per year in the UK.

Approved Cable Initiative (ACI): www.aci.org.uk

Innovative FR cables and connectors for electric vehicles

Hitachi Cable has developed what it says are the smallest compact connectors available for the demanding requirements of high power wiring in hybrid and electric vehicles, to be combined with the company's special heat resistant cables (rated ISO6722 class D at 150°C and class F at 200°C). The former uses "halogen and heavy metal free" materials based on an ethylenic copolymer with metal hydroxide flame retardants to ensure self-extinguishing and low smoke for the insulation and sheath. The latter is fluorine resin cable Fluonlex®. The connectors use a specific spring mechanism whereby high spring force is applied after inserting the connectors, and a single spring for multiple terminals, thus minimising size and improving vibration resistance.

Photo : Hitachi Cable compact connector

Hitachi news release 30th August 2011: http://www.hitachi-cable.com/products/news/20110830.html

Hitachi development paper: http://www.hitachi-cable.com/about/publish/review/__icsFiles/afieldfile/2010/01/18/n28_2.pdf

FRX Polymers innovation award entry

FRX Polymers polymeric phosphorus flame retardants are entered for the US Presidential Green Chemistry Challenge Awards, operated by the EPA (Environment Protection Agency). FRX has brought online a high-yield production plant for DPP (DiPhenyl methyl phosphonates), which is then polymerised into flame retardants containing up to 10% phosphorus which can either be used as stand-alone polymers, or as additives to improve fire safety of polycarbonates, polyesters, polyurethanes, PET, epoxies and polyureas, as well as in bio-sourced polymer materials. The polymerisation process is solvent free, producing mainly phenol as a by-product, which is recycled back to monomer production. The polymer flame retardant is non-migrating (avoiding losses from products to air or dust), amenable to recycling and does not deteriorate host polymer physical performance. Applications tested to date include carpets, transparent lenses in LED lights, electrical connectors and switches and electronic products housings. FRX already obtained the 2008 Frost & Sullivan North American Product Innovation of the Year Award for flame-retardant materials.

US Presidential Green Chemistry Challenge Awards: http://www.epa.gov/greenchemistry

FRX Polymers www.frxpolymers.com

New flame retardants in consumer products

A study of brominated and organophosphorus flame retardants in new consumer goods in Japan suggests that the chemicals being used have evolved, with in some cases new brominated molecules appearing (bromine present but "traditional" flame retardants analysed not found) and in other cases replacement by phosphorus based products. The "traditional" organophosphorus ester flame retardants were also not detected, whereas triphenylphosphate was widely found, possibly because of its presence as in impurity in some formulations of condensed organophosphorus flame retardants. These new molecules offer the advantage of low indoor air pollution. The study notes that the organophosphorus compounds in the products do not correspond to those found in household dust, which may come from floor polishes (TBEP).

Traditional brominated flame retardants were found in low concentrations in some cases, probably because of the use of recycled materials.

Brominated and organophosphate flame retardants in selected consumer products on the Japanese market in 2008, N.Kajiwara, Y. Noma, H. Takigami, Journal of Hazardous Materials, Volume 192, Issue 3, 15 September 2011, Pages 1250-1259: http://www.sciencedirect.com/science/article/pii/S0304389411008053

ACI is an industry-wide working group bringing together organisations including Electrical Distributors Association (EDA); Electrical Contractors Association (ECA); Electrical Safety Council; British Approvals Service for Cables (BASEC); British Cables Association (BCA); Energy Networks Association (ENA); Ascertiva (previously the NICEIC Group Limited) and SELECT.

ACI - "Low Smoke Halogen Free Cables - are you getting the performance you expect?"
http://www.aci.org.uk/page/90/Low-Smoke-Halogen-Free-Cables-are-you-getting-the-performance-you-expect-.htm

Fire Industry Association (FIA) "Focus" article, Issue 20, 2011, pages 12-13:
http://content.yudu.com/Library/A1tyfr/FIAFocusIssue20/resources/12.htm

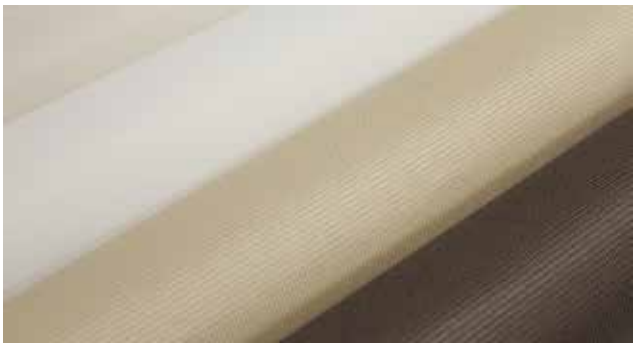
Wildfire risks increasing

Evidence suggests that the frequency, extent and impacts of wildfires are already increasing, and will accelerate in coming years, as a consequence of climate change, and of increasing urbanisation of risk areas. The US National Fire Protection Association has devoted a special issue of its magazine NFPA Journal to wildfires (October 2011). US studies suggest that the wildfire season is now 78 days longer than it was in the 1980's, that wildfire consumed biomass will double in the Western US this century, but that also States in the North East and West will face fire where it has not traditionally been a problem. Climate change accentuates wildfires with increasing temperature, extended droughts, and stronger winds. 45 million homes in the USA are potentially threatened by wildfires. PIN substances such as ammonium phosphates are widely used to support wildfire fighting, as environmentally safe additives to fire fighting water which improve fire prevention and suppression.

NFPA Journal "Big Picture NFPA and wildfire", October 2011: www.nfpa.org

Fire retardant window screen wins Sustainability award

Draper's GreenScreen Revive® is a window shade fabric, certified by MBDC (Cradle to Cradle®-certified Silver www.c2ccertified.com) and by Greenguard® Environmental Institute (Children and Schools and Indoor Air Quality), which offers solar control, reducing heat and glare, whilst maintaining a clean window view. The halogen-free, low VOC flame retardant (NFPA 701, CSFM Title 19) polyester fabric is made of c. 90% Repreve® recycled fabric, produced from consumer waste plastics. 1 kg of Repreve fibre saves around 3.6 litres of oil. GreenScreen has won the 2011 Window Coverings Manufacturers Association "Sustainability: Most Innovative Concept" Award 2011.



Draper GreenScreen Revive window shade fabric:
http://www.draperinc.com/windowshades/revive.asp

Halogen-free FR cables for electronics and vehicles

Alliance Polymers & Services (APS), US specialist in elastomer applications, has launched new halogen-free flame retardant (HFFR) polymers for a range of cable applications. APS's halogen-free TPEs (styrenic block copolymer thermoplastic elastic) are adapted for power plugs, charger cables, ribbon wire and other cables in consumer and industrial applications, offering flexibility, good processing and surface quality. The different grades are conforming to UL 1581 or UL94 as appropriate. APS has also launched solutions for high-temperature, high-voltage cable harnesses and sheathing in electric and hybrid vehicles. The use of BASF's Elastollan thermoplastic polyurethanes ensures high physical resistance to wear, chemicals and temperature (up to 300°C) and conformity to requirements for high voltages in electrically powered vehicles and can be supplied halogen-free fire safety treated.

Alliance Polymers & Services www.apstpe.com

Other news

A study of 13 herring gull eggs from the US-Canada Great Lakes detected two halogenated organophosphorus flame retardants (TCPP, TCEP) and one phosphate ester mainly used in floor polish and other industrial applications (TBEP) in all the tested eggs, generally at <1 ng/g (<1 part per billion) levels. Two other phosphorus flame retardants analysed were detected in only 2 and 3 of the 13 eggs, and the other 7 phosphorus flame retardants analysed were not detected at all.

Determination of non-halogenated, chlorinated and brominated organophosphate flame retardants in herring gull eggs based on liquid chromatography-tandem quadrupole mass spectrometry, Journal of Chromatography A, in press (12/2011), D. Chen, R. Letcher, S. Chu http://www.sciencedirect.com/science/article/pii/S002196731101747X

Abbreviations

DPCP	*Diphenyl cresyl phosphate*	
HFFR	*Halogen Free Flame Retardant*	
NFPA:	*US National Fire Protection Association* www.nfpa.org	
TBEP:	*Tris(2-butoxyethl)phosphate*	
TCEP:	*tris(2-chloroethyl) phosphate (known as "TRIS")*	*halogenated flame retardant*
TCPP:	*tris(2-chloro-1-methylethyl) phosphate*	*halogenated flame retardant*

Agenda

Events with active pinfa participation are marked: ►

6-8 March 2012	Cologne, Germany	Cables 2012 (AMI): http://www2.amiplastics.com/Events/Event.aspx?code=C441&sec=2105
14-16 March 2012	New York	5th International Symposium on Tunnel Safety & Security http://www.istss.se/en/Sidor/default.aspx
20-22 March 2012	Cologne, Germany	Green Polymer Chemistry 2012 www.amiplastics.com
25-29 March 2012	San Diego, California	ACS Fire and Polymers VI conference http://portal.acs.org
1-5 April 2012	Orlando, Florida	►National Plastics Exhibition www.npe.org , SPE Conference www.spe.org
16-17 April 2012	Shanghai, China	3rd International Conference on Flame Retardants (SKZ) http://www.skz.de/en/training/conferences/international_conference/1499..html
18-21 April 2012	Shanghai, China	Chinaplas (Asia Plastics and Rubber Trade Fair) http://www.chinaplasonline.com
8-10 May 2012	Indianopolis, Indiana	American Coatings Show (Vincentz Network) http://www.american-coatings-show.com/
13-16 May 2012	Strbske Pleso, Slovakia	7th International Conference on Wood & Fire Safety http://www.sfs.au.com/documents/Wood%20&%20Fire%20Safety%20Conference%2020121.pdf
20-23 May 2012	Cambridge, Massachusetts	BCC Flame Retardancy conference http://www.bccresearch.com/conference/
23-24 May 2012	Würzburg, Germany	Trends im Brandschutz/Flammschutzmittel (SKZ) www.skz.de
4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com

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pinfa North America ready for action

pinfa North America (Phosphorus, Inorganic and Nitrogen flame Retardants Association) is now formally incorporated and not-for-profit status is being ratified. This follows the launch decision announced in spring 2011 by the US Society of Plastics Engineers (SPE www.4spe.org) and leading US flame retardant and masterbatch producers. The organisation will be the counterpart of pinfa Europe, with FRX Polymers, Clariant and Nabaltec being the founding members. The association will provide technical information and technology exchange on halogen-free, innovative fire safety solutions with sound environmental and health profiles. Pinfa North America will engage specifically in the local market and regulatory context, and co-operate globally with pinfa activities in Europe and Asia.

Companies interested in joining pinfa North America should contact Maggie Baumann, FRX Polymers at MBaumann@FRXpolymers.com.

See: https://www.4spe.org/sites/default/files/pinfa.pdf

iNEMI HFR-Free Leadership Project Update

The objective of the iNEMI Halogenated Flame Retardant Free Leadership project is to identify technology readiness, supply chain capability, and reliability characteristics for HFR-free alternatives to conventional printed circuit board materials and assemblies looking at both the electrical and mechanical properties of these materials. The project is part of iNEMI's "Environmentally Conscious Electronics" target action. iNEMI, the International Electronics Manufacturing Initiative, is a not-for-profit R&D consortium of more than 85 leading electronics manufacturers, suppliers, associations, government agencies and universities whose mission is to forecast and accelerate improvements in the electronics manufacturing industry for a sustainable future. Below we provide an update of the HFR-Leadership project.

HFR-Free PCB Materials Work Group (2008-2012)

In 2008, the electronics industry was concerned with both the thermo-mechanical affects and the laminate supplier's capacity/capability of the transition to HFR-Free laminates. The iNEMI Printed Circuit Board (PCB) Materials working group was initiated to generate a methodology for evaluating the reliability and material properties of these new laminates for the Desktop and Notebook market segments. A "Test Suite Methodology" (TSM) was developed, including both modified IPC laminate test methods and some non-traditional tests applied to the bare laminate. Each test method was evaluated for 6 materials at several test sites to understand the variability of the test methods. The WG concluded that 1) the HFR-Free laminates evaluated had properties that would support the transition to HFR-Free products, 2) the TSM allows selection of the most cost effective laminate, 3) the laminate suppliers have the capability to supply the volumes required for the transition, 4) the laminate suppliers are willing to provide the Industry with the iNEMI TSM data for HFR-Free laminates upon request.

HFR-Free Signal Integrity Working Group (2009-2011)

In 2009, the electrical properties of most HFR-free printed circuit board (PCB) materials on the market were causing significant design problems for high-speed digital systems such as PCs, servers and telecommunication products. In order resolve these problems, the iNEMI HFR-free Signal Integrity Working group, with 16 member companies, identified the critical electrical parameters that affect signal integrity and are unique to HFR-free PCBs, developed a common way to measure the parameters, defined general limits on HFR-free dielectric performance and communicated these to material manufacturers. Additionally, the working group identified HFR-free materials for testing, and constructed a design data base comparing measured material properties to the specified performance limits, thus providing a comparison tool for PCB materials for design purposes. This project has effectively 1) united a large portion of the industry (electronics equipment design and manufacture, PCB producers) concerning design of high-speed buses on HFR-free PCB's, 2) defined a unified approach to mitigate the challenges and 3) paved the way for member companies to produce "green" HFR-free computing products.

Text supplied by Stephen Tisdale, Intel, with thanks.

iNEMI statement on the definition of "Low Halogen electronics"
http://thor.inemi.org/webdownload/projects/ese/HFR-Free/Low-Halogen_Def.pdf

"iNEMI HFR-free leadership program", S. Tisdale, RC Pfahl, H Fu, in: 4th International Microsystems, Packaging, Assembly and Circuits Technology Conference, 2009. IMPACT 2009, 21-23 Oct. 2009, pages 594 - 597 http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5382255

EU low voltage, halogen-free cables standards published

CENELEC, the European Committee for Electrotechnical Standardisation, has published standards for halogen-free, low voltage cables, applicable as EU harmonised standards under Directive 2006/95/EC. Four different new standards concern low-smoke, low-voltage cables with special fire performance: single-core, non-sheathed cables and flexible cables, both with thermoplastic and with cross-linked insulation. The four standards were published on 17th January 2012 and are valid through to 2014: EN 50525-3-11:2011, EN 50525-3-21:2011, EN 50525-3-31:2011 and EN 50525-3-41:2011. These standards cover fire-performance cables for voltages up to 450/750 V, for uses including consumer and industrial equipment.

EU Commission low voltage standards page: http://ec.europa.eu/enterprise/policies/european-standards/documents/harmonised-standards-legislation/list-references/low-voltage/

CENELEC: www.enelec.eu

PIN flame retardant in innovative scaffolding

RH PRODUCTS (Norway) patented scaffolding is made of recyclable plastic, offering cost advantages compared to aluminium and better safety and lower weight compared to wood. Fire safety is essential, because building sites pose specific risks of accidental fires (welding, work tools) and worker safety and egress issues. RH PRODUCTS scaffolding uses Paxymer's MB "green flame retardant" solution, which is based on PIN FRs and claims low smoke, no drip, no soot and conformity to UL94-V0, GWFI 960°, EN-50085. As part of the UNEP's pilot programme of POPs-free (Persistent Organic Pollutants) product development, testing by the Austrian Environment Agency (EAA) showed no detectable presence of 28 POP substances. This innovative, PIN FR fire safety treated, recycled plastic scaffolding has significant potential in markets where certain halogenated fire safety solutions are no longer used.

Photo copyright RH PRODUCTS. More information: http://www.rhproducts.no and www.paxymer.se

UK fire statistics continue to show improvement

Fire services attended 287 000 fires in the UK in the year 2010-2011, 5% fewer than the year before. Fire deaths also fell by 28, to 388 deaths/year, compared to a highest level of 1 096 deaths in 1979. Fire injuries however increased slightly: +5% to 11 100, but still consistent with a long term trend downwards. The main cause of accidental home fires was the misuse of equipment/appliances. The main source of ignition was cooking appliances, accounting for half of all accidental home fires.

Fire Statistics Great Britain 2010-2011: www.communities.gov.uk/documents/statistics/pdf/568234.pdf

Analysis to improve flame retardant textile application

Phosphorus-based flame retardants are one of the PIN FR solutions for ensuring fire safety of textiles, offering environmentally responsible profiles. They can be used on materials which are highly flammable if not treated, such as cotton or polyester. To ensure appropriate fire protection and also optimise flame retardant consumption and finished textile quality, it is important to monitor the application process. Applied Rigaku Technologies has launched a new tool to ensure this monitoring of phosphorus FRs, rapidly, reliably and without affecting the treated textile. The equipment uses energy dispersive X-ray fluorescence (XRF) to analyse phosphorus flame retardants on textiles.

Source: www.rigakuedxrf.com/press/2011PR_App1127%20final.pdf
Application report on request: http://www.rigakuedxrf.com/edxrf/app-notes.html?id=1127_AppNote

Polymer and clay fire treatment for textiles

Researchers at Texas A&M University have developed a water-based nano-film coating for textile fibres and foams, based on a polymer – clay composite, which offers flame retardancy whilst enabling the materials to remain soft and flexible. The technology is adapted from "intumescents" used to protect steel and concrete beams against structural failure due to heat during fires. When touched by a flame, the nano-coating swells up "like beer foam", producing tiny bubbles in a protective barrier. The polymer layers developed are so thin (1 / 50 000 th the width of a hair) that they can cover each individual fibre. Fire tests have shown the effectiveness of the treatment on cotton textiles, which are naturally highly flammable. Combinations of positive and negative charged polymer layers can ensure that softness is maintained. Further research is needed to render the coating durable. The technology was presented at the US American Chemical Society's 242nd National Meeting, August 2011.

See: http://www.newswise.com/articles/a-nano-environmentally-friendly-and-low-toxicity-flame-retardant-protects-fabric and http://www.sciencenews.org/view/generic/id/333924

"Flame-Retardant Materials: Intumescent All-Polymer Multilayer Nanocoating Capable of Extinguishing Flame on Fabric", Advanced Materials (Wiley), Vol. 23, Issue 34, page 3868, 2011. Y-C Li et al. Contact: jgrunlan@tamu.edu

Tighter fire safety requirements in French hotels

1st January 2012 saw the entry into application of updated fire safety regulations for French hotels. Smaller hotels had until this date to submit to authorities a calendar for works necessary to ensure conformity to 2006 fire safety regulations, as updated in October 2011, covering aspects such as fire alarm systems, egress stairs, fire blocking doors, information and training. This follows a report in May 2011 which concluded that better coherence was needed between different regulations applicable to hotels, and that it was not feasible to apply tighter fire safety regulations to hotels offering "social housing". France has suffered a series of tragic hotel fire deaths since the Paris-Opéra hotel fire killed 15 people in 2005, including fatal hotel fires in Paris, Marseille and La Rivoire near Chambery in 2011.

"Arrêté du 26 octobre 2011 portant approbation de diverses dispositions complétant et modifiant le règlement de sécurité contre les risques d'incendie et de panique dans les établissements recevant du public (petits hôtels) ": http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000024725239&categorieLien=id#

CENTEXBEL fire safe textiles for a changing society

pinfa participated in the Belgian Textile Research Centre CENTEXBEL conference "Fire-safe textiles, foams and composites for a changing society", Ghent, 23-24th November 2011. Philippe Salemis, pinfa General Secretary, presented the pinfa vision of continuously improving environmental and health profile of fire-safety solutions through the use of phosphorus, nitrogen and inorganic based performance compounds. pinfa flame retardants aim to be non-toxic, to not migrate out of finished products, not accentuate toxicity or corrosive effects of gases in case of fire, be compatible with recycling and degrade or remain neutral in the environment. pinfa works to promote these objectives through initiatives such as the EU "ENFIRO" project (life cycle assessment of environment-compatible flame retardants) and the US Environmental Protection Agency's "Design for the Environment" programme. A number of conference participants expressed interest in pinfa and its activities.

CENTEXBEL: http://www.centexbel.be/fr/conf%C3%A9rence-internationale-retardateurs-de-flammes

TCO criteria for short throw projectors

The health, environment and worker protection label "TCO" has published criteria for short and ultra-short throw video projectors. Such projectors are increasingly used in education and business because they can be placed very close to the screen. The new TCO criteria exclude organically bound halogen from parts >25g and exclude all PBB and PBDE brominated flame retardants completely, including from printed wiring boards. Fire safety standards can therefore be achieved by a combination of appropriate safe electrical design, non-flammable or less flammable materials and PIN flame retardants.

TCO Certified: http://tcodevelopment.com/pls/nvp/document.show?cid=4146&mid=931

Other News

Meaningless … "100% chemical free" ! It makes no sense, but increasingly often, we see adverts claiming just that. The Royal Society of New Zealand's 2011 Manhire Prize for non-fiction creative writing was won by Joanna Wojnor's essay with that title, in which she explains that chemistry is everywhere, and that we humans are made up entirely of chemicals. "Chemicals are neither good nor bad. They just are." Ms Wojnor notes that the word chemical is increasingly misused to suggest something man-made or manufactured, but reminds us that whether chemicals "come from a natural source, or are made in the factory or lab, if they have the same structure they will possess the same properties".

New Zealand Royal Society: http://www.royalsociety.org.nz/2011/11/17/2011manhire-winners-announced

Glossary and abbreviations

Please refer to the pinfa Glossary of abbreviations:
http://www.pinfa.eu/library/glossary-of-abbreviations

Agenda

Events with active pinfa participation are marked: ►

6-8 March 2012	Cologne, Germany	Cables 2012 (AMI): http://www2.amiplastics.com/Events/Event.aspx?code=C441&sec=2105
14-16 March 2012	New York	5th International Symposium on Tunnel Safety & Security http://www.istss.se/en/Sidor/default.aspx
20-22 March 2012	Cologne, Germany	Green Polymer Chemistry 2012 www.amiplastics.com
25-29 March 2012	San Diego, California	ACS Fire and Polymers VI conference http://portal.acs.org
1-5 April 2012	Orlando, Florida	►National Plastics Exhibition www.npe.org , SPE Conference www.spe.org
16-17 April 2012	Shanghai, China	3rd International Conference on Flame Retardants (SKZ) http://www.skz.de/en/training/conferences/international_conference/1499..html
18-19 April 2012	Miami, Florida	Polymers in Cables (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C451
18-21 April 2012	Shanghai, China	Chinaplas (Asia Plastics and Rubber Trade Fair) http://www.chinaplasonline.com
8-10 May 2012	Indianopolis, Indiana	American Coatings Show (Vincentz Network) http://www.american-coatings-show.com/
13-16 May 2012	Strbske Pleso, Slovakia	7th International Conference on Wood & Fire Safety http://www.sfs.au.com/documents/Wood%20&%20Fire%20Safety%20Conference%2020121.pdf
20-23 May 2012	Cambridge, Massachusetts	BCC Flame Retardancy conference http://www.bccresearch.com/conference/
23-24 May 2012	Würzburg, Germany	Trends im Brandschutz / Flammschutzmittel (SKZ) www.skz.de
4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1

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Injunction for failure to respect mattress fire standard

A Federal Judge has granted an injunction against Brooklyn Sleep Products, New York, to stop sale of mattresses not compliant with federal flammability laws. The Judge also ordered the company to recall all non-compliant mattresses already sold. The company can face a daily fine of US$ 1 000 per day if it fails to comply. The decision follows legal action taken by the US Consumer Product Safety Commission (CPSC), following an inspection at the company's production facility in New York and at retail stores selling the mattresses, collection of a mattress and testing by the CPSC showing that it failed an open flame flammability test, showing breach of the Flammable Fabrics Act and the Consumer Product Safety Act. The CPSC estimates that around 100 deaths per year in the USA result from mattress fires, emphasising that flammability standards ensure that fire spreads more slowly if it starts in or near a mattress, giving more time to escape.

US CPSC (Consumer Product Safety Commission) press release #12-039, 10th November 2011, "Federal Judge Grants Permanent Injunction Against Brooklyn Sleep Products and Francisco Chavez - Firm Sold Mattresses in Violation of Lifesaving Federal Flammability Laws" http://www.cpsc.gov/cpscpub/prerel/prhtml12/12039.html

Fire research directors on sustainability and fire safety

FORUM, the International Forum of Fire Research Directors has published a position paper on sustainability and fire safety. The organisation underlines that many trends towards building sustainability, energy conservation and renewable energies potentially imply new or increased fire risks, and emphasises that public fire safety and firefighter safety must not be compromised. Possible increased fire or safety risks can arise from the use of flammable natural materials for insulation or construction (wood, cotton, waste fibres …), lightweight materials in transport or buildings, natural aeration, high voltages in renewable energy production or electric vehicles … At the same time, the use of bromine or chlorine based flame retardants "is no longer considered acceptable" and alternatives are being sought. Flame retardancy of natural materials particularly needs to be carefully addressed to ensure safety and avoid emissions under smouldering or flaming fire conditions. The FORUM concludes inter alia that: "*fire safety consideration should form an unrenouncable part of any new product or technology developed to promote sustainable construction, acceptable solutions to acute fire safety concerns must not pose a threat to the long term health of workers, firefighters or the general public*"

FORUM: www.fireforum.org

"The International FORUM of Fire Research Directors: A position paper on sustainability and fire safety", U. Krause et al., Fire Safety Journal 49 (2012), pages 79–81, www.elsevier.com/locate/firesaf

Renewable chitosan based PIN-FR

A phosphorus and inorganic metal based PIN flame retardant has been developed based on the polysaccharide chitosan (made from chitin, the material of shrimp exoskeletons, by deacetylation). The nickel chitosan phosphate (NiPCS) is shown to reduce burning (HRR heat release rate and THR total heat release) and form fire-protecting char in PVA polymer (poly vinyl alcohol). The inorganic component showed to both synergistically delay polymer degradation in fire, so reducing the combustible volatile substances released, and reduce flammability by inhibiting burning and by improving the structure of the fire-protective char formed.

"Thermal properties and combustion behaviors of chitosan based flame retardant combining phosphorus and nickel", S. Hu et al., Ind. Eng. Chem. Res., in press, publication February 2012: http://pubs.acs.org/doi/abs/10.1021/ie2022527

Organosilicane fire safety for textiles

Alexium International has launched a new process for flame retarding nylon textiles, and potentially other synthetic and blend textiles. The 'RST' (Reactive Surface Treatment) combines microwave curing with organosilicanes, which contain both organic and inorganic functionalities in the same molecule. The process encloses the textile fibres in a "shrink wrap" nanoscale intractable coating, thus avoiding the problems often encountered in treating synthetic fibres which are relatively inert and so do not bond with many types of coating. It enables fire protection, water repellence and durability whilst avoiding heavy back-coating or halogenated chemicals. In case of fire, the organosilicanes react to form a nanocomposite char, inhibiting burning, melting and dripping.

Media coverage: http://www.innovationintextiles.com/alexiums-nanoscopic-shrink-wrap-gains-traction/

Office equipment fires

Office equipment causes around 1 500 non-confined fires per year in the USA, according to a report by the National Fire Protection Association www.nfpa.org Of these, just over half were in homes and the remainder in offices, resulting in yearly averages of 8 deaths, 65 civilian injuries and US$ 84 million direct property damage. Around half of these fires were caused by the ignition of cable insulation or apparatus casings. Nearly three quarters of the fires were caused by computers or computer-related equipment, with the remainder caused by various equipment such as telephones, copiers, fax machines … Home office equipment fires have approximately doubled since the early 1980's, in line with the increase in home computers.

NFPA – US National Fire Protection Association – fire research – appliances and equipment: http://www.nfpa.org/itemDetail.asp?categoryID=1614&itemID=39399

"Home and non-home fires involving office equipment", J. Hall, NFPA, January 2012.

"Development of flame retarded self-reinforced composites from automotive shredder plastic waste", C. Bocz et al., Polymer Degradation and Stability, Volume 97, Issue 3, March 2012, Pages 221–227: http://www.sciencedirect.com/science/article/pii/S0141391012000031

Coextrusion of PIN Flame Retarded fire pressure hoses

A significant risk for fire fighters in action is failure or rupture of fire hoses caused by contact with burning material or embers. Research has been carried out to develop more resistant hoses for use with standard fire service equipment and water pressures. The hose system developed uses a new material based on a thermoplastic elastomer (TPE) with an intumescent flame retardant system (PIN-FR). This achieved UL94 – V0 (vertical burn test). Under DIN 14811 testing (125 mm above a gas burner, water is pumped through the hose under pressure 5 bars) non-FR hoses generally burst after <30 seconds, whereas the PIN-FR hoses withstood around 10 minutes. Other DIN 14811 tests including abrasion and mechanical resistance were also passed. The team is now trying to further improve the fire resistance (objective: 20 mins) by optimising the innovative hose manufacturing process.

This research is part of the German Federal Ministry of Economics and Technology (BMWi) central innovation programme (ZIM), funded by AiF (Alliance for Industry Research), and is led by Albert Ziegler GmbH & Co. KG, Allod Werkstoff GmbH & Co. KG, SKZ German Plastics Center, and WSF Kunststofftechnik GmbH.

See http://www.skz.de/en/ and http://www.allod.com/ALLOD_1_eng.html

PIN-FR behind innovative recycled car plastic composite

A phosphorus and nitrogen based PIN flame retardant has been tested and shown to enable fire safety and mechanical properties of innovative composite materials produced from automobile dismantling wastes. The "self-reinforced" material combines polypropylene fabric layers, for structural reinforcement, with layers of recycled mainly polypropylene plastics from the light fraction of density-separated automotive shredder secondary materials. The self-reinforced material was compared to non-reinforced and glass fibre reinforced materials, in each case with and without addition of ammonium polyphosphate flame retardant. Tensile, bending, shear and impact tests were carried out, and flammability tests (ASTM D 2863 and UL-94 ASTM D 635-77). The authors conclude that the self-reinforcing composite provides a route to produce high mechanical performance, readily recyclable materials from automotive wastes, and that the composite layers and PIN flame retardant combination offer improved fire safety.

"Development of flame retarded self-reinforced composites from automotive shredder plastic waste", C. Bocz et al., Polymer Degradation and Stability, Volume 97, Issue 3, March 2012, Pages 221–227:
http://www.sciencedirect.com/science/article/pii/S0141391012000031

Zinc borate no longer classified for long term aquatic tox

The Zinc Borate Consortium and Nordmann, Rassmann GmbH have re-assessed the long term effects of the inorganic PIN flame retardant zinc borate (Firebrake 500 and ZB) using guidance documents from ECHA *, concluding that the R53 Classification Is not applicable (can cause long-term adverse effects in the aquatic environment). This change of classification is based on the fact that zinc is not bioaccumulative, and on tests showing that >70% of the zinc ions were removed from the water column in 28 days. Recent data for acute aquatic toxicity were also reviewed, concluding acute aquatic toxicity concentrations of 0.41 mg Zn/l (pH < 7) and 0.14 mg Zn/l (pH 7 - 8.5). Zinc Borate thus remains classified Aquatic Acute 1 (formerly R50) but Aquatic Chronic 1 (formerly R53) does not apply.

** ECHA, 2009. Guidance to Regulation (EC) No 1272/2008 on classification, labelling and packaging (CLP) of substances and mixtures. ANNEX IV: METALS AND INORGANIC METAL COMPOUNDS Chapter IV.3 Assessment of environmental transformation*

Source: Nordmann, Rassmann GmbH, Hamburg, Germany, www.nrc.de

Fax fire hazard product recall

Over one million fax machines have been recalled by Hewlett Packard in the USA and Canada, because of fire and burn risks, related to internal electrical component failure or overheating of the power supply. There have been reports of HP 1040, 1050 1010 and 1010xi models overheating and catching fire. The US Consumer Product Safety Commission indicates that there have been 7 reports of these fax machines catching fire in the US and Canada, including one case resulting in major property damage and one causing minor injuries.

HP fax safety recall page: http://faxrecall.hpordercenter.com/US-en/

CPSC: http://www.cpsc.gov/cpscpub/prerel/prhtml12/12101.html

Landscape fires cause 339 000 deaths per year

Research suggests that smoke from bush, forest, grassland and agricultural fires contributed to some 339 000 deaths per year (average 1997 – 2006). Most of these deaths were in Sub-Sahara Africa (157 000) and Asia (110 000). Deaths more than doubled during El Nino years, indicating that deaths are likely to increase if climate change increases the incidence of wildfires. Death estimates were based on satellite data and atmospheric transport models and estimated impacts of PM2.5 particles. Reducing smoke emissions from such fires can also reduce biodiversity loss and global warming impacts. The research was funded by the Australian Research Council, NASA and the University of Tasmania. Phosphorus and nitrogen based compounds are appropriate for large volume use in fighting wildfires, offering low toxicity (compounds similar to mineral fertilisers) and considerably increase the effectiveness of water sprayed in preventing or reducing the spread of fires.

"Estimated Global Mortality Attributable to Smoke from Landscape Fires », F. Johnston et al., Environmental Health Perspectives, in press, online 18th Feb. 2012: http://dx.doi.org/10.1289/ehp.1104422

US National Association of State Foresters summary of fire retardants (2006): http://www.fs.fed.us/fire/retardant/comments/FEA-007.pdf

EU mattress and textile Ecolabels

Stakeholder consultation is open on how to authorize flame retardants in EU "Flower" Ecolabel categories bed mattresses and textiles. Present criteria (dating from 2009) exclude without discrimination all flame retardants which are not reacted into mattress foams and textiles, but it is recognised that this needs to be modified to make it possible to ensure fire safety of mattress foams (latex or polyurethane foams). The present criteria pose public safety issues and makes it impossible to obtain the EU Ecolabel in countries such as the UK which require mattresses and foams to resist small-flame ignition and not burn rapidly (weight loss rate in fire). Background documents indicate that flame retardancy not only contributes to public safety, but can also reduce environmental impact because of the high pollutant emissions resulting from accidental fires. The use of "Risk Phrases" as exclusion criteria for flame retardants is proposed. Industry considers that this is not appropriate, as these phrases can reflect risks in handling or other uses and may not be relevant, and would support positive lists of flame retardants and families of flame retardants recognised as acceptable in order to achieve fire safety.

Comments should be sent to ecolabel@tuvnel.com ***by 22nd March 2012 if possible****.*

"Revision of the EU Ecolabel, draft background report", JRC – IPTS - Oakdene Hollins, February 2012 http://susproc.jrc.ec.europa.eu/mattresses/docs/BackgroundReportCriteriaRevision_DRAFT.pdf

"Revision of the European Ecolabel and Green Public Procurement Criteria for Textile Products, technical report and criteria proposals (draft)", JRC – IPTS – DS, February 2012 http://susproc.jrc.ec.europa.eu/textiles/docs/Ecolabel_Textile products_IPTS technical report_AHWG1 final.pdf

EU "Flower" Ecolabel pages: http://ec.europa.eu/environment/ecolabel/

Glossary and abbreviations

Please refer to the pinfa Glossary of abbreviations: http://www.pinfa.eu/library/glossary-of-abbreviations

Agenda

Events with active pinfa participation are marked: ►

20-22 March 2012	Cologne, Germany	Green Polymer Chemistry 2012 www.amiplastics.com
25-29 March 2012	San Diego, California	ACS Fire and Polymers VI conference http://portal.acs.org
1-5 April 2012	Orlando, Florida	►National Plastics Exhibition www.npe.org , SPE Conference www.spe.org
3-5 April 2012	Paris, France	Matériaux de construction : comprendre les enjeux des Euroclasses (CREPIM) http://www.innovative-building.fr/animation_16_891_917_p.html?cid=1238
16-17 April 2012	Shanghai, China	3rd International Conference on Flame Retardants (SKZ) http://www.skz.de/en/training/conferences/international_conference/1499..html
18-19 April 2012	Miami, Florida	Polymers in Cables (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C451
18-21 April 2012	Shanghai, China	Chinaplas (Asia Plastics and Rubber Trade Fair) http://www.chinaplasonline.com
8-10 May 2012	Indianopolis, Indiana	American Coatings Show (Vincentz Network) http://www.american-coatings-show.com/
13-16 May 2012	Strbske Pleso, Slovakia	7th International Conference on Wood & Fire Safety http://www.sfs.au.com/documents/Wood%20&%20Fire%20Safety%20Conference%2020121.pdf
20 May 2012	Stamford, Connecticut	Short Course: Selection, Evaluation, and Commercial Application of Flame Retardants http://www.bccresearch.com/conference/
21-23 May 2012	Stamford, Connecticut	23rd Annual Conference Recent Advances in Flame Retardancy of Polymeric Materials http://www.bccresearch.com/conference/
23-24 May 2012	Würzburg, Germany	Trends im Brandschutz / Flammschutzmittel (SKZ) www.skz.de
4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
6-8 June 2012	Zurich, Switzerland	SIF2012 – 7th International Conference on Structures in Fire http://www.structuresinfire.com/
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
29 Jul – 3 Aug	Warsaw, Poland	34th International Symposium on Combustion http://www.combustion2012.itc.pw.edu.pl/
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** *2013* **********		
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u

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Newsletter for non-halogen fire safety solutions

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EU sustainable flame retardancy R&D network

Funded by the European Union COST programme, the 'FLARETEX' network brings together over 30 partners to network scientific research and technology transfer addressing "Sustainable flame retardancy for textiles and related materials based on nanoparticles substituting conventional chemicals." The objectives are to develop innovative flame retardants which are halogen-free, with low fire toxicity and low environmental impacts, including cooperation and technology transfer to industry to facilitate commercial development. The network already includes research organisations across Europe and PIN flame retardant manufacturers, and is open for further members to join.

EU COST network 'FLARETEX': http://www.cost.eu/domains_actions/mpns/Actions/MP1105

PIN-FR for wind turbines

Reactive flame retardants can pose viscosity problems for unsaturated polyester resin (UPR) in the vacuum assisted resin transfer molding (VARTM) process, used to impregnate glass fibres with resin in the manufacture of key parts for wind turbine nacelles. A liquid phosphorus based PIN flame retardant (dimethyl methyl phosphonate) has been tested and shown to enable lower viscosity, to achieve vertical burning classification of V-0 (self-extinguishing away from flame) and to offer satisfactory mechanical properties (stretch and bend tensile strength of cast pieces) in glass-fibre reinforced polymers, enabling achievement of the requirements for wind turbine technologies.

"The Research on Flame Retardant Wind Turbines Nacelle Made through VARTM Process", Z. Wang et al., Journal Advanced Materials Research, vol. 450 - 451, pages 508-512, January 2012: http://www.scientific.net/AMR.450-451.508

Electrical fire dangers

Fires starting with electrical equipment or installations in homes in the USA resulted in over 49 000 structural fires requiring fire service intervention, 440 civilian deaths, 1 450 civilian injuries and over 1.5 billion US$ direct property damages annually in the period 2005-2009. Around half of these fires started in electrical installations (wiring, circuit breakers or fuse boxes, extension cords) and around half in equipment (in particular washers, dryers, fans, space heaters, air conditioning). Although the number of such fires has fallen around 30% since 1980 (first statistics available), the number of civilian deaths and injuries is nearly unchanged, and the direct damage is up nearly 50% (inflation adjusted).

"Home Electrical Fires", J. Hall, NFPA (US National Fire Prevention Association), January 2012 www.nfpa.org

High-performance aviation tapes

Polyonics engineered tapes offer high performance for aerospace applications, providing reliable electrical and thermal insulation in difficult operating environments and applications. Polyonics has recently extended their range to include double-coated tapes, offering secure bonding systems for static sensitive devices (SSD), where the propagation of fire needs to be prevented and/or for high temperature applications. The halogen-free flame retardant tapes are tested for compliance to UL94 VTM0, stringent aviation flammability standards FAR 25.852 & 25.855 and smoke and toxicity standard BSS 7238 & 7239. The REACH and RoHS compliant tapes are based on high-performance polyimide and polyester (PET) films and aluminium foils and can be constructed with a variety of acrylic and silicone adhesives.

Source: www.polyonics.com Photo courtesy Polyonics

PIN electrical and fire performance for PBT

Two different PIN flame retardants have been tested and shown to enable both fire safety performance and good electrical insulting performance (comparative tracking index CTI) in PBT (poly butylene terephthalate). The PIN FRs tested were diethylphosphinic acid aluminium salt (supplied by Clariant) and melamine polyphosphate (supplied by Ciba). They were tested separately, in combination, and in combination with an added polyetherimide resin. Depending on the flame retardants used, UL94 V0 or V2 fire performance was achieved, and CTI of 600 Volts was reached by all formulations.

"Effect of phosphorus based flame retardants on UL94 and Comparative Tracking Index properties of poly(butylene terephthalate)", S. Sullati et al., Polymer Degradation and Stability
http://www.sciencedirect.com/science/article/pii/S0141391012000195

Developments of P and N flame retardants for textiles

Nonwoven cotton: different phosphorus (P) and nitrogen (N) flame retardants were tested on a nonwoven cotton-polypropylene blend textiles (87% cotton). The PIN flame retardants used were DAP diammonium phosphate, DMDHEU dimethylol dihydroxyethyleneurea and guanidine phosphate – amidosulphonoc acid. Results showed that P and N acted in synergy, imparting high flame retardancy to the nonwoven fabrics (reduced heat release rate and peak heat release). The FRs were shown to be acting primarily on the cotton fibres, rather than the polymer component, and to be more effective on unbleached cotton. The authors predict that such PIN flame retardant cotton solutions can provide fire barriers to enable mattresses to meet US Federal Standard 16CFR1633 (resistance to dual burner: limited 30" peak heat release and 10" total heat release).

"Evaluation of three flame retardant (FR) grey cotton blend nonwoven fabrics using microscale combustion calorimeter", D. Parikh et al., Journal of Fire Sciences, January 2012
http://jfs.sagepub.com/content/early/2012/01/23/0734904111432838

Cheil Industries – Samsung innovate fire safety

Cheil Industries Inc. / Samsung, chemicals section, has developed an innovative flame-resistant polymer material for the outer casings of electronic equipment such as TVs and Notebook PCs. The material is bromine-free and offers V0 flame resistance, self-extinguishing within 10 seconds and obtained the 2011 Jang Youg-Sil Award from the Korea Industrial Technology Association and Maeil Business Newspaper. Cheil Industries also published in June 2011 a patent for a non-halogen flameproof aromatic vinyl resin, using a phosphate flame retardant, and derivatives thereof. The polymer is considered suitable for use in external parts of electronic goods, and V1 or V0 fire resistance can be achieved.

"Environmentally Friendly New Platform Flame-resistant Material":
http://www.samsungchemical.com/jsp/eng/pr_center/sm_news_view.jsp?IDX=33

Non-halogen flameproof resin composition, United States Patent 7956110:
http://www.freepatentsonline.com/7956110.html

Choosing fire-rated cable

In an article in 'International Fire Protection', Toby Collins (Draka UK) explains the importance and difficulties of selecting a fire-rated cable for installation in building wiring or construction work. Fire-rated cables are tested for three different parameters: fire resistance (integrity = length of time the cable will continue to function in a fire), flame propagation (spread of fire by the cable) and smoke emission. The cable's fire rating must be marked on the cable's outer sheath, thus ensuring that only appropriate cables should be used, both in construction and in any later repair or rewiring work. However, if the cable does not come from a fully reliable supplier, the marking on the cable does not always prove conformity because of the risk of counterfeit cable. The marking should include the name of the third-party testing organization which has accredited the fire-rating, and if in doubt this organization should be contacted for verification. Legislation around cable specification is increasingly complex. The author gives the example of BS 8519:2010 (Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications) where cables are in some cases promoted as compliant despite not having been ratified under the relevant test (BS 8491:2008).

Toby Collins, Draka UK "Choosing fire-rated cable is no simple matter", in 'International Fire Protection' magazine, Issue n°49, February 2012: http://www.mdmpublishing.com/mdmmagazines/magazineifp/

PIN fire safety for silk

A phosphorus (P) and nitrogen (N) based flame retardant was tested for use on silk. Methacryloyl ethyl diethyl phosphoric amide was synthesised, then grafted onto silk from an oil-water emulsion by Atom Transfer Radical Polymerization (ATRP). Details of factors affecting the grafting process are presented. Flame retardancy of the treated textile was assessed using LOI (limiting oxygen index), char length, after flame and glow time. Self-extinguishing with candle flame ignition was achieved with flame retardant grafting of 6-12% by weight. Low flammability endured with up to c. 30 laundry wash cycles.

"Synthesis of a Flame Retardant Containing Nitrogen-Phosphor and its Application on Silk Fabric", S. Shao et al., Advanced Materials Research, vol. 44, January 2012 http://www.scientific.net/AMR.441.447

Survey of Flame Retardant Industry in China

CCM International has published the second edition of its 'Survey of Flame Retardant Industry in China'. China produced some 600 000 tonnes/year of flame retardants in 2011, with 400 000 tonnes domestic use and an annual growth rate of 15% over the last five years. This report assesses China's production of different types of flame retardant, identifies major products and producers, analyses China's domestic use of flame retardants and provides forecasts for future output and demand for the coming five years.

"Survey of Flame Retardants Industry in China", 125 pages, CCM Data & Primary Intelligence, January 2012: http://www.cnchemicals.com/Report/ReportMin_2039.html

High performance flame-retarded laminates

Ventec, global supplier of materials for printed circuit board (PCB) applications, has launched a new range of flame-retarded, halogen-free, high electrical performance laminates and pre-regs for single or multilayer PCBs and other assembly applications. The VT-464 materials offer high signal transmission speed and low transmission loss (low Dk), mechanical properties, thermal properties and moisture absorption appropriate for use in high-speed electronics products such as routers. High glass transition temperature and thermal reliability ensure compatibility with lead-free assembly processes. VT-464 materials are flame retarded to UL-94 V0 rating and are available in a range of E-Glass styles. These new materials add to Ventec's existing range of halogen-free PCB materials VT-441 (middle temperature processing 150°C) and VT-447 (high temperature 175°C).

Source: http://www.ventec-europe.com/news_more.asp?news_id=16 and http://www.ventec-europe.com/page/86/Halogen-Free.htm

US Forest Service assesses fighting chemicals

The US Forest Service has issued a final statement on the environmental impact of fire retardant chemicals. The Service considers that the continuing use of fire retardants in aerial applications to fight fire is necessary to reduce fire intensity and rates of fire spread, and so improves the safety of ground-based fire-fighters in action against wildland fires. The Service's proposed policy is to continue to use fire retardant chemicals subject to guidelines intended to limit possible impact on waterways or ecologically sensitive areas, but even in these cases to use retardant chemicals wherever human life or public safety is threatened and the retardant can be expected to alleviate these threats. Phosphate and nitrogen P, N) based wildland fire retardant chemicals are in many cases the same substance or similar to agricultural fertilisers, and so have low toxicity, but can nonetheless have environmental impacts when used in large quantities which is inevitably the case when fighting wildfires.

USDA (US Department of Agriculture) Forest Service, Press Release No. 1139, 21st October 2011 "USDA Forest Service releases fire retardant Final Environmental Impact Statement": http://www.fs.fed.us/news/2011/releases/10/impactstatement.shtml

Guide to environmental FR solutions for polymers

International fire safety expert Jürgen Troitzsch has published a summary of halogen-free fire safety solutions for polymers. The document lists the flame retardants currently recognized as achieving different specific fire safety requirements for over 20 polymers, including both the halogenated FRs used in the past and the halogen-free replacements available to respect environmental criteria. The flameretardants-online.com website provides information about flame retardants, their role in fire safety, and their applications, and is maintained by pinfa Member company Clariant.

Flame retardants online website: www.flameretardants-online.com

"Commercially Available Halogen free Alternatives to Halogen-Containing Flame Retardant Systems in Polymers" http://www.flameretardants-online.com/images/userdata/pdf/297_EN.pdf

Other News

The European Commission has published final proposals to update the list of "priority substances" under EU water legislation. Brominated HBCDD flame retardants are amongst chemicals proposed for addition to the list, which already includes the halogenated FRs brominated diphenylethers and short-chain chlorinated parafins $C_{10\text{-}13}$.

NGOs are pushing to limit the use of chlorinated FRs in products for children in the USA. The action follows tests which found TDCPP, TCEP or TCPP in a selection of products such as car seats, baby changing mats and nursing pillows.

The Chlorinated FR TCEP has been added to the EU's SVHC (Substance of Very High Concern) list under REACH, with a 'sunset date' of August 2015 (phase out unless specifically justified and authorized for certain uses). This list already includes the brominated FR HBCD (sunset date August 2015)

EU Commission proposal to amend Directives 200/60/EC and 2008/105/EC as regards priority substances in the field of water policy, COM(2011) 876 final, 31st January 2012 http://ec.europa.eu/environment/water/water-dangersub/pdf/com_2011_876.pdf

Chemical Watch "US NGO raises concern about 'tris' flame retardants in children's products", 11th January 2012: http://chemicalwatch.com/9619/us-ngo-raises-concern-about-tris-flame-retardants-in-childrens-products and Washington Toxics Coalition http://watoxics.org/publications/hidden-hazards-in-the-nursery

ECHA REACH SVHC Authorisation List: http://echa.europa.eu/web/guest/addressing-chemicals-of-concern/authorisation

Glossary and abbreviations

Please refer to the pinfa Glossary of abbreviations: http://www.pinfa.eu/library/glossary-of-abbreviations

Agenda

Events with active pinfa participation are marked: ►

16-17 April 2012	Shanghai, China	3rd International Conference on Flame Retardants (SKZ) http://www.skz.de/en/training/conferences/international_conference/1499..html
18-19 April 2012	Miami, Florida	Polymers in Cables (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C451
18-21 April 2012	Shanghai, China	Chinaplas (Asia Plastics and Rubber Trade Fair) http://www.chinaplasonline.com
8-10 May 2012	Indianopolis, Indiana	American Coatings Show (Vincentz Network) http://www.american-coatings-show.com/
13-16 May 2012	Strbske Pleso, Slovakia	7th International Conference on Wood & Fire Safety http://www.sfs.au.com/documents/Wood%20&%20Fire%20Safety%20Conference%2020121.pdf
20 May 2012	Stamford, Connecticut	Short Course: Selection, Evaluation, and Commercial Application of Flame Retardants http://www.bccresearch.com/conference/
21-23 May 2012	Stamford, Connecticut	23rd Annual Conference Recent Advances in Flame Retardancy of Polymeric Materials http://www.bccresearch.com/conference/
23-24 May 2012	Würzburg, Germany	Trends im Brandschutz / Flammschutzmittel (SKZ) www.skz.de
4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
6-8 June 2012	Zurich, Switzerland	SIF2012 – 7th International Conference on Structures in Fire http://www.structuresinfire.com/
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
29 Jul – 3 Aug	Warsaw, Poland	34th International Symposium on Combustion http://www.combustion2012.itc.pw.edu.pl/
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** *2013* **********		
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u

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Reducing the dangers of fire gases and smoke

The main danger in fires is from inhalation of invisible toxic gases and smoke, rather than burns or heat, according to research presented recently to the American Chemical Society by Anna Stec of the University of Central Lancashire, UK. This is particularly the case in Europe (smaller rooms, less open layouts). 55% of fire deaths in the UK occur when the victim is in the room where the fire starts (only 21% in the USA). The toxicity of fire gases depends strongly on the type of material and on additives used. In tests in several different insulating materials, mineral or phosphorus based flame retardants resulted in lower levels of toxic gases carbon monoxide (CO) and hydrogen cyanide (HCN) compared to brominated flame retardants.

Anna Stec, University of Central Lancashire, UK, presentation at the 243rd National Meeting & Exposition of the American Chemical Society (ACS), San Diego, 25-29 March 2012:
http://www.newsroomamerica.com/story/229339/some_flame_retardants_make_fires
http://www.scientificamerican.com/article.cfm?id=flame-retardants-may-create-deadlier-fires

"Fire toxicity", Edited by A A Stec and T R Hull, University of Central Lancashire, UK, 728 pages, 2010:
http://www.woodheadpublishing.com/EN/book.aspx?bookID=1530

Fire safety for natural and synthetic rubbers

Halogen-free flame retardant solutions are reviewed for polyisoprene elastomer, that is natural or synthetic rubber, as used in tires, dampers, suspension elements. Without flame retardants, rubbers burn easily and emit large quantities of dense smoke. This paper reviews the physical and chemical processes of rubber thermal decomposition and burning, and the different possible flame retardant solutions. Phosphorus flame retardants, nitrogen or inorganic flame retardants alone are considered inadequate, but combinations of intumescent PIN-FRs can provide effective fire protection (reduced flammability, smoke inhibition, low toxicity) whilst maintaining the rubber's physical properties. The PIN-FR performance can be further improved by combination with zeolites (aluminium silicates) or the use of zinc compounds as synergists. Nano-scale flame retardants, such as clays or carbon nanotubes, are reported to be effective but have not yet been introduced industrially.

"A review of candidate fire retardants for polyisoprene", J. Kind, T. Hull, Polymer Degradation and Stability, December 2011, http://www.sciencedirect.com/science/article/pii/S0141391011003983

HDPUG cables presentation at ANTEC NPE

At the international plastics showcase exhibition, ANTEC NPE 2012, progress towards implementing halogen-free cables in the electronics and electrical industries was presented by HDPUG (High Density Packaging User Group International). This organisation brings together nearly 40 major companies producing and using electronics goods and supplying materials and components. It started work on halogen-free electronics ten years ago, at the initiative of major consumer electronics manufacturers. Halogen-free materials have now been tested for ribbon cables, external data cables such as HDMI, high speed data cables such as MiniSAS, desktop and notebook power cords, looking at mechanical, electrical and fire safety performance and production issues. The tests to date conclude that physical characteristics (mechanical, flexibility tensile, elongation) remain challenges, where materials' suppliers need to work with user industries. Summarised conclusions are now available to the public as below.

Halogen Free Guideline (public version): $50.00 : http://hdpug.org/content/halogen-free-guideline-1

PVC Free Cables project (public version): $150.00: http://hdpug.org/content/bfr-pvc-free-cables

NPE plastics showcase, 1st – 5th April 2012, Orlando, Florida: www.npe.org

Commitments from children's car seat makers

Two manufacturers of children's car seats have announced commitments to reduce or eliminate chemicals containing bromine or chlorine from their products: Britax, the world's 4th largest children's car seat producer, and Orbit Baby products. NGOs have expressed concerns that such chemicals pose particular issues when used in vehicles, where sunlight can result in high temperatures and ultraviolet exposure, and in contact with young children. Both companies underline that this will not prevent conformity to fire safety requirements. PIN flame retardants (based on phosphorus, nitrogen and minerals) make this possible.

HealthyStuff.Org: http://www.healthystuff.org./release.030812.britax.php

Developments for PIN FRs in polyamides

A review in 'Plastics Additives & Compounding' presents the increasing use of polyamides for high performance application in automobiles and electronics applications because they offer mechanical strength, temperature and chemical resistance. Technical specifications include high levels of fire safety, temperature resistance for lead-free soldering and processing flow for manufacturing of miniaturised components. OEMs increasingly require halogen-free flame retardants, in response to EU regulations (WEEE Directive) or environmental image objectives. PIN flame retardant solutions are developing rapidly, often with specific synergists, to offer fire safety, no coloration, high-temperature processing, electrical performance (CTI) and other specific properties. The paper notes that PIN FRs in polyamides require somewhat different processing from the halogenated FRs which manufacturers previously used, so that technical training is needed.

"Flame retardants for polyamides – new developments and processing concerns", Jennifer Markarian, Plastics Additives & Compounding (Elsevier), March-April 2005 http://www.sciencedirect.com/science/journal/1464391X

Substances of very high concern in consumer goods

The European Chemical Agency (ECHA) has published information containing chemicals on the "SVHC Candidate List" (Substances of Very High Concern). This list of 20 chemicals includes the halogenated flame retardants HBCDD and TCEP. Manufacturers and importers are obliged to notify ECHA if their products might contain these substances, if the substance has not already been registered by a manufacturer or importer in the EU for that use, and if human or environmental exposure during use cannot be excluded. ECHA received over 200 notifications in 9 months in 2011. The most notified chemicals were phthalates (114x), and the second most notified was HBCDD (30x). ECHA is reminding companies of its obligations, if products may contain these chemicals, and reminding the public that they have the right to be informed.

ECHA press release ECHA/PR/12/03, 5th March 2012, ECHA publishes information on consumer articles containing Substances of Very High Concern (SVHCs)": http://www.echa.europa.eu/documents/10162/13601/pr_12_06_SiA_en.pdf

ECHA information concerning notification of substances (on the Candidate List) in articles: http://echa.europa.eu/en/regulations/reach/candidate-list-substances-in-articles/notification-of-substances-in-articles

Call for substitution case studies

Seven environmental NGOs, via the EU-funded substitution portal website SUBSPORT (www.subsport.eu), have launched a call to companies and other stakeholders to share experiences of substitution of "hazardous" chemicals. The case stories will be evaluated by the NGOs, and published as a substitution database in May 2012. The SUBSPORT website names nearly 9300 chemicals as potentially hazardous by one or other of 29 different sources, but the substitution stories will particularly focus on "10 priority substances" including brominated flame retardants and one family of chlorinated flame retardants (chloroalkanes = chlorinated paraffins). The European Chemical Council cefic is currently consulting member companies to prepare a response to this call for case study examples.

SUBSPORT substitution data base: http://www.subsport.eu/case-stories NGO call for substitution stories: http://www.chemsec.org/images/stories/2012/chemsec/NGO_call_on_industry_case_stories_2012-03_final.pdf

ECHA C&L Inventory: use with caution

ECHA (the European Chemical Agency) has recently put online the “Classification and Labelling Inventory” (C&L). However, this currently includes ALL proposals for Classification received from any company, without any verification, and does not take into account the agreed Classification and Labelling defined together after consultation by industry, even when this has been included in submitted REACH Registration Dossiers. The “Inventory” online at present is thus a list of all different proposals received, and should not be consulted to identify the appropriate Classification and Labelling for chemicals. CEFIC has already requested that ECHA modify this inventory to indicate clearly the concerted and agreed Classification and Labelling for each chemical (and to indicate when this is included in a published REACH Registration Dossier). Pending this modification of this ECHA tool, CEFIC strongly recommends NOT to refer to this tool but instead to contact the relevant REACH Consortium where this exists or to contact directly your substance supplier.

ECHA “Classification and Labelling C&L Inventory” at http://echa.europa.eu/fr/regulations/clp/cl-inventory

Lithium ion battery fire risks

Lithium ion batteries pose a specific fire risk. Even though the numerical risk is low (0.1 to 1 fires per million batteries per year), the consequences can be considerable as documented by numerous cases of computer and telephone battery explosions or fires and nine fires in airplanes or cargo destined for air freight. Consequences become even more important in larger battery systems used for vehicles. This detailed overview paper explains the construction of different lithium ion batteries, the mechanisms whereby overheating, too rapid charge or discharge, or overcharging, can lead to exothermic reactions between or within the cathode, anode or electrolyte, and then “thermal runaway” where heat accelerates reactions, generating further heat. The liquid electrolytes which transport lithium ions are organic, and once heated can decompose or react producing highly flammable gases, causing fire or explosion once heat causes the battery to deform enabling contact with air. The paper presents different strategies for reducing these risks including phosphorus-based flame retardants in the electrolyte, battery design and control, or inherently safer cathode and anode materials.

“Thermal runaway caused fire and explosion of lithium ion battery”, Q. Wang et al., Journal of Power Sources 208 (2012), pages 210– 224: http://www.sciencedirect.com/science/article/pii/S0378775312003989

Fire safety of tents questioned

Many tents installed at festivals and events are suspected of not being fire safe. In the UK, for example, although there are no specific fire resistance standards for such installations, they must respect general EU product safety regulations, and the Government's "Fire Risk Assessment for Open Air Events and Venues" specifies that organisers must: "ensure that all upholstered furniture, curtains, drapes, tents and marquees, are fire retardant, or have been treated to give some fire retardancy". Imported 'bell tents' often do not respect such requirements.

"Posh tents at festivals - do they meet UK fire retardant standards?": http://www.safeconcerts.com/news/2012/apr/7170-posh-tents-at-festivals-do-they-me

Tent Flammability requirements on the rise, Juli Case, Industrial Fabrics Association International (IFAI), 2006: http://tentexperts.org/safety/safetyarticles/flammabilityrequirements

Other News

The US EPA (Environmental Protection Agency) has proposed new regulations for five "potentially harmful" chemicals. The proposed Significant New Use Rules (SNUR) would require companies to report all new uses in domestic manufacture or imported products. The five chemicals targeted include the halogenated flame retardants PBDEs, HBCD and chlorinated paraffins. EPA indicates that the objective is particularly to control new uses of these chemicals in consumer goods or products.

KEMI, the Swedish Chemicals Agency, has published a report assessing whether chemicals regulations provide adequate environment and health protection. KEMI concludes that EU regulations are very extensive and up to date, but that nonetheless further regulation should be considered in a number of areas to provide better protection of children and to address certain risks which are not currently covered: tighter regulations on chemicals in textiles, regulation of chemicals in "articles" (such as toys, electronic goods), potentially endocrine-disrupting chemicals, coordination of chemicals regulation and waste/recycling, certain issues of chemicals in foods (e.g. brominated flame retardants).

US EPA press release 20th March 2012, "Rules Proposed to Limit New Uses of Potentially Harmful Chemicals / EPA also calls for additional testing on health and environmental impacts of PBDEs": http://yosemite.epa.gov/opa/admpress.nsf/bd4379a92ceceeac8525735900400c27/ab152df292f2eef6852579c70050910f

KEMI Sweden, "EU laws have to be improved to reach a non-toxic environment", 1st March 2012, English summary: http://www.kemi.se/en/Content/News/EU-laws-have-to-be-improved-to-reach-a-non-toxic-environment/

Glossary and abbreviations

Please refer to the pinfa Glossary of abbreviations: http://www.pinfa.eu/library/glossary-of-abbreviations

Agenda

Events with active pinfa participation are marked: ►

13-16 May 2012	Strbske Pleso, Slovakia	7th International Conference on Wood & Fire Safety http://www.sfs.au.com/documents/Wood%20&%20Fire%20Safety%20Conference%2020121.pdf
14 May 2012	Liège, Belgium	REACH and the Polymer Industry workshop: http://www.reachforpolymers.eu/news/workshop-on-reach-and-the-polymer-industry-liege
20 May 2012	Stamford, Connecticut	Short Course: Selection, Evaluation, and Commercial Application of Flame Retardants http://www.bccresearch.com/conference/
21-23 May 2012	Stamford, Connecticut	23rd Annual Conference Recent Advances in Flame Retardancy of Polymeric Materials http://www.bccresearch.com/conference/
23-24 May 2012	Würzburg, Germany	Trends im Brandschutz / Flammschutzmittel (SKZ) www.skz.de
4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
6-8 June 2012	Zurich, Switzerland	SIF2012 – 7th International Conference on Structures in Fire http://www.structuresinfire.com/
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
14 June 2012	Tokyo, Japan	► **pinfa Electronics flame retardants workshop** "Building the Future for Flame Retardants in E&E", during JCPA (Japanese Printed Circuit Board Association exhibition). Information pinfa@cefic.be
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
29 Jul – 3 Aug	Warsaw, Poland	34th International Symposium on Combustion http://www.combustion2012.itc.pw.edu.pl/
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
17-20 Sept. 2012	Chengdu, China	2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT) http://www.isfrmt.org/
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** *2013* **********		
28-30 Jan 2013	San Franciso, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u

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Phosphorus, Inorganic & Nitrogen Flame Retardants Association

E&E Workshop

"Building the Future for Flame Retardants in E&E"

14th June 2012, Tokyo

In 2009 and 2010, the Phosphorus, Inorganic & Nitrogen Flame Retardants Association (pinfa) organised workshops on "Green Electronics & Innovative Flame Retardants" for the E&E value chain in Brussels, Belgium and one workshop in Taipei, Taiwan, in 2011. The objective of the workshops was to build a constructive network where manufacturers of alternative flame retardant technologies could interact with direct users along the supply chain as well as other stakeholders such as regulators and environmental groups. These workshops made a big step towards fostering mutual understanding along the supply chain on the different needs and drivers and identified the key issues for flame retardants: how to approach the future of flame retardancy and how to improve the communication throughout the supply chain.

Pinfa would like to invite you to its 4th E&E Workshop in Tokyo during the JPCA, the Japanese Printed Circuit Board Association Show. We would like to discuss technology, needs and trends with key players. In addition, an update on developments in Europe and America will be presented. The workshop will provide attendees with the opportunity to debate key questions on flame retardants with representatives from manufacturers of flame retardants, compounders, electronic manufacturers, regulators, environmental groups and electronics associations.

- **Where?** TFT Building. East Wing 9th Floor, Room 9 A, 3-6-11 Ariake, Koto-ku, Tokyo 135-8071 Japan Tel:+81-3-5530-5010
- **When?** 14-June-2012, 13.00 – 18:30 h

Who is pinfa

pinfa, the Phosphorus, Inorganic & Nitrogen Flame Retardants Association represents the manufacturers and users of the three major technologies of non-halogenated flame retardants. The members of pinfa share the common vision of continuously improving the environmental and health profile of their flame retardant products and offering innovative solutions for sustainable fire safety. pinfa engages in a dialogue with the users of flame retardants on the development of environmentally-friendly fire safety solutions. Members of pinfa in 2012 are: Adeka Palmarole, BASF, Budenheim, Catena Additives, Clariant, Dartex Coatings, Delamin, DSM Engineering Plastics, FRX Polymers, Georg H. Luh, Italmatch, Krems Chemie, Lanxess, Nabaltec, Perstorp, Rhodia, Rockwood Clay Additives, Schill & Seilacher, Thor, William Blythe and iNEMI (International Electronics Manufacturing Initiative – mutual membership).

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Phosphorus, Inorganic & Nitrogen Flame Retardants Association



E&E Workshop

Agenda

Chairs: Michael Klimes and Adrian Beard – pin*fa*

13:00	Welcome tea and coffee	
13:30	**Welcome and introduction to pinfa**	**Michael Klimes, Adrian Beard – pin*fa***
13:50	**Regulatory and environmental drivers for flame retardants in Europe and North America: RoHS, REACH and more**	**Ulrich Wietschorke, Hideo Kawasaki - Adeka Corp., Japan**
14:20	**iNEMI activities and projects on halogen free materials**	**Masahiro Tsuriya - International Electronics Manufacturing Initiative (iNEMI)**
14:50	**Flame retardant resins used for copy machines**	**Masayuki Okoshi, Fuji Xerox, Japan**
15:20	Tea and coffee break	
15:50	**Long-term reliability of plastics containing phosphorus flame retardants**	**Shinsuke Nakamoto, Panasonic, Japan**
16:20	**Phosphorus based FRs for printed circuit boards and other composite materials in E&E**	**Adrian Beard – Clariant Corp., Germany**
16:40	**Reliable substrates and CCL with Boehmite as a halogen free co-flame retardant**	**Carsten Ihmels – Nabaltec AG, Germany**
17:00	**Flame retardants for engineering thermoplastics used in electric and electronic equipment**	**NN – BASF Corp.**
17:20	Cocktail reception and stakeholder networking	

Registration

There is no need to pre-register. For any questions please contact pinfa at pinfa@cefic.be

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Pinfa would like to invite you to its 4th E&E Workshop in Tokyo during the JPCA, the Japanese Printed Circuit Board Association Show. We would like to discuss technology, needs and trends with key players. In addition, an update on developments in Europe and America will be presented. The workshop will provide attendees with the opportunity to debate key questions on flame retardants with representatives from manufacturers of flame retardants, compounders, electronic manufacturers, regulators, environmental groups and electronics associations.

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Newsletter for non-halogen fire safety solutions

June 2012 – N° 20



Innovation

Contents

LeanDfd: recycling flame retardant polymers

At the 19th CIRP Berkeley Conference on Life Cycle Engineering, a review was presented of "design for disassembly" and materials recycling (LeanDfd) for industrial consumer products, including material selection, product architecture and design, selection of joints and connectors. Advantages of LeanDfd include profit optimisation, part and material reuse and recycling, minimisation of end-of-life waste. A cooker hood was presented as a case study, looking at the blower fan and the electronics systems. A LeanDfd redesign enabled a 30% life-cycle decrease in CO_2, 38% material recycling, 17% part reuse and 7% remanufacture. This was achieved by using a non-halogenated flame polypropylene plastic for the blower parts and casing to allow either recycling or reuse, and snap fits to facilitate hood parts disassembly.

CIRP: International Academy for Production Engineering www.cirp.net

"LeanDfd: A Design for Disassembly Approach to Evaluate the Feasibility of Different End-of-Life Scenarios for Industrial Products", C. Favi et al., published in Leveraging Technology for a Sustainable World, Proceedings of the 19th CIRP Conference on Life Cycle Engineering, University of California at Berkeley, Berkeley, USA, May 23 - 25, 2012
http://www.springerlink.com/content/978-3-642-29068-8/

TSCA proposal to add 27 FRs to priority testing list

The US Environmental Protection Agency is proposing add 27 flame retardants to the TCSA (Toxic Substances Control Act) list of substances for priority testing. The ITC (Interagency Testing Committee) proposal cites 2 brominated FRs, 8 chlorinated phosphate ester FRs and 16 non-halogenated phosphate ester FRs. The proposal is based on a need for biomonitoring of these flame retardants and their metabolites in urine samples, and studies of their metabolism (break-down) in animals, in order to estimate human exposure. **Deadline for comments is 22nd June 2012.**

ITC recommendations, Federal Register, vol. 77, n° 100, 23rd may 2012:
http://www.gpo.gov/fdsys/pkg/FR-2012-05-23/pdf/2012-12493.pdf

Review of phosphorus flame retardants

'Chemosphere has' published a detailed review of the principal phosphorus-based flame retardants (PFRs), covering applications, production, environmental occurrence, behaviour and properties and analytical methods. PFRs have been used for over 150 years, and are developing rapidly in a range of applications as industry moves away from halogenated FRs. PFRs also have the advantage in fires of reducing toxic emission by char formation. Some organic PFRs are used in other applications (e.g. lubricants) which may explain levels found in the environment. The authors look at both chlorinated and non-halogenated (PIN) PFRs, concluding that only chlorinated PFRs give rise to concerns about carcinogenicity, and that RDP, BADP and melamine phosphates may be considered as viable substitutes for brominated flame retardants on the basis of available environmental and toxicity data.

"Review: Phosphorus flame retardants: Properties, production, environmental occurrence, toxicity and analysis", I. van der Veen & J. de Boer, Chemosphere in print 2012 http://www.sciencedirect.com/science/article/pii/S0045653512004353

Aluminium phosphorus PIN FRs for epoxy resins

Aluminum diethylphosphinate (Al(DEP)) and aluminum methylethylphosphinate (Al(MEP) were tested as flame retardants for epoxy resin, as widely used in electronic and electrical applications. Flame retardancy, char formation, thermal stability, flexural modulus and strength were tested. Doses of 15% of each FR enable UL94V0 fire resistance to be achieved, with improved thermal stability and char formation. Al(MEP) epoxy resin showed a higher LOI (limiting oxygen index) value, because of its higher phosphorus content. At 15% loading, the two flame retardants tested result in a 20% - 30% decrease in flexural strength, a small (c 5%) increase in stiffness (flexural modulus) and in increase in surface roughness which appears to improve crack resistance. Overall, Al(DEP) shows better mechanical performance, possibly because of better compatibility with the epoxy resin matrix and more uniform dispersion in the resin.

Liu et al., "Comparative study of aluminium diethylphosphinate and aluminium methylethylphosphinate-filled epoxy flame retardant composites", Polymer Composites, vol. 33, issue 6, May 2012:
http://onlinelibrary.wiley.com/doi/10.1002/pc.22214/abstract

DRICON timber fire safety in prestigious buildings

Lonza Wood Protection halogen-free fire protection treatments for timber have been selected for prestigious and demanding building projects. DRICON treatment will ensure the fire safety of:

- 10,000 m of FSC-Certified European oak internal cladding and NON-COM for Western Red Cedar external cladding in the Passmores School and Technology Centre which opened in September 2011 in Essex, UK;
- pine panelling in the refurbished Charles Inglis Clark mountain refuge on Ben Nevis, the highest fire retardant project in the UK at 685m;
- birch plywood which contributes to the overall building structure safety of the Corby Cube building in the UK to help achieve the BREAAM excellent rating;
- recreation of the 16th century timber roof, mouldings and ceilings in Stirling Castle, Scotland.

DRICON fire safety products proved their efficiency in 2006 when Scarborough's historic Peasholm Pagoda, whose timbers had been treated, resisted a fire started by vandals using building site wastes and petrol. DRICON is the only BBA (British Board of Agrement) certified (Technical Approvals for Construction) fire treatment for timber with over 25 years on continuous certification.

DRICON fire safety treatment for timber: http://www.archtp.com/Products/FireRetardantProtection/default.htm
BBA British Board of Agrement: http://www.bbacerts.co.uk/
Lonza Wood Protection News: http://www.archtp.com/News/default.htm

***Photos**: Lonza Wood Protection ,*
http://commons.wikimedia.org/wiki/Category:Files_by_User:Keith_D

***Top left**: Stirling Castle, Scotland.*

***Right**: Passmores School and Technology Centre.*

***Bottom left**: Scarborough's historic Peasholm Pagoda resisted a fire started by vandals in 2006.*

Reducing smoke emission from polyesters

Three PIN FRs (ammonium polyphosphate APP, silane-coated APP, and melamine pyrophosphate) were tested to measure improvements on flammability and smoke emission in unsaturated polyester resins. The resin tested is formulated for light resin transfer moulding (RTM) processes and transport applications. Peak heat release rates were reduced by 60-70% for polyester containing 35% loading of each one of the tested flame retardants. Smoke formation was reduced by up to 80%.

M. Ricciardi, "Fire behavior and smoke emission of phosphate–based inorganic fire-retarded polyester resin", Fire and Materials, vol. 36, issue 3, April 2012: http://onlinelibrary.wiley.com/doi/10.1002/fam.1101/abstract

Fire hazard, sustainable development and flame retardants

A 21-page review paper in 'Fire and Materials' summarises current science and research into flame retardancy of polymers. Polymers are increasingly used in many products because of advantages including cost and ease of manufacture. This trend is likely to continue in the future with the development of bio-based polymers in response to sustainable development drivers. Both petrochemical and bio-based polymers imply a fire hazard. US statistics show that over the last 30 years, the number of fires has decreased but that the total cost of fire has increased and that the first ignited item is often polymer-based. Polymer combustion science is presented and the different types of flame retardants and their mechanisms for action. Future developments are expected to include flame retardants (FRs) which are either reacted into the polymer or themselves polymeric to reduce risk of migration, FRs acting by catalysis (e.g. transition metals), ceramic/glass precursors, and new vapour phase FRs (possibly based on phosphorus, tin, iron, manganese).

Morgan, J. Gilman "An overview of flame retardancy of polymeric materials: application, technology, and future directions", Fire and Materials, in print 5/2012: http://onlinelibrary.wiley.com/doi/10.1002/fam.2128/abstract

Gigabit data cables for mass transport systems

Belden Cables has launched a new halogen-free gigabit data cable for railways, underground trains systems and other public transport networks (Cat 5 Ethernet). This enables data, voice, video-streaming, conferencing and monitoring, tracking, intercom and system control on one single network. Belden BE43769 and BE43800 are shielded, halogen-free data cables designed to support 100 Mbps and Gigabit ethernet based network applications. They meet railway industry specifications and offer flexibility, durability, oil resistance and are PIN flame retardant, halogen-free and low-smoke, conform to IEC standards IEC standards 60332-1-2, 60332-3-24 and 60332-3-25 Cat D, EN 50155:2007, EN/TS 45545-2:2009, DIN 5510-2 and ISO/IEC 11801 2nd edition.

Source: www.beldensolutions.com

Light weight, performance PIN FR composites

The major global resin supplier, AOC, has launched a new PIN (phosphorus, inorganic and/or nitrogen based) flame retarded polyester resin technology to produce halogen-free, lighter weight, high tensile strength composites, particularly adapted to fibre reinforced applications in mass transportation, where weight gains and fire safety are key criteria. Weight saving can be up to 30% compared to standard antimony or ATH containing resins. The Firepel® K120 resin offers low flame spread, low smoke and low smoke toxicity. AOC also offer a range of partly biologically derived polyester and vinyl ester resins, offering 'green' styrene-free and low VOC resins with high performance.

AOC March 2012: http://www.aoc-resins.com/web/site/newsinfo/1035//new_firepel_k120_fr_system_halogen-free_resins_for_lighter_weight_composite

Russia moves to EU fire safety standards

Russia has announced its intention to harmonise fire safety standards with the EU. Already around one third of the country's standards are harmonised or correspond to the same basic principles and the remainder are under revision. Russia officially recorded nearly 180 000 fires in 2010, killing 13 000 people. Russia has also suffered several recent catastrophic fire events recently, including the Lame Horse Nightclub fire (5/12/2009) in which over 150 people died after pyrotechnics ignited the plastic ceiling covering and then wooden decorations in the club and emergency exits were either not indicated or partly sealed.

Source: http://en.ria.ru/russia/20120315/172181923.html

PIN fire safety for vegetable oil polymers

Different temperatures (60, 90°C) and microwave action were used to bind phosphorus into a sunflower oil derived polymer, which was then tested for fire resistance. Diphenyl phosphine oxide (DPO) was reacted into high-oleic sunflower oil (ETR) and derivatives in an aza-Michael reaction, producing a phosphorus containing triglyceride, which was then crosslinked. Fire behaviour properties of the polymers (with and without reacted phosphorus) were tested by (TGA) thermogravimetry and LOI (limiting oxygen index). LOI was increased by 25 – 50%. The authors conclude that the resulting polymer samples "show excellent flame retardant properties" and do not burn in air.

M. Moreno et al., "Phospha-Michael addition to enone-containing triglyceride derivatives as an efficient route to flame retardant renewable thermosets", Polymer Chemistry in print May 2012: http://onlinelibrary.wiley.com/doi/10.1002/pola.26106/abstract

PIN FR paper structures for packaging and display

A US patent application from Pregis Innovative Packaging presents printable product transport and display structures produced from composite layers of paper and/or corrugated card, with a fire resistant layer obtained by treating a paper with PIN FRs (sulfamic acid, diammonium phosphate, boric acid or sodium sulphate compounds are cited). The paper and card used can be produced from recycled fibres.

US patent application: "Fire-resistant print board" 1/3/2012 n° 2012/0052238A1:
http://www.google.com/patents/US20120052238

Other News

A study of flame retardants in New Zealand household dust found trace levels of 7 phosphorus-based flame retardants and 4 new brominated flame retardants at the order of 0.01 – 2 ng/kg adult human exposure. In all cases, these exposure levels were calculated to be several orders of magnitude lower than reference doses (RfDs) considered to avoid health risks. *"Occurrence of alternative flame retardants in indoor dust from New Zealand: Indoor sources and human exposure assessment", N. Ali et al, Chemosphere, 2012 (in press)* *http://www.sciencedirect.com/science/article/pii/S0045653512004833*

The 'Flame retardancy of polymers' blog offers updated information, news and exchange about fire behaviour of polymers and fire safety solutions, as well as useful links, conference and meeting dates, a video library. *http://polymer-fire.com/*

Fire Safe Europe, an association of three companies producing fire-safe insulation materials (Knauf, Paroc, Rockwool) offers news and information on fire safety at *www.firesafeeurope.eu* The association estimates that 4 400 people per year are killed by fires in Europe.

Glossary and abbreviations

Please refer to the pinfa Glossary of abbreviations: http://www.pinfa.eu/library/glossary-of-abbreviations

Agenda

Events with active pinfa participation are marked: ►

4-6 June 2012	Lausanne, Switzerland	ETTC European Technical Coatings Congress www.etcc2012.ch
6-8 June 2012	Zurich, Switzerland	SIF2012 – 7th International Conference on Structures in Fire http://www.structuresinfire.com/
11-14 June 2012	Las Vegas	NFPA Conference and Expo (US National Fire Protection Association) http://www.nfpa.org/displayContent.asp?categoryID=943
12 June 2012	Berlin, Germany	iNEMI European Workshop for the 2013 iNEMI Roadmap (International Electronics Manufacturing Initiative) www.inemi.org
14 June 2012	Tokyo, Japan	► **pinfa Electronics flame retardants workshop** "Building the Future for Flame Retardants in E&E", during JCPA (Japanese Printed Circuit Board Association exhibition). Information pinfa@cefic.be
14-15 June 2012	Denver, Colorado	►Fire Retardants in Plastics (AMI) http://www2.amiplastics.com/Events/Event.aspx?code=C448&sec=2199
15 June 2012	Paris, France	Conference: fire behaviour of wood in construction. infos@gtfi.org
29 Jul – 3 Aug	Warsaw, Poland	34th International Symposium on Combustion http://www.combustion2012.itc.pw.edu.pl/
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
17-20 Sept. 2012	Chengdu, China	2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT) http://www.isfrmt.org/
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** *2013* **********		
28-30 Jan 2013	San Franciso, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u

pinfa

Newsletter for non-halogen fire safety solutions

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Industry sponsorship of fire safety campaigns questioned

The 'Chicago Tribune' journal has published a series of articles suggesting that fire safety campaigns have been funded by industry, and that flame retardants in furniture do not contribute to fire safety. pinfa welcomes an open debate on the fire safety contribution of flame retardants, and on their health and environmental safety, but regrets that on certain points the Chicago Tribune articles present very partial information. Levels of flame retardants used in consumer products will indeed not prevent products burning in a fully developed room fire - but that is not their aim. Flame retardants are used to prevent fires starting (inhibit ignition), and slow initial fire development, to give occupants time to escape, sprinklers time to act and fire fighters time to intervene. Many studies show that PIN flame retardants do this effectively when used appropriately. pinfa is in contact with fire safety organisations, because our industry's role is to further fire safety, but we have never been involved in funding these organisations to affect their independence. pinfa believes that PIN flame retardants save lives and properties from fire, without the environmental and health questions of the halogenated flame retardants targeted by the 'Chicago Tribune' articles.

Tribune Watchdog "Playing with Fire": http://media.apps.chicagotribune.com/flames/index.html

PIN FR for LEDs and transparent polymers

A naturally-sourced Hallyosite clay–based flame retardant will be used by Samsung Cheil Industries, an affiliate business of Samsung Group, as part of a proprietary formulation for LED applications (Light Emitting Diodes). The Dragonite-XR:LBV™ additive is part of Applied Minerals' halogen-free range of flame retardants, offering V0 fire performance synergy with other PIN flame retardants such as magnesium and aluminium hydroxides or other clays, and is compatible with high temperature processing (water not released until 400°C). LED light sources are used in LCD TVs and displays, smart phones, tablets, store signs, public transport and many other applications. The Dragonite-XR:LBV flame retardant additive offers fire resistance, mechanical reinforcement and, importantly, high optical transparency.

Applied Minerals news, 24th April 2012: http://appliedminerals.com/news/article/applied-minerals-inc.-enters-into-agreement-to-supply-samsung-cheil-in
Dragonite-XR: http://appliedminerals.com/applications/flame-retardancy-application-page

pinfa workshop on sustainable flame FRs for electronics, Tokyo, met by huge interest

Since 2009, pinfa has held workshops on sustainable flame retardants in electric and electronic applications. After two events in Brussels, Belgium, one was held in Taipei, Taiwan, last November and now in Tokyo, Japan. Alongside the Japanese Printed Circuits Association's (JPCA) trade show, this half day seminar covered regulatory and environmental developments on flame retardants as well as reports from original equipment manufacturers Panasonic and FujiXerox on their experiences with the transition to non halogenated flame retardants. iNEMI gave an update on their technical projects for low halogen materials in electronics.

Finally, pinfa member companies presented their latest solutions for making electronic material safe. We are considering a next pinfa workshop together with pinfa North America in the USA in 2013.

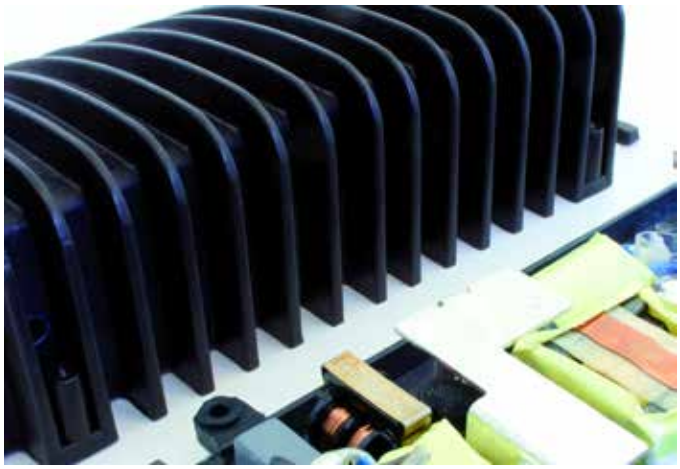
Photo: the speakers of the pinfa "Electronics Flame Retardants" workshop in Tokyo, 14th June 2012.

The workshop agenda and presentations are available at www.pinfa.org

Marine cable specialist certification approvals

Helkama, Finland, is specialised in the development and manufacture of marine cables. The company has chosen to produce only halogen-free cables, which improve the safety of ships by reducing emissions of toxic fumes and smoke. The company offers reduced weight, high performance, easy installation cables, conform to flame-retardant IEC 60332-3A or fire-resistant IEC 60331 standards. These halogen-free cables are approved by all major classification societies. http://www.helkamabica.fi

Thermally conductive PIN FR polyester



The high-tech thermoplastic developer LATI has launched a thermally conductive, halogen-free PA6 compound Laticonther 62 CEG/500-V0HF1 for electronics and electrical applications where heat dissipation is important, e.g. for transformers, mains adapters, electronics circuits. Cooling is increasingly important as E&E devices become both more miniaturised, so concentrating heat production, and more powerful, both in terms of data processing capacity (electronics) or electrical power (e.g. transportation). The material offers wide fire resistance (V0 at 1.5 mm, GWFI 960°C, and 775°C GWFI at 1 mm) and heat transmission much better than any ordinary plastic product, whilst maintaining the advantages of injection molding: cost, ease of use, design flexibility. The material has already been used by SAPLAST for electronics boxes where cooling is achieved directly through the Laticonther polymer casing which includes finning to increase heat exchange.

Source: http://www.lati.com/en/news/2011/thermally_conductive_and_self-extinguishing_ul_94.html and http://www.lati.com/en/news/2012/ts45545.html

Bio-derived flame retardants and oxidants

Researchers are looking at deriving new flame retardant materials from agricultural waste products or other renewable biological materials. Cashew nutshell liquid (Cardanol), a food industry waste, was treated with different organic oxydants to produce polyphenols which showed low heat release and high char production, suggesting that they could prove effective as flame retardants for carpets and textiles. The research is being funded by the Massachusetts Toxic Use Reduction Initiative (TURI) in the EPA People, Planet and Prosperity programme (P3).

"Halogen-free ultra-high flame retardant polymers through enzyme catalysis", S. Ravichandran et al., Green Chemistry, Issue 3, 2012: http://pubs.rsc.org/en/content/articlelanding/2012/gc/c2gc16192c

"A renewable waste material for the synthesis of a novel nonhalogenated flame retardant polymer", S. Ravichandran et al., J. Cleaner Production, vol. 19, issue 5, 2011 http://www.sciencedirect.com/science/article/pii/S0959652610003604

13 killed in coach fire

An electrical short-circuit in a door is thought to have been the cause of a coach fire which killed 13 and injured 22 more in Hulu Air, Limapuluh Kota, West Sumatra on 1st May 2012. 48 people were on the coach, and were mainly asleep when the bus caught fire. Indonesia's Parliament is requesting a review of bus and coach roadworthiness tests. This incident again confirms the problem of fire safety in buses and coaches, resulting largely from inadequate fire performance requirements for materials used (interior fittings, seats, plastic structural elements …). Some 1 out of 100 buses and coaches on the road suffer a fire incident every year, according to SP Sweden.

Media: http://www.thejakartapost.com/news/2012/05/01/short-circuit-likely-behind-deadly-bus-fire-west-sumatra.html

SP Fire Technology, Sweden, Brandposten magazine n°42 "Fires in vehicles": http://www.sp.se/en/units/fire/information/brandposten

Report suggests PIN FRs are reliable and cost effective

The New York State Task Force on Flame Retardant Safety, headed by the State's Department of Health, has concluded that three PIN flame retardants (Magnesium Hydroxide, RDP Resorcinol Bis(diphenyl phosphate) and Boric Acid) are reliable and cost-effective, and are viable alternatives to the brominated flame retardant Deca-PBDE. The report covers applications in upholstered furniture or electronics. A voluntary phase-out, announced by the US Environmental Protection Agency (EPA) in 2009, will end the importation, production, and sale of Deca-BDEin the USA by 31st December 2013. The Task Force states that "*Fires are a major cause of property damage, injuries and death in the United States and in New York State, and pose a risk to fire-fighter health and safety … Flame retardants are one mechanism to help reduce the risk and dangers associated with fires by increasing ignition resistance, or reducing flame spread, heat output and smoke production. Flame retardants in commercial materials and products are part of efforts to improve fire safety at both the state and national level*."

"Draft Report of the New York State Task Force on Flame Retardant Safety Review", December 2011, open for public comment until 9th July 2012: http://www.health.ny.gov/environmental/investigations/flame/flame_retardant.htm

Recycled magnesium potential flame retardant

Magnesium, recovered from metallurgy works wastes as magnesium hydroxide, could be used as a flame retardant. A process tested by the China ENFI Engineering Corporation enables recovery of magnesium sulphate, magnesium hydroxide $Mg(OH)_2$ and magnesium ammonium phosphate (struvite) or gypsum from a nickel production plant. The magnesium sulphate can be sold as a magnesium source, the high-quality magnesium hydroxide could be used as a flame retardant, and struvite is a good fertiliser. A 80 m^3/h plant is currently being built at a hydro-nickel plant in Guangxi, South China. The first stage (magnesium sulphate recovery) is already commercially operational, and the second stage (magnesium hydroxide recovery) is being built.

"Recovery of Magnesium from Waste Effluent in Nickel Laterite Hydrometallurgy Process", N. Sun et al., EPD Congress 2012, TMS (The Minerals, Metals & Materials Society)
http://onlinelibrary.wiley.com/doi/10.1002/9781118359341.ch49/summary

Durable fire-safe cable protection for solar energy

Thomas & Betts have installed PMAFLEX, conduit type XSOLL, long-life cable protection in a 241 panel, 52 000 kWh/y photovoltaic plant in Uster, Switzerland. The fire-safety characteristics of the cable protection (self-extinguishing, UL94 V2, UL224, IEC EN 61386 non flame propagating) enabled building authority authorities to waive the individual safety switching requirement for each panel. The XSOLL cable protection corrugated conduits are triple-layered (PA12 outer layer for highest UV resistance, PA6 inner layer), formulated with PIN FRs (phosphorus, inorganic, nitrogen flame retardants) and offer long life (>25 years), good mechanical strength at -40 - +150°C, UV and weathering resistance.

Source http://www.pma.ch/pma_com/products/pmaflexpro/xsoll.html

Novel PIN retardant for cotton and cellulose

A new type of PIN flame retardant has been developed for application to cotton and cellulose fibres. The halogen and formaldehyde free PSiN (phosphorus silicon nitrogen) or Neo-FR was synthesised from silicon, phosphorus and nitrogen, using one or two steps including cross linking addition of phosphorus-based multi-function groups. and retained three methoxyl groups enabling self-polymerisation or covalent bonding to textile molecules. The FRs were tested on cotton fibres and showed good fire performance (vertical flammability test, LOI limiting oxygen index) through high char generation, did not significantly deteriorate the tensile strength or elasticity of the cotton samples, and was durable (wash resistant).

"A durable flame retardant for cellulosic fabrics", Z. Yang et al., Polymer Degradation and Stability, in press 2012: http://www.sciencedirect.com . "A novel halogen-free and formaldehyde-free flame retardant for cotton fabrics", Z.Yang, Fire and Materials, vol. 36, issue 1, 2012: http://onlinelibrary.wiley.com/doi/10.1002/fam.1082/abstract

PIN flame retardants for lithium ion batteries

Lithium ion batteries are widely used in portable electronics in our everyday life (laptops, telephones …) and also now in electric cars, because of their high power to weight ratio. However, these batteries pose a recognised fire risk, in case of damage, electrical malfunction or overheating. A number of phosphorus-based molecules are proving to be effective flame retardant additives for lithium ion batteries. A new phosphonamidate, bis(N,N-diethyl)(2-methoxyethoxy)methylphosphonamidate (DEMEMPA), has been shown to be effective as a flame retardant (considerably reducing SET self-extinguishing time) and to not deteriorate electrochemical performance. The phosphorus-based additive DPOF (diphenyl octyl phosphate), used as a flame retardant additive in the electrolyte of lithium ion batteries, has been shown to actually improve the electrical performance.

"Effect of flame-retarding additives on surface chemistry in Li-ion batteries", N. Nam et al., Materials Research Bulletin, in press, 2012 www.elsevier.com/locate/matresbu . "Effect of the concentration of diphenyloctyl phosphate as a flame-retarding additive on the electrochemical performance of lithium-ion batteries", E-G. Shim, Electrochimica Acta 54 (2009): www.elsevier.com/locate/electacta . "A new phosphonamidate as flame retardant additive in electrolytes for lithium ion batteries", J. Hu, J. Power Sources 197, 2012 : www.elsevier.com/locate/jpowsour

Other News

The **International Electrotechnical Commission (IEC) has decided against a proposed "candle flame ignition" resistance requirement** in standards for the plastic enclosures of television sets. 40% of country representatives voted against the proposal, enough to result in its rejection. pinfa regrets this decision, because small flames, such as candles and tea-lights, placed on or near televisions continue to start a significant number of home fires, including with modern flat-screen TVs. The proposed safety requirement would have prevented or considerably reduced the risk of such fires.

A study in four USA sewage works of 8 traditional and newer halogenated flame retardants in sewage sludge shows the presence of PBDEs, TBPH and DP* in all samples with total concentrations in the range 2 – 6 µg/g. The authors conclude that these substances can migrate out of consumer products into the environment.

A study in Vancouver shows that PBDEs continue to be found in household dust, with concentrations stable for the now-banned Penta-BDE and increasing for other PBDEs (concentrations up to 43 µg/g). Nine non-PBDE brominated flame retardants were also found in 81-100% of dust samples (median concentrations 0.003 – 0.3 µg/g).

A study published by the Scandinavian countries, assesses 17 different halogenated flame retardants used to substitute PBDEs* in a range of urban and rural environments, including indoor and outdoor air, and in wildlife. These "new" halogenated FRs were regularly found and undergo long range environmental transport. The authors suggest further studies to identify emission sources and pathways.

A study of airborne particles in the Arctic and Antarctic regions found traces of organophosphorus flame retardants. 75 – 85% of the concentrations detected were chlorinated substances (TCEP and TCPP), with PIN (non-halogenated) phosphorus flame retardants being found at much lower concentrations of <100 picogrammes/m^3 (e.g. TiBP, TnBP, TEHP, TPhP*)

IEC vote:
http://www.iec.ch/dyn/www/f?p=103:52:0::::FSP_ORG_ID,FSP_DOC_ID,FSP_DOC_PIECE_ID:1311,139509,269491

EFRA statement : http://www.cefic-efra.com/images/stories/Position_Paper/2012-04-27_efra%20statement_iec-standard.pdf

"Measurement of flame retardants and triclosan in municipal sewage sludge and biosolids", E. Davis, Environment International 40 (2012) 1–7 , Elsevier: www.elsevier.com/locate/envint and http://www.sourcewatch.org/images/7/73/Measurement_of_flame_retardants_and_triclosan_in_municipal_sewage_sludge_and_biosolids.pdf

"Legacy and current-use flame retardants in house dust from Vancouver, Canada", M. Schoeib et al., Environmental Pollution 2012, in press : www.elsevier.com/locate/envpol

"Brominated Flame Retardants (BFR) in the Nordic Environment", M. Schlabach et al., NORDEN (official Nordic cooperation organisation), 18th Aug. 2011: http://www.norden.org/en/publications/publikationer/2011-528

"Organophosphorus Flame Retardants and Plasticizers in Airborne Particles over the Northern Pacific and Indian Ocean toward the Polar Regions: Evidence for Global Occurrence", A. Möller et al., Environmental Science & Technology 46, 2012, http://pubs.acs.org/journal/esthag

* PBDE: Poly Brominated Diphenyl Ethers). TBPH: di(2-ethylhexyl)-2,3,4,5-tetrabromophthalate. DP: Dechlorane Plus. TiBP: tri-iso-butyl phosphate. TnBP: tri-n-butyl phosphate. TPhP: triphenyl phosphate.

Agenda

Events with active pinfa participation are marked: ►

********** 2012 **********		
29 Jul – 3 Aug	Warsaw, Poland	34th International Symposium on Combustion http://www.combustion2012.itc.pw.edu.pl/
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
17-20 Sept. 2012	Chengdu, China	2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT) http://www.isfrmt.org/
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** 2013 **********		
28-30 Jan 2013	San Franciso, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u

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California considers moving backwards on fire safety

In a move without precedent, California Governor Edmund Brown has proposed to effectively dismantle the State's furniture fire safety legislation, replacing the current TB117 requirement for small-flame resistance by a simple "smouldering cigarette" test, generally recognised as providing no real fire protection for the public, because it does not prevent furniture catching light from other heat sources (candles, electrical faults) nor prevent furniture foam providing fast-burning fuel to a fire starting in other items, resulting in considerable heat release and smoke and very little time for occupants to escape. This would be the first time that any authority has knowingly and deliberately regressed or removed fire safety requirements. The proposal comes in a context where environment and health organisations' concerns about certain chemicals are resulting in unjustified rejection of all flame retardants (see pinfa Newsletter n°21). However, rather than increasing fire risk for the general public, such possible concerns should be addressed by maintaining the fire safety requirement and either excluding the use of certain substances or requiring the use of other approaches.

Fire safety is achieved by a combination of complementary solutions, used together, including appropriate flame retardants. Many studies show that fire resistance requirements do prevent fires starting and so reduce deaths, injuries and material losses (see eg. pinfa Newsletter n°10 (1999 assessment of the effectiveness of the UK furniture fire safety regulations). pinfa fully supports critical reviews of fire safety standards and of environmental and toxicological properties of flame retardants, but believes that simply repealing fire safety standards will reduce public and consumer safety.

California State Assembly: http://aesm.assembly.ca.gov/californiaflamiblitystandards

Statistical report on the effectiveness of the UK Furniture and Furnishings (Fire) (Safety) Regulations, 1988, Greenstreet Berman, December 2009: http://www.bis.gov.uk/files/file54041.pdf

US federal questions on furniture fire safety

A US Senate Subcommittee hearing on flame retardants, chaired by Dick Durbin, heard that 7 000 reported home fires per year start in upholstered furniture, leading to 500 deaths, 890 injuries and US$ 442 million property damage. However, questions are asked about the safety to health and the environment of certain flame retardants used in furniture. The US Environmental Protection Agency announced that it will investigate the flame retardants targeted by such concerns. The head of the US Consumer Product Safety Commission considered that regulators should speed up the replacement of such flame retardants. The CPSC considers that the risks from fires resulting from contacts of upholstered furniture with flames can be reduced by fire-proof barriers, added to prevent the flames reaching the cushion foams. This is based on a CPSC report published May 2012 which shows the effectiveness of such fire-proof barriers in the conditions tested.

Senate hearing: http://durbin.senate.gov/public/index.cfm/pressreleases?ID=297ffe35-dc8b-47a3-9932-a831504dc023

US CPSC report, 9th May 2012 "Upholstered Furniture Full Scale Chair Tests – Open Flame Ignition Results and Analysis": http://www.cpsc.gov/library/foia/foia12/os/openflame.pdf

US-EPA DfE alternatives assessment for Deca-BDE

The US Environmental Protection Agency (EPA) has made available for public comment (until 30th September 2012) a draft Design for the Environment (DfE) report assessing 30 alternatives for the brominated flame retardant DecaBDE. This follows proposals made by EPA in April to include all PBDE brominated flame retardants under TSCA SNUR (Toxic Substances Control Act Significant New Use Rules) which would require reporting of all new uses in domestic manufacture or imported products (see pinfa Newsletter n°19). EPA indicates that the alternatives to DecaBDE considered in the draft report are already available, may have a lower potential for bioaccumulation in people and in the environment, and offer varying characteristics: some appear to offer low health risk but may be persistent, others are less toxic. The 30 alternatives assessed include halogenated substances, antimony trioxide and a range of PIN flame retardants including aluminium, magnesium, zinc, melamine (nitrogen) and phosphorus compounds.

US EPA press release 30th July 2012 http://www.epa.gov/oppt/existingchemicals/pubs/actionplans/

EPA draft report for public comment: "An Alternatives Assessment for the Flame-Retardant Decabromodiphenyl Ether (DecaBDE)" (PDF, 812pp, 10.2MB) http://www.epa.gov/dfe/pubs/projects/decaBDE/deca_fullreport.pdf

Comments to Emma Lavoie (Lavoie.Emma@epa.gov) by 30th September 2012

Bus fire research

Bus and coach fires are considered a serious issue in China, following a number of tragic incidents with lives lost. The authors used the NIST Fire Dynamics Simulator model (FDS) to assess how smoke and fire develop in a bus, depending on the type of fire source, where the fire starts, and the combustible materials present. Temperature inside the bus was indicated as reaching 415°C with the bus completely full of smoke in less than one minute if doors remained closed, and 1000°C if front and rear passenger doors were opened. Another article emphasizes that bus fire protection is inadequate, and recommends a range of measures to improve safety, including controlling flammability of materials, limiting luggage and keeping exits clear, ensuring the structural integrity of the bus in case of fire. A recent research report in Finland indicates that the number of bus fires has doubled over the past decade, without being able to identify the reasons for this. Attention to fire safety aspects in vehicle maintenance is considered important, and fire resistance of interior materials "crucial for the prevention of catastrophic incidents".

"Numerical simulation study on bus fire", Zhang et al., State Key Laboratory of Fire Science, University of Hefei, China, 2011 http://dx.doi.org/10.1109/RSETE.2011.5964326

"Consideration after Persistent Self-Burning of Buses", H. Chow, Research Centre for Fire Engineering, Hong Kong Polytechnic University http://www.bse.polyu.edu.hk/researchCentre/Fire_Engineering/Hot_Issues/20120207-CFFTD1G.pdf

VTT Research Report "Bus fire safety in Finland": http://trid.trb.org/view.aspx?id=1097669

Puyang bus fire, June 2012: http://www.mdmpublishing.com/mdmmagazines/magazineapf/newsview/465/

Hunan bus fire, July 2011: http://www.chinabuzz.net/buzz/deadly-bus-fire-on-expressway-claims-41-lives/

Bus fire recalls and investigations

In Washington DC, 94 Daimler Orion buses have been withdrawn from service, following two fires in a week. In Montgomery County MA, Navistar ride-on buses have been taken out of service after seven caught fire in three years. Investigations said that the causes of the incidents were different, but a common feature was the speed with which fire spread through the bus interior. Australian official investigators have published conclusions concerning a fire in a 3-year old Mercedes New South Wales State Transit Authority bus which burnt out in July 2011. This fire started in the engine air compressor, possibly as a result of a rupture in a coolant pipe, then evaporation of water from the coolant leaving flammable ethylene glycol, this despite modifications having been made on this bus following 11 previous fires in this type of bus in Western Australia. The fire reached the passenger compartment by burning though a floor hatch and the interior of the bus completely burnt out despite fire service intervention.

Washington Daimler Orion bus recall: http://www.firerescue1.com/firefighter-safety/articles/1273450-2nd-DC-bus-fire-prompts-removal-of-94-buses/

Montgomery Navistar ride-on bus fires: http://www.gazette.net/article/20120719/NEWS/707199835/1124/ride-on-buses-show-history-of-sudden-fires

Fire investigation STA bus MO4878, July 2011: http://www.otsi.nsw.gov.au/bus/preliminary_report_bsi_fire_involving_sta_bus_mo4878.pdf

WEEE Directive updated

The European Directive on Waste Electrical and Electronic Equipment (WEEE), previously 2002/96/EC, has now been updated by 2012/19/EU. The updated Directive increases the mandatory recycling/reuse objectives for Member States to 65% by 2019, whereas at present only around one third of electrical waste is recycled or reused, most goes to landfill or inappropriate disposal. Stores will be required to take back for free for recycling consumers' small electronic goods, even if no new item is purchased. The Directive's scope is widened to cover nearly all E&E equipment, including items such as toys, lighting, computers, consumer electrical and electronic goods, photovoltaic panels, medical devices … As in the existing WEEE Directive, "plastics containing brominated flame retardants" must be removed from collected WEEE. The Restriction of Hazardous Substances (RoHS) Directive, previously 2002/95/EC, was already updated by 2011/65/EC in June 2011, and bans the use of PBDE and PBB brominated flame retardants in electrical and electronic equipment in Europe and indicates that "the risks to human health and the environment arising from the use of Hexabromocyclododecane (HBCDD) … should be considered as a priority" (see pinfa Newsletter n°13).

RoHS II Directive 2011/65/EC: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:174:0088:0110:EN:PDF

WEEE II Directive 2012/19/EU : http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0038:0071:EN:PDF

Phosphorus and mineral synergy for aircraft interiors

The phosphorus-based flame retardant DOPO was tested in combination with the microfibre aluminium oxide hydroxide mineral Boehmite for an epoxy novolac resin material for aircraft interiors. Flammability (UL 94 test), thermal stability (glass transition temperature) and mechanical properties (DMA modulus, fracture toughness) were tested. Epoxy novolac resins show minimal shrinkage during curing, thus optimising adhesive properties, and halogen-free solutions are necessary for aircraft applications because of requirements concerning smoke toxicity. Results showed that tested mechanical properties were not affected by the inclusion of DOPO at dosages of up to 1% phosphorus by weight, and that the mineral Boehmite both improves fire performance (synergy with DOPO) and significantly improves the fracture toughness.

DOPO: 9,10- Dihydro-9-oxa-10-phosphaphenanthrene-10-oxide

"Fire behaviour and mechanical properties of an epoxy hot-melt resin for aircraft interiors", T. Neumeyer et al, ECCM15 – 15th European Conference on Composite Materials, 24-28 June 2012, Proceedings ISBN 978-88-88785-33-2 http://www.eccm15.org/page.php?id=95

Other relevant recent publications:

"Novel DOPO-based flame retardants in high-performance carbon fibre epoxy composites for aviation", B. Perret et al., European Polymer Journal, Vol. 47, Issue 5, May 2011, pages 1081–1089 http://dx.doi.org/10.1016/j.eurpolymj.2011.02.008

"A effective flame retardant for epoxy resins based on poly(DOPO substituted dihydroxyl phenyl pentaerythritol diphosphonate", Wang et al., Materials Chemistry and Physics, Vol. 125, Issue 3, Feb. 2011, pages 536–541 (Elsevier) http://dx.doi.org/10.1016/j.matchemphys.2010.10.020

"Pyrolysis and fire behaviour of epoxy resin composites based on a phosphorus-containing polyhedral oligomeric silsesquioxane (DOPOPOSS)", W. Zhang et al., Polymer Degradation and Stability, vol. 96, Issue 10, Oct. 2011, pages 1821–1832 (Elsevier) http://dx.doi.org/10.1016/j.polymdegradstab.2011.07.014

Phosphorus FR synergy for polymers and wiring boards

A US patent application presents combinations of two phosphorus FRs (DOPO derivatives and phosphinic acid mineral salts, e.g. aluminium) for flame retardancy of different polymers, including polyesters, polyamides, polycarbonates and PBT (polybutylene terephthalate). The FR combinations reduce dripping flames during burning, improve electrical properties (CTI) and are resistant to leaching by water. UL94 testing in glass fibre reinforced PBT showed flame retardancy (UL94 V0 with 17-20% total of the two FRs), self-extinguishing and absence of burning drips. Another patent presents combinations of DOPO and phosphinic acid salts for flame retardancy of epoxy resins, in particular for epoxy prepregs, laminates, and printed circuit boards, offering mechanical and thermal performance for the laminates.

US patent application US 2012 0095140, April 2012, "DOPO flame retardant compositions": http://www.google.com/patents/US20120095140

US patent application US 2011 20110294920, December 2011, "DOPO flame retardant in epoxy resins" http://www.patentstorm.us/applications/20110294920/description.html

Hong Kong Consumer Council finds mattresses not safe

7 out of 25 mattresses tested by the Hong Kong Consumer Council were found to not be fire resistant, despite passing the "smouldering cigarette" test obligatory for mattresses sold there. The Consumer Council chief executive said that legislation should be tightened to require more stringent fire resistance testing.

Media coverage: http://www.thestandard.com.hk/breaking_news_detail.asp?id=21627

Ammonium polyphosphate and bamboo fibres

Silica gel microencapsulated ammonium phosphate (APP) demonstrated flame retardancy synergy with bamboo fibres in low density polyethylene (LDPE), polypropylene and Poly(butylene succinate) PBS, a polymer which offers the advantage of excellent biodegradability. The bamboo fibre provides a hydroxyl-containing carbon source for the intumescent action of the flame retardant. In LDPE, the bamboo fibre provides mechanical properties (strength, toughness), as well as ease of separation for recycling and biodegradability. Fire resistance was tested using UL94 and LOI (limiting oxygen index), showing that UL94 V0 could be achieved with appropriate APP – bamboo fibre combinations, optimal 1:1 ratio by weight APP: fibres. In PBS and polypropylene polymers, the microencapsulated APP/bamboo fibre combination also enabled UL94 V0 to be achieved. SEM analysis illustrates the char surfaces generated, which protect the polymer from fire.

"Investigation on Flame Retardant and Thermal Properties of Novel Intumescent Flame Retardant Low-Density Polyethylene Composites", X. Liu et al., Advanced Materials Research Vol. 548, 2012, pages 64-67: http://www.scientific.net/AMR.548.64

"Investigation on Flame Retardancy and Thermal Degradation of Flame Retardant Poly(butylene succinate)/Bamboo Fiber Biocomposites", S. Nie, X. Liu et al., Journal of Applied Polymer Science, Vol. 125, E485–E489, 2012, (Wiley) http://onlinelibrary.wiley.com/doi/10.1002/app.36915/full

"Intumescent flame retardation of polypropylene/bamboo fiber semibiocomposites", J. Thermal Analysis and Calorimetry, 2012 (Springer) http://www.springerlink.com/content/g81r86068172h974/

For information: other recent publications concerning bamboo fibre composite flame retardancy: "Effect of nano nhydrous magnesium carbonateon fire-retardant performance of polylactic acid/bamboo fibers composites", Li et al., J Nanosci Nanotechnol. Vol. 11, n°12, pages 10620-3, Dec. 2011 http://dx.doi.org/10.1166/jnn.2011.4103

ENFIRO alternative flame retardant workshop

The European Commission funded project ENFIRO is working on the substitution of some specific brominated flame retardants". ENFIRO has selected 17 PIN flame retardants (FRs) as alternatives for three brominated FRs. The project aims to deliver a comprehensive dataset on viability of production and application, environmental safety, and a life cycle assessment of the alternative flame retardants. A workshop on flammability, applications, toxicity, exposure and Life Cycle Assessment will take place 7-8th November 2012, Brussels, and a première screening of the ENFIRO film "Burning Questions" on 7th November at 18h00.

ENFIRO (Life Cycle Assessment of Environment-Compatible Flame Retardants: Prototypical Case Study): www.enfiro.eu

Flammable materials and furniture are killing fire fighters

A presentation by Sean DeCrane, Cleveland Fire Department and IAFF, shows that fire fighter deaths in US building fires due to traumatic injuries have increased from 1.8 to nearly 3 deaths per 100,000 fires from the 1970's to the 1990's. Key contributing factors, he suggests, are that building contents burn hotter and faster, in particular thermoplastics and polyurethane foam in furniture. Increased fuel loads result from the mass of consumer items, clothes, upholstered furniture and textiles in homes. Mr DeCrane emphasises the importance of building codes and sprinklers in reducing risk and consequences of fires. This hypothesis supports the need for fire retarded thermoplastics and polyurethanes, to reduce fire spread and temperatures, as part of the overall fire safety toolbox.

S. DeCrane, M24 "Fire Fighter Safety Through Building Codes and Standards, NFPA Conference & Expo, 10-13 June 2012: http://www.nfpa.org/download.asp?type=2012cepapers&file=m24.pdf

Electronics environment performance standards

New IEEE 'Environmental Assessment Standards' for Imaging Equipment and Televisions will require labelled equipment to be free of halogenated flame retardants and PVC. These standards define environmental performance criteria, providing a tool for corporate and institutional Green Purchasing and for consumer choice, and identifying products "*demonstrating the leading environmental performance currently available in the marketplace*". These are presented as presenting a precedent for future IEEE EPEAT standards, that is the global registry for green electronics, covering some 45 manufacturers and at present over 3,000 registered products, and set as a purchasing requirement by many institutions.

IEEE (Institute of Electrical and Electronic Engineers) 1680 Standards: http://grouper.ieee.org/groups/1680/ (see 1608.2 Imaging Equipment and 1680.3 Televisions), approved by the IEEE SA Standards Board 30th August 2012.

Laptop and mattress fire kills 6

Investigations suggest that the tragic home fire in Rehovot, Israel, this spring was caused by a laptop left on a bed, overheating and igniting the bedclothes and mattress. The family father and five children died in the fire. The Israeli Fire Brigade Bureau reminds that laptops placed on soft surfaces (upholstered furniture, beds) are likely to have their cooling ventilation vents blocked, and so risk overheating. Laptops should only be placed on hard surfaces where adequate ventilation is ensured when in operation. Turned-on electrical devices and heat sources should be kept away from mattresses, which in most countries worldwide are highly flammable.

Media coverage Rehovot laptop and mattress fire: http://www.timesofisrael.com/overheated-laptop-sparked-rehovot-fire-that-killed-six/

Toyota door fire investigation

The fire risk of some 1.4 million Toyota vehicles is being investigated following 160 reported fire incidents and 9 injuries. Similar investigations target some 340 General Motors Chevrolet vehicles. According to the US National Highway Traffic Safety Administration (NHTSA) a driver's door window switch in certain Camry, Yari, Highlander, Solara and RAV4 2007 -2009 models can overheat and ignite

Feds probe 1.4 million Toyotas for window switch fires:
http://content.usatoday.com/communities/driveon/post/2012/06/camry-fire-power-window-switches/1

Abbreviations

See pinfa website: http://www.pinfa.eu/library/glossary-of-abbreviations.html

Agenda

Events with active pinfa participation are marked: ►

********** 2012 **********		
9-12 Sept. 2012	Berlin, Germany	►Electronic Goes Green 2012+ www.egg2012.de
17-20 Sept. 2012	Chengdu, China	2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT) http://www.isfrmt.org/
27-28 Sept. 2012	Chicago	►2nd International Conference on Fires in Vehicles (FIVE) www.firesinvehicles.com
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/dct/page/1 and 2nd International Symposium on Flame-Retardant Materials & Technologies (ISFRMT 2012) www.isfrmt.org
7-8 Nov 2012	Brussels	ENFIRO Workshop on alternative flame retardants "Burning Questions" www.enfiro.eu
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
********** 2013 **********		
28-30 Jan 2013	San Franciso, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
16 Apr 2013	Indianopolis, USA	'Modern Vehicles: Techniques and Technology' workshop in FDIC (Fire Department Instructors Conference) http://www.fdic.com/attend/conference/workshops.html
13-14 Jun 2013	Denver, Colorado	Fire Retardants in Plastics (AMI) http://www.amiplastics-na.com/events/Event.aspx?code=C516
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u
25-28 Jun 2013	Lund, Sweden	6th European Combustion Meeting http://www.ecm2013.lth.se/
30 Jun – 4 July	Lille, France	14th FRPM (Flame Retardancy and Protection of Materials) http://www.frpm2013.eu

pinfa

Newsletter for non-halogen fire safety solutions

October 2012 – N° 23



Innovation

Contents

California furniture fire safety regulation saves lives

Recent questioning of California's exemplary fire safety is countered by the facts, that is the numbers of fire death statistics. Controversial California Republican politician and columnist, Raoul Lowery Contreras points out that official US fire statistics (FEMA) show that California's fire death rate is half the US national average. The per capita fire death rate in California is six times lower than before the furniture fire safety regulations in the 1980's, and the number of upholstered furniture fires has fallen from 2500 to 800 per year, a 66% reduction despite the population increase. A study presented in May 2012 by the Southwest Research Institute further shows that furniture cushion foam conform to the fire safety regulation (CA TB 117) increases the safety of home furniture by delaying the onset of free-burning conditions, decreasing heat release and increasing the time to 'flashover', that is, giving longer for residents to escape or for the fire service to intervene.

Source: Raoul Lowery Contreras commentary, Latino Times : http://latinotimes.org/2012/06/09/the-burning-truth-questionable-science-the-media-special-interests/

M. Blais, Southwest research Institute "California TB 117: Does The Regulation Add Value?", Polyurethane Foam Association Technical Program meeting, May 2012: http://www.pfa.org/abstracts/index.html#

Safer, heat-resistant performance cable compounds

In collaboration with the cable industry, DuPont has developed DuPont™ Vamac® halogen-free (i.e. halogen is not an intended ingredient of the product), flame resistant compounds for use in flame-retardant cables and hoses. Vamac® ethylene acrylic acetate (AEM) offers fire and oil resistance with low temperature flexibility (without plasticiser) and heat resistance up to 175°C. For the railway industry, where high flame retardance, low smoke and low toxicity are critical, Vamac® DP offers solutions for power and communications cables. DuPont AEM also accepts the high levels of metal oxide fillers required in high-performance low fire hazard compounds for rail transportation, as well as for military, marine and oil and gas applications. Vamac G is adapted for automobile applications such as wire jacketing, protective ignition wire sleeving and battery cables.

Source:
http://www.lucintel.com/news/dupont_and_cable_industry_collaboration_yields_safer_more_durable_cables_with_vamac_halogenfree_flame_resistant_compounds.aspx

iNEMI greening electronics

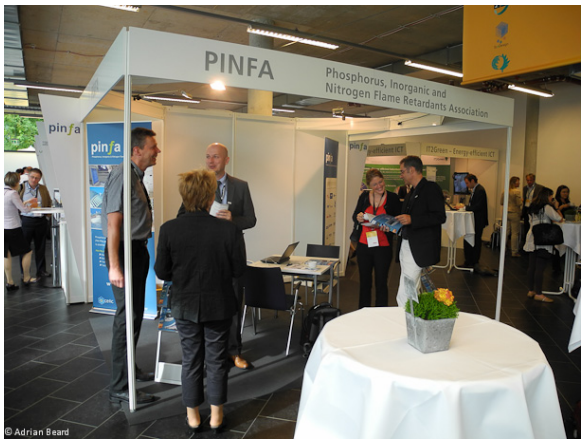
The iNEMI (see *pinfa* Newsletter n° 16) Workshop, Berlin, 9th September 2012 (held before Electronics Goes Green conference, see below) presented current electronics industry initiatives to move to environmentally sustainable products. Key leadership initiatives in this direction include "Halogen Flame Retardant Free Printed Circuit Board (PCB) Materials" and "Halogen Flame Retardant Free Signal Integrity". The presentation on "Industry Halogen Free Conversion and Challenge" (T. Sidiki, DSM) emphasised that industry leaders should be largely halogen-free for connectors, casings, switches, circuit boards and other elements by 2013, the major challenge being to marry halogen-free flame retardants with technical performance and high temperature stability necessary for lead-free soldering. PIN flame retardant polyamides are presented as a solution, subject to appropriate processing, which requires close collaboration between polymer and additive suppliers, compounders and moulders. New developments PIN FR printed circuit boards offer high levels of tensile strength, design flexibility and electrical performance (comparative tracking index CTI). J. Adams of IBM confirmed the need to implement alternatives to some brominated flame retardants targeted by EU Directives and by NGO "sin" lists.C. Handwerker of iNEMI confirmed the progress of the organisation's priority work on halogen-free electronics, in particular with the halogen-free PCB materials and reliability projects aiming for completion by end 2012.

iNEMI Forum on Progress in Green Electronics - Alignment on Best Practices and Future Focus, held at Electronics Goes Green, September 9th 2012 Berlin, Germany. Presentations available online at: http://www.inemi.org/node/2321

Electronics Goes Green 2012

Some 450 industry representatives joined the 'Electronics Goes Green 2012+' conference. A number of papers and sessions addressed issues around flame retardants. A Carbon Footprint analysis of a phosphorus- and a bromine-based FR suggested that comparative results depended strongly on the source of bromine. A study of materials recycling for a flat screen LCD television showed the difficulty of separating and recycling different polymers and additives and the need for appropriate solutions. Presentations

underlined the increasing regulatory pressure (in Europe, the USA and elsewhere) and other drivers (NGOs, Ecolabels) towards PIN flame retardants to ensure fire safety in electrical and electronic equipment. The EU ENFIRO investigation is currently carrying out a Life Cycle Assessment of environmentally compatible flame retardants, with risk and impact assessments based on hazard exposure, fire performance and application performance. The electronics industry explained that PIN solutions (phosphorus, inorganic, nitrogen base fire safety) are available for engineering thermoplastics and for electronic circuit boards, offering as good or better performance than halogenated flame retardants. *pinfa* members presented developments in PIN flame retardant solutions, such as ammonium polyphosphate intumescents for polyesters and polyamides, phosphinates for polyamides, melamine salts for printed circuit boards, hindered amine derivatives (NOR) for barrier membranes and scaffolding surface protection, aluminium oxide hydroxides (AlOOH) for polyamide and printed surface boards, and various combinations of these for engineering polymers … These PIN solutions offer low toxicity, absence of bioaccumulation risk, and high mechanical and fire safety performance.



Electronics Goes Green 2012+, Berlin, Germany, 10th – 12th September 2012 http://www.egg2012.de

Calls for criteria in ensuring hospital fire safety

A number of NGOs on different continents (Americas, Europe, Australia) have joined a call for 'Healthier Hospitals', asking for tighter constraints on chemical safety, for example by following the BizNGO Guiding Principles for Safer Chemicals. This particularly calls to "know and disclose product chemistry". The Health Care Without Harm (HCWH) website includes documents suggesting what health care purchasers can do about flame retardants. A suggested policy is that, where flame retardants are necessary to ensure fire safety standards, products should be preferred which are halogen free and for which comprehensive toxicity data is available showing that they are not toxic, persistent or bio-accumulative.

Health Care Without Harm (HCWH) http://www.noharm.org/ and document on purchasers policy on flame retardants : http://www.noharm.org/lib/downloads/bfrs/Purchasers_Can_Reduce_BFRs.pdf

Healthier Hospitals Initiative (HHI) http://healthierhospitals.org/media-center/press-releases/hospital-initiative-urges-development-safer-interior-furnishings

BizNGO Principles for Safer Chemicals http://www.bizngo.org/guidingPrinciples.php

Fire protected, low-smoke railway data cable

Huber+Suhner has launched a new flame retardant RADOX® RAILCAT cable, offering halogen-free, low-smoke and high data transmission capacity, for Ethernet connections up to 10 gigabits. The CAT7 cable offers fire protection specifications to DIN 5510-2 and prEN 45545-2. It is available as 4x2x24 AWG and its reduced dimensions allow flexible installation for data routing for railway vehicles, systems and devices. Using electron-beam cross-linked insulation sheath material, RADOX® EM 104, the cable is resistant to heat, cold, aggressive media and weather.

Source: http://www.hubersuhner.com/en/Recent-Products/RADOX-RAILCAT-CAT7

Promoting safer chemical substitution

The EU-funded SUBSPORT (chemical substitution portal) www.subsport.eu has a publicly accessible web-based database of 'restricted and priority substances', combining 29 lists of chemicals which are legally or voluntarily restricted or recommended for restriction, including by international agreements, EU regulations (such as Restriction of Hazardous Substances), national government lists, NGO and trade union lists and company or industry lists. The lists can be searched by substance name (full name or part of name), EC and CAS numbers. The objective of SUBSPORT is to provide a web information centre on the state of the art of chemical substitution, including lists of restricted chemicals, case studies of successful substitution and tools and guidance for chemical evaluation and substitution implementation.

SUBSPORT: www.subsport.eu

Restricted and priority substances database: http://www.subsport.eu/list-of-lists-database

Public consultation on Substances of Very High Concern

The European Chemical Agency ECHA has opened a public consultation on proposals to add 54 further chemicals to the EU list of 'Substances of Very High Concern' (SVHC). The proposed chemicals include the brominated flame retardant DecaBDE, indicated to be PBT (Persistent, Bioaccumulative and Toxic) and vPvB (Very Persistent Very Bioaccumulative). The halogenated flame retardants HBCDD, SCCPs and TCEP are already included in the EU SVHC list: these substances must be notified to consumers if present at concentrations of > 0.1% in any article or product on sale in Europe.

ECHA authorisation list: http://echa.europa.eu/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisation-list/authorisation-list

*ECHA consultation on new SVHCs, consultation **until 18th October 2012**: http://echa.europa.eu/en/web/guest/view-article/-/journal_content/512b7526-9dd6-4872-934e-8c298c89ad99*

PIN flame retardants for polycarbonates

Polycarbonates are a charrable polymer, and the condensed phase action is thought to be the main fire retardant mechanism of phosphorus-based FRs, and this is principally a function of the phosphorus content. Vothi et al. (2012) developed and tested new P-FRs for polycarbonates based on phloroglucinol, with the aim of achieving high P content but also good thermal stability and water insolubility. Results showed that UL94 V-0 fire performance could be achieved with 2% FR addition to polycarbonate, with over 8% char production. Zhao et al. (2012) showed that a novel P-based synthetized flame retardant, designed to offer improved stability in processing (lower volatility) and resistance to acid and alkali, achieved UL94-V0 vertical burn fire standard with 6-8% FR loading in polycarbonate. Cheil Industries (Korea) has filed, amongst other patents for polycarbonate combinations with other polymers, a patent application for a polycarbonate combined with a polysiloxane and ABS with a phosphorus-based flame retardant.

"Thermal stabilities and flame retardancies of phloroglucinol-based organo phosphates when applied to polycarbonate", H. Vothi, Fire and Materials, 2012 http://onlinelibrary.wiley.com/doi/10.1002/fam.2158/abstract

"Synthesis of a phenylene phenyl phosphine oligomer and its flame retardancy for polycarbonate", W. Zhao, Journal of Applied Polymer Science, 2012 http://onlinelibrary.wiley.com/doi/10.1002/app.37610/abstract

Cheil Industries International Patent Application n° PCT/KR2010/008651 (text in Korean) http://patentscope.wipo.int/search/en/WO2012015109

Potassium and PIN flame retardants

The mineral nutrient potassium can contribute to flame retardancy effectiveness of PIN FRs. Onuegbu et al. (2012) show that ignition time of polyurethane foam (as used in furniture, car seats …) can be delayed by nearly 10x and flame duration reduced by >80% by including doses of <1% potassium aluminium sulphate or potassium sesquicarbonate. A 2012 patent application by Morikawa et al. indicates that potassium hydroxide improves the effectiveness of the PIN FR ammonium dihydrogen phosphate in thermoplastic resins, probably by buffering the pH decrease resulting from ammonia release under heat. Potassium compounds can also react with silicones or other compounds to form inorganic glasses (eg. potassium silicate) in fire conditions, providing a protective coating against heat and fire (Gilman, 1996). Yuan et al. (2012) showed that a potassium, sulphonate and silica based flame retardant system in polycarbonate offered improved Limiting Oxygen Index, cohesive dense char structure protecting from fire, and achieved UL-94 class V-0.

"Comparative Effects of the Fire Behaviours of Potassium Aluminium Sulphate and Potassium Sesquicarbonate on Flexible Polyether Foam", T. Onuegbu et al., Molecular Crystals and Liquid Crystals, 556-1, 2012 http://www.tandfonline.com/loi/gmcl20

US Patent 2012/0108716, K. Morikawa &S. Ichii, "Flame retardant agent for thermoplastic resin and flame retardant resin composition" www.google.com/patents/US20120108716

"Fire retardant additives for polymeric materials – I – char formation from silica gel – potassium carbonate", J. Gilman et al., NISTIR 6030, 13th meeting of the UJNR Panel on Fire Research and Safety, March 1996 http://fire.nist.gov/bfrlpubs/fire97/PDF/f97093.pdf

"Synergistic effect of organic silicon on the flame retardancy and thermal properties of polycarbonate/potassium-4-(phenylsulfonyl) benzenesulfonate systems", D-D. Yuan et al., Applied Polymer Science 2012 http://onlinelibrary.wiley.com/doi/10.1002/app.37888/abstract

Phosphorus flame retardants for polyurethane foams

Flexible and rigid polyurethane foams (PUR) are extremely widely used in upholstered furniture, mattresses, car seats, insulation materials and a range of other furnishings and interior decoration. However, this foam is flammable if not flame retarded. Phosphorus-containing compounds are increasingly used to improve fire safety without halogenated chemicals. Lorenzetti et al. studied organic and inorganic aluminium phosphinates as flame retardants in PUR at 10% loading, showing that both are effective in improving the thermal stability and the fire behaviour (LOI, heat release). The inorganic phosphinates offered better fire performance, probably because of char characteristics and higher phosphorus content. The tested phosphinates also acted by a fuel dilution effect, by release of water or ammonia. Chen et al. tested a novel nitrogen-phosphorus FR (a phosphinic acid melamine salt) in PUR foam, showing that the structure and mechanical properties of the foam were not significantly changed at 12% FR loading, whereas the fire performance was considerably increased (LOI, cone calorimeter, flame propagation). At 12% loading, the foam passed he California furniture fire safety regulation test CAL TB 117A-part1, so confirming that halogenated substances are not necessary to achieve this. Zhang et al. tested a phosphorus flame retardant (DMMP) with different minerals in a rigid PUR foam showing a synergy effect, and significantly improved fire performance (LOI). Zenhui et al. tested 8 different flame retardants, and combinations thereof, in rigid PUR foam, concluding that the most effective flame retardants were the PIN FRs micro encapsulated red phosphorus, nano aluminium tri hydrate and melamine cyanurate

"Synthesis of phosphinated polyurethane foams with improved fire behaviour", A. Lorenzetti et al., Polymer Degradation and Stability, 2012 (in print) www.elsevier.com/locate/polydegstab

"Halogen-Free Flame-Retardant Flexible Polyurethane Foam with a Novel Nitrogen−Phosphorus Flame Retardant", M-J. Chen et al., I&ECR (Industrial & Engineering Research), ACS Journals, 2012 http://pubs.acs.org/journal/iecred

"Synergistic Effects of Hydroxides and Dimethyl Methylphosphonate on Rigid Halogen-Free and Flame-Retarding Polyurethane Foams", A. Zhang et al., J. Applied Polymer Science, 2012 http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1097-4628

"Preparation of Rigid Flame Retardancy Polyurethane Foam Material with Difficult Combusted Degree", Q. Zenhui et al., Advanced Materials Research Vols. 535-537 (2012) pp 1151-1157, http://www.scientific.net/AMR.535-537.1151

1.4 million dishwashers recalled after fires

Nearly 1.4 million dishwashers have been recalled in the US and Canada following incidents in which heating element failures led to fires (seven reported fires, three of which caused extensive property damage). The GE Aderna, Eterna, Profile and Hotpoint dishwashers in question were sold from 2006 to 2009. Consumers are asked to disconnect the appliances, and contact GE who offer either free in-home repair or a rebate on a new dishwasher, but not to return the appliances to retailers who may refuse to take them back. A study in Finland in 2001 suggested that 10% of home fires of electrical origin were caused by dishwashers, and that nearly all appliances tested caught fire and burnt vigorously after contact with a flame heat source.

CPSC GE dishwasher recall, 8/8/2012: http://www.cpsc.gov/cpscpub/prerel/prhtml12/12244.html

J. Hietaniemi et al., 2001, VTT Finland « Burning of Electrical Household Appliances, an experimental study », VTT Research Notes n° 2084: http://www.vtt.fi/inf/pdf/tiedotteet/2001/T2084.pdf

Abbreviations

See pinfa website: http://www.pinfa.eu/library/glossary-of-abbreviations.html

Agenda

Events with active pinfa participation are marked: ►

********** ***2012*** **********		
17-20 Oct. 2012	Hefei, China	9th Asia-Oceania Symposium on Fire Science and Technology http://aosfst.csp.escience.cn/
18-19 Oct. 2012	Brussels, Belgium	Fireforum Congress "Fire & Sustainability" www.fireforum.be
7-8 Nov 2012	Brussels	*ENFIRO "Burning Questions : A workshop on alternative flame retardants looking at flammability, applications, toxicity, exposure, life cycle assessment"* ***Deadline early Registration = 15th October 2012*** *www.enfiro.eu*
10-14 Nov 2012	Dammam, Saudi Arabia	4th SFPE-SAC – Fire Protection Conference http://www.sfpe-saudi.org/2012Conference/index.html
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
5-6 Dec 2012	Cologne, Germany	VdS Brandshutz Tage (German fire protection expert days) www.vds-brandschutztage.de
********** ***2013*** **********		
28-30 Jan 2013	San Franciso, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
19-21 Feb 2013	San Diego, California	IPC APEX Electronics Industry exhibition and conference http://www.ipcapexexpo.org/
16 Apr 2013	Indianopolis, USA	'Modern Vehicles: Techniques and Technology' workshop in FDIC (Fire Department Instructors Conference) http://www.fdic.com/attend/conference/workshops.html
7-8 May 2013	Miami, Florida	Bioplastics Compounding and Processing 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C513
14-15 May 2013	Miami, Florida	Polymers in Cables 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C512
18-19 May 2013	Guangzhou, China	4th International SKZ Conference on Flame Retardants: Chinese and International Markets Requirements, Challenges and Innovations. Abstract submissions: jtroitzsch@troitzsch.com
10-13 Jun 2013	Chicago, Illinois	US National Fire Protection Association NFPA conference www.nfpa.org
13-14 Jun 2013	Denver, Colorado	Fire Retardants in Plastics (AMI) http://www.amiplastics-na.com/events/Event.aspx?code=C516
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u
25-28 Jun 2013	Lund, Sweden	6th European Combustion Meeting http://www.ecm2013.lth.se/
30 Jun – 4 July 2013	Lille, France	14th FRPM (Flame Retardancy and Protection of Materials) http://www.frpm2013.eu
11-12 Sept 2013	Würzburg, Germany	13th SKZ Conference on Trends in Fire Safety and Innovative Flame Retardants in Plastics. Abstract submissions: jtroitzsch@troitzsch.com

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Newsletter for non-halogen fire safety solutions

November 2012 – N° 24



Innovation

FIVE fires in vehicles

170 delegates from 14 countries met for the FIVE (Fires in Vehicles) conference, Chicago, 27-28 September 2012. The conference underlined that fires in vehicles pose a specific threat to life and property, with further issues emerging with new fuels and electrical vehicles. Many papers emphasised the high fire risk in buses and coaches, with much less stringent fire safety regulation than in airplanes or trains, with recent catastrophic fires in buses and coaches in Europe, Asia, the Americas, India … Speakers proposed to adopt the Hazard Level 1 or HL2 (from EN 45545) requirement for buses, which would provide an easy transition (fire tests, compliant materials/products already exist) to a minimum safety level corresponding to Euroclass E/DIN 4102 B2. Presentations underlined the need to develop active and structural fire safety systems for coaches and buses (smoke alarms, fire extinguishers particularly in the engine area, compartments and fire block separations), to be combined with fire safety requirements for structural and interior materials (panels, seats, curtains, carpets …) to increase escape time for occupants and rescue time in the case of accidents. A poster presented by Jérôme de Boysere, for *pinfa*, detailed the contribution of PIN flame retardants to fire safety in vehicles and the different application areas (and corresponding PIN product types).

"Performance fire safety in vehicles: phosphorus, inorganic and nitrogen flame retardants", available on the pinfa website www.pinfa.eu

FIVE: www.firesinvehicles.com FIVE 2014: 1-2 October 2014, Berlin, Germany.

ENFIRO identifies PIN flame retardants with a good environmental and health profile

The EU-funded collaborative research project ENFIRO (www.enfiro.eu) concluded with a workshop in Brussels, 8th November 2012. About 90 participants received an overview of the results of the project and an insight into related research activities from scientists outside the consortium. The project started out considering that there were not enough environmental and health data for alternatives to established brominated flame retardants. About a dozen PIN flame retardants were studied representing a large variety of applications, from engineering plastics, printed circuit boards, encapsulants to textile and intumescent coatings. Most of the studied flame retardants were found to have a proven good environmental and health profile: ammonium polyphosphate (APP), aluminium diethylphosphinate (Alpi), aluminium hydroxide (ATH), magnesium hydroxide (MDH), melamine polyphosphate (MPP), dihydro-oxaphosphaphenanthrene (DOPO), zinc stannate (ZS)[1] and zinc hydroxstannate (ZHS). Overall, they were found to have a lower tendency to bioaccumulation than the studied brominated flame retardants. In order to make a comprehensive evaluation, both material and fire performance were compared, and a life cycle assessment of a reference product containing halogen free versus brominated flame retardants (FRs)..Tests on the fire behaviour of materials confirmed that PIN FRs generally produce less smoke. Leaching experiments showed that the nature of the polymer is a dominating factor and that the leaching behaviour of PIN FR and brominated FRs is comparable. The more porous or “hydrophilic” a polymer, the more FR can be released. However, moulded plates which represent real world plastic products showed much lower leaching levels than extruded polymer granules.

[1] ZS and ZHS showed some neurotox-effects in in-vitro tests (tests with cells or cell cultures but not whole animals), which were not confirmed in ex-vivo tests (with organs from animals) and therefore are of limited relevance.

Impressions from the ENFIRO Workshop (from top left): The project coordinator Pim Leonards, Jonas Aspling from Swerea, Emma Lavoie from the US-EPA, Stefan Posner from Swerea, the panel discussion with Adrian Beard, Cynthia DeWit, Jürgen Troitzsch, Niels Jonkers and Dag Andersson, an attentive crowd, Sabyasachi Gaan from EMPA, Shigeki Masunaga from Yokohama National University and Niels Jonkers from IVAM.

ENFIRO initial assessment of 13 PIN flame retardants

As part of the start of the ENFIRO project, a review article of the PBT (persistence, bioaccumulation and toxicity) properties of 13 PIN flame retardants was prepared, and this has recently been published. This covers aluminium, magnesium and zinc compounds (inorganics), organophosphorus compounds, melamine polyphosphate (nitrogen and phosphorus) and intumescent systems. The study concludes that most of these PIN FRs offer low toxicity (9/13 in vitro, 11/13 in vivo) and are not vPcB (10/13), but in many cases this is based on insufficient data. Questions are raised about TPP (triphenyl phosphate), and it should be ensured that phosphorus FRs with lower toxicity (RDP, BDP) should not contain impurities of this substance. The authors conclude that this study, based on published literature only and not taking into account more recent experimental work during the ENFIRO project, does not provide adequate data for conclusions, and that more targeted studies are necessary on many of these flame retardants. In some cases, this conclusion appears to be an artefact of the study approach (magnesium hydroxide is indicated as lacking data for bioaccumulation, whereas this poses no risk because the substance breaks down to natural minerals), in other cases work is currently underway to provide full data sets in the context of the EU chemical regulation REACH.

Homepage of the ENFIRO project, with presentations from the final workshop coming soon www.enfiro.eu

"Persistence, bioaccumulation, and toxicity of halogen-free flame retardants", S. L. Waaijers et al. (Universities of Amsterdam, VU Amsterdam, Stockholm, Utrecht), Rev Environ Contam Toxicol. 2013, page 222:1-71
http://www.springerlink.com/content/xj60u1m2517j4712/

Fire safe thermoplastics for railway interiors

SABIC has launched a new range of LEXAN™ sheet materials, compliant with norms for railway carriage interior fire safety. The PC/ABS (polycarbonate / acrylonitrilebutadiene styrene) sheets use non-chlorinated and non-brominated flame retardants to ensure fire safety performance: LEXAN H6500 sheet for the future CEN/TS 45545 R6 standard, as well as current European rail standards including French F16-101 M1F1 (2-4mm), and LEXAN H6200 sheet for German DIN 5510 S3 SR2 ST2 (3mm) and S4 SR2 ST2 (4mm). The materials offer light weight and flexibility (compared to metal, glass or thermosets), resistance to impacts and performance at low temperatures and reduced temperature processing. Both materials offer lower system costs, because they can be manufactured coloured and finished, avoiding secondary painting and coating operations.

Source: http://www.sabic-ip.com/gep/en/NewsRoom/PressReleaseDetail/september_19_2012_sabicsworldrenowned.html

PIN FR developments for polypropylene fire resistance

Polypropylene is a tough and flexible polymer, widely used in electronics, automobile, textiles and many other applications. A number of recent publications present new developments in phosphorus-based PIN flame retardants (PFRs), to improve fire safety of polypropylene whilst ensuring environmental quality. A lanthanum (rare metal element) – phosphorus compound enabled UL94-V0 fire performance to be achieved at 20% FR loading. A montmorillonite (clay) – phosphorus – nitrogen (melamine) FR combination also achieved UL94-V0, showing the advantages of synergy between the different PIN FR components. A PFR based on a poly silsesquioxane (a silicon molecular structure) showed to improve the flame retardancy and the mechanical properties of treated polypropylene compared when used in combination with phosphorus – nitrogen intumescent FR (ammonium polyphosphate and pentaerythritol APP/PER). Similarly, mesoporous silica showed synergy with this APP/PER intumescent flame retardant in polypropylene. Zinc hydroxystannate also showed synergy with this APP/PER FR, achieving UL94-V0 with lower LOI (limiting oxygen index), peak heat release (PHR) and mass loss rate (MLR) and reduced dripping. A novel phosphorus compound (caged bicyclic trimer) also showed synergy with APP, achieving UL94-V0 fire performance.

"Flame Retardancy of Lanthanum Phosphinate in Combination with Intumescent Flame-Retardant in Polypropylene", R. Chen et al., Advanced Materials Research , vols. 490 – 495, pages 3366-3369, 2012 http://www.scientific.net/AMR.490-495.3366

"Synergistic Effect of Phosphorus-Containing Montmorillonite with Intumescent Flame Retardant in Polypropylene", X. Lai et al., J. Macromolecular Science, Part B: Physics, vol. 51, n° 6, pages 1186-1198, 2012 http://www.tandfonline.com/doi/abs/10.1080/00222348.2011.625909

"Preparation of hybrid phosphamide containing polysilsesquioxane and its effect on flame retardancy and mechanical properties of polypropylene composites", Y. Qian et al., Composites Part B: Engineering, in print 2012 http://www.sciencedirect.com/science/article/pii/S1359836812006142

"Influence of mesoporous fillers with PP-g-MA on flammability and tensile behavior of polypropylene composites", N. Wang et al., Composites Part B: Engineering, vol. 44, n° 1, pages 467–471, Jan. 2013 http://www.sciencedirect.com/science/article/pii/S1359836812002454

"Synergistic effect of zinc hydroxystannate with intumescent flame retardants on fire retardancy and thermal behaviour of polypropylene", S. Su et al., Polymer Degradation and Stability, vol. 97, n° 11, pages 2128-2135, Nov. 2012 http://www.sciencedirect.com/science/article/pii/S0141391012003424

"Study on the thermal degradation of mixtures of ammonium polyphosphate and a novel caged bicyclic phosphate and their flame retardant effect in polypropylene", Polymer Degradation and Stability, vol. 97, n° 4, pages 632–637, April 2012, http://www.sciencedirect.com/science/article/pii/S0141391012000055 and "Synthesis and Structure of A Novel Caged Bicyclic Phosphate Flame Retardant", X. Li et al., Chinese Chemical Letters, vol. 11, n°. 10, pages 887−890, 2000 http://www.imm.ac.cn/journal/ccl/1110/111015-887-20165-p4.pdf

WHO global burns statistics

The World Health Organisation (WHO) has published an estimate that 300 000 deaths per year are caused by fires and 195 000 by burns worldwide, and 11 million people sustained burns requiring medical attention. Burns are one of the main causes of disability adjusted life years (DALYs) lost in low and middle income countries. The WHO document "Burn prevention and care" underlines that in high-income countries, "*implementation of proven interventions, such as smoke detectors, regulators of hot water heater temperatures and flame retardant children's sleepwear, has meant that mortality rates from burns have steadily declined over the past 30–40 years*" but that action is lacking in low and middle income countries. Better safety regulations are needed, suggests the WHO, for housing designs and materials.

WHO Burns page, 5/2012: http://www.who.int/mediacentre/factsheets/fs365/en/index.html
WHO Burn Prevention and Care report:
http://www.who.int/violence_injury_prevention/media/news/13_03_2008/en/index.html

Motorola Citrus shows gets best Ecology Centre rating

A study of 36 cell phones by the Ecology Center (published by www.healthysuff.org and www.ifixit.com) gives the Motorola Citrus the best rating for not containing undesirable chemicals, followed by the iPhone4S, LG Remarq, Samsung Captivate and iPhone5. The iPhone5 obtains a better rating than the Samsung Galaxy III. Overall, the NGOs note that in more recent phone models, manufacturers are improving by "*using bromine and chlorine free printed circuit boards and laminates*" (electronic parts) and by "*moving to less toxic reactive phosphorus-based flame retardant chemistries*". The NGOs consider that the ratings of the chemicals used in mobile phones has improved 33% since 2007, with leading manufacturers having "*started the shift to safer materials and chemistries*", in particular Apple, Sony and Samsung.

Press release: http://www.healthystuff.org/release.100312.phones.php and full report:
http://www.healthystuff.org/pressimages/ChemicalsinMobilePhones.pdf

Canada consultation on HBCD

The Canada government has opened (**until 2nd December 2012**) a public consultation concerning a proposal to prohibit the manufacture, import, sale or export of products containing Hexabromocyclododecane (HBCD). This follows publication of 'state of the science' assessment reports and proposed bans on two brominated flame retardants HBCD and Deca-BDE (see pinfa News n°5). The consultation states that "*alternatives are known to exist"* for all uses of HBCD other than in expanded polystyrenes (EPS, XPS). The Canada government's proposal is to allow a transition time during which the sale could continue of existing vehicle models which currently use HBCD containing materials, and to allow development of alternatives for EPS/XPS, with entry into force of regulations proposed for December 2016. It is also suggested that it should not be required to remove and eliminate EPS/XPS materials containing HBCD (eg. from buildings), providing that these pose a negligible risk to the environment.

Canada Government consultation on proposed HBCD ban:
http://www.ec.gc.ca/ese-ees/default.asp?lang=En&n=6668F8BC-1

New PIN flame retardants for cotton

Two novel phosphorus – nitrogen PIN flame retardants have been synthesised and tested by researchers on cotton. The DAEP compounds (di acryloloxyethyl phosphorus compounds) were chemically bound to cotton using an inorganic (potassium sulphur) thermal initiator: the two vinyl groups in the molecules enabling a double bonding to the cotton fabric. The compounds significantly reduced flammability of the cotton fabric, compared to an untreated control, with less vigorous burning, lower flame, lower combustion heat and no after-glow. When applied by the padding method, both compounds rendered the 102 g/m^2 cotton fabric self-extinguishing. The compound with higher nitrogen content showed a better fire safety performance, because of phosphorus – nitrogen synergy in fire resistance.

"Conferring Flame Retardancy on Cotton Using Novel Halogen-free Flame Retardant Bifunctional Monomers", H. Cheema, A. El-Shafei, P. Hauser, Carbohydrate Polymers (2010)
http://www.sciencedirect.com/science/article/pii/S014486171200999X

US market for flame retardants expected to grow

A new market research report estimates annual flame retardant sales growth of around 5% through until 2016. Fire safety in construction and motor vehicles will be driving forces, as well as stringent fire codes and flammability requirements. Construction markets are expected to see the biggest growth, with flame retardants contributing to fire safety in insulation materials, roofing, flooring, building boards and structural materials. Growth is also expected in construction-related industries such as carpeting, furnishing, curtains and electrical and communications cables. The increasing use of plastics in motor vehicles will result in additional needs for fire safety products. Health, safety and environmental issues will result in opportunities for PIN flame retardants.

Freedonia industry study, US flame retardant market, September 2012:
http://www.freedoniagroup.com/DocumentDetails.aspx?DocumentId=592476

PIN flame retardants are a growing segment

PIN flame retardants today already make up around 40% by value of world sales for fire safety chemicals of 4.3 billion USD. In terms of quantity, the PIN share is more than half. Industry trends are moving towards PIN solutions, according to a presentation by A. Beard (Clariant) at EGG 2012 (Electronics Goes Green). The key drivers of the market shift are regulatory activities with relevance for flame retardants like RoHS (restriction of hazardous substances in electronics) and REACH as well as voluntary tools like ecolabels. There are several voluntary commitments and policies in place from OEMs (manufacturers of consumer goods and other equipment), in response to public and NGO opinion. In addition, projects related to the environmental assessment of alternative flame retardants have supported the move, like the design for environment projects of the US EPA on flame retardants for printed wiring boards and alternatives to decaBDE as well as the European research project ENFIRO which studied the environmental and toxicity profile of flame retardants in a prototypical case study (see article above).

"Non-halogenated phosphorus, inorganic and nitrogen flame retardants for electronics: update on market situation, drivers and trends", Electronics Goes Green Conference, 12 September 2012, Adrian Beard, Michael Klimes, Ulrich Wietschorke. Available on pinfa website www.pinfa.eu

Other news

Articles containing the chlorinated flame retardant TDCPP (Tris(1,2-dichloro-2-propyl) phosphate), often referred to as "Tris") will have to carry warnings if sold in California after 28th October 2012. This is the one year deadline following California OEHHA (Office of Environmental Health Hazard Assessment) listing of TDCPP under "Proposition 65" regulation in 2011 (see pinfa News n°11).

GRACO, which holds around 1/3 of the US market for baby equipment, has announced the phase out of four halogenated flame retardants. This follows similar decisions taken by Orbit and Britax earlier this year (see pinfa News n°19).

California OEHHA TDCPP Proposition 65: http://oehha.ca.gov/prop65/law/060112tdcppnotice.html
American Chemical Council statement: http://flameretardants.americanchemistry.com/FAQs/FAQs-About-Proposition-65-TDCPP.pdf
GRACO baby products announcement: http://www.ecocenter.org/newsletters/ecolink/today-we-have-reason-celebrate-graco-cuts-flame-retardants-childrens-products

Abbreviations

See pinfa website: http://www.pinfa.eu/library/glossary-of-abbreviations.html

Agenda

Events with active pinfa participation are marked: ►

********** 2012 **********		
27-28 Nov 2012	Atlanta, Georgia, USA	Minerals in Compounding (AMI) http://www.amiplastics-na.com/Events/Event.aspx?code=C475
27-29 Nov 2012	Cologne, Germany	Fire Resistance in Plastics 2012 http://www2.amiplastics.com/Events/Event.aspx?code=473
5-6 Dec 2012	Cologne, Germany	VdS Brandshutz Tage (German fire protection expert days) www.vds-brandschutztage.de
********** 2013 **********		
28-30 Jan 2013	San Francisco, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
19-21 Feb 2013	San Diego, California	IPC APEX Electronics Industry exhibition and conference http://www.ipcapexexpo.org/
16 Apr 2013	Indianapolis, USA	'Modern Vehicles: Techniques and Technology' workshop in FDIC (Fire Department Instructors Conference) http://www.fdic.com/attend/conference/workshops.html
7-8 May 2013	Miami, Florida	Bioplastics Compounding and Processing 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C513
14-15 May 2013	Miami, Florida	Polymers in Cables 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C512
18-19 May 2013	Guangzhou, China	4th International SKZ Conference on Flame Retardants: Chinese and International Markets Requirements, Challenges and Innovations. Abstract submissions: jtroitzsch@troitzsch.com
10-13 Jun 2013	Chicago, Illinois	US National Fire Protection Association NFPA conference www.nfpa.org
13-14 Jun 2013	Denver, Colorado	Fire Retardants in Plastics (AMI) http://www.amiplastics-na.com/events/Event.aspx?code=C516
24-26 Jun 2013	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u
25-28 Jun 2013	Lund, Sweden	6th European Combustion Meeting http://www.ecm2013.lth.se/
30 Jun – 4 July 2013	Lille, France	14th FRPM (Flame Retardancy and Protection of Materials) http://www.frpm2013.eu
11-12 Sept 2013	Würzburg, Germany	13th SKZ Conference on Trends in Fire Safety and Innovative Flame Retardants in Plastics. Abstract submissions: jtroitzsch@troitzsch.com
9-10 Oct 2013	Basel, Switzerland	6th Eurofire (European fire safety engineering) Conference www.eurofireconference.com

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Newsletter for non-halogen fire safety solutions

December 2012 – N° 25



Innovation

DuPont joins pinfa


DuPont, a world leader in market-driven innovation and science, has become pinfa's 21st member. DuPont has been bringing world-class science and engineering to the global marketplace in the form of innovative products, materials, and services since 1802. The company believes that by collaborating with customers, governments, NGOs, and thought leaders they can help find solutions to such global challenges as providing enough healthy food for people everywhere, decreasing dependence on fossil fuels, and protecting life and the environment. DuPont has been undertaking significant amounts of research to develop a broad range of high temperature polyamides. For example since 2006 DuPont Performance Polymers has introduced flame retardant DuPont™ Zytel® HTN grades, without using halogen, antimony and red phosphorus based flame retardant systems, to fulfil requirements for more sustainable materials without compromising performance and reliability, as confirmed by customer testing.

Additional information about DuPont and its commitment to inclusive innovation: www.dupont.com
Photos: Connectors molded from non-halogenated Zytel® PA66 and Zytel® HTN.

Sao Paolo stadium uses PIN FR bio-sourced seats

Sao Paolo Football Club's Morumbi Stadium, currently under renovation, will include PIN flame-retarded seats using renewable sourced (sugar cane) polyethylene-based polymer. The seats are supplied by Giroflex-Forma, a leading Brazil producer of seats and workspace furniture, using compounds supplied by Cromex, Brazil's leading plastics masterbatch and additive supplier, and Braskem, one of Americas' principal thermoplastic resins manufacturers. The seats comply with international (FIFA) safety standards and Brazilian technical norms (ABNT) and use PIN fire safety solutions (phosphorus, inorganic, nitrogen flame retardants) to achieve UL94 V0 fire safety classification, rather than the German B1 standard usually required internationally. Cromex also offers a PIN flame retardant polypropylene copolymer classified UL94 V0 for stadium seats, currently being used in the Arena Gremio stadium under completion and three further stadiums are already planning to use Cromex PIN FR seats.

Source: http://www.braskem.com.br/site.aspx/Detalhe-releases/Morumbi-Stadium-to-receive-Brazil's-first-sugar-seats

Triazine and polyphosphates work as PIN FR combination

MCA Technologies, Switzerland, has launched a nitrogen-based PIN flame retardant for use in combination with APP (ammonium poly phosphate), to provide flame retardancy for polymers including polypropylene and polyethylene for injection moulding and extrusion, polyurethane foams and casting resins (epoxy, polyester). The combination enables UL94-V0 fire performance to be achieved in polypropylene at 1.6mm, rigid polyurethane skin foam or resins. The long-chain molecule MCA® PPM Triazine offers a high nitrogen content combined with high resistance during processing (avoidance of sublimination, ammonia release, deposits or plate-out). It acts by forming a cross-linked, solid char on materials surface in case of fire, acting as a fire shield, limiting oxygen permeability and reducing dripping of molten polymer, whilst offering low smoke and low toxic fumes. A study published by Enescu et al., 2012, confirms the fire performance and thermal stability of the product when combined with APP in polypropylene, and the achievement of UL94-V0 at 20% addition.

"Novel phosphorous-nitrogen intumescent flame retardant system. Its effects on flame retardancy and thermal properties of polypropylene", E. Enescu et al., Polymer Degradation and Stability, 2012 in press
http://www.sciencedirect.com/science/article/pii/S0141391012003643

MCA Technologies: http://www.mcatechnologies.com/53362898410ca3c05/04965c9d5d122670f

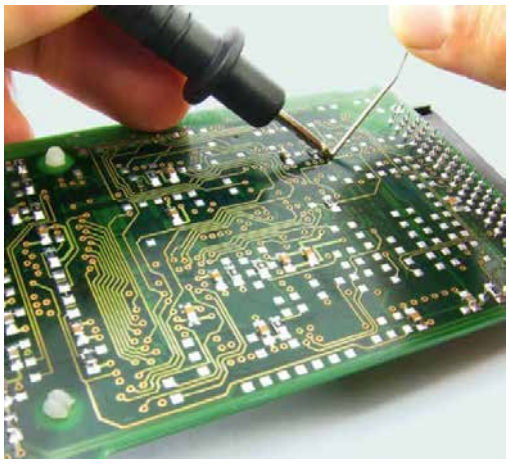
Public image of chemical industry improving

A European survey of 6 000 people, including decision makers and the general public, suggests that the image of the chemical industry is positive, but with room for improvement. The general public in all 10 countries surveyed rated the chemical industry just above 50 (in a scale from 1 to 100). The survey showed that the chemical industry' is recognised for its role in areas such as cleaning products, pharmaceuticals, the creation of new products and processes and energy saving in products. 65% of respondents considered the benefits of chemicals more significant than their risks.

Cefic survey of the chemical industry's reputation across Europe: http://www.chemanager-online.com/en/news-opinions/headlines/public-image

New performance phosphorus flame retardants

Clariant has extended the range of its Exolit® halogen-free PIN flame retardant range, for applications in the electronics and electrical engineering markets. Two new reactive products in the Exolit EP range are specifically adapted for epoxy resins used in electronic circuit boards, offering minimal impact on glass transition temperature and enabling lower flame retardant loadings to be used. The new flame retardants are currently available in sample quantities from the development labs in Germany, where Clariant also produces Exolit AP for polyolefins for use in electronics applications and for the protection of structural elements in buildings and Exolit OP flame retardants, in particular based on DEPAL (diethyl phosphinic acid aluminum salt), for electronics and electrical engineering polyamides and polyesters in switches, plugs, fans, casings. These different phosphorus based Exolit flame retardants are compatible with the EU RoHS (Restriction of Hazardous Substances) legislation, and with Blue Angel, TCO and EU Flower Ecolabels.



Clariant Additives news 09/10/2012 http://www.additives.clariant.com

Fire risks of green buildings

Green building is developing rapidly in response to demand for healthy, low carbon, low environmental impact construction. Nearly 50 000 buildings worldwide have been LEED (Leadership in Energy and Evnironmental Design) certified or have registration pending. Fire safety organisations are however expressing concern that new materials and installations are being implemented without adequate understanding or regulation of fire safety. Building components such as bamboo or other natural fibre materials, spray-applied foam insulation can potentially pose significant fire risks, as can plastics used in solar panels and renewable energy installations. PIN flame retardants can offer effective answers to these, by enabling fire protection treatment of materials that is compatible with LEED labelling, by using compounds based on phosphorus, nitrogen or minerals. Lightweight materials, which reduce materials consumption in building, can also pose risks if not adequately fire safety treated: a floor system using lightweight wooden I-beams failed after around 6 minutes, compared to 18 minutes with standard timbers.

See pinfa Newsletter n°9 2011 "US Green Buildings Council materials criteria" and n°7 2011 "US Green Buildings Council looks at flame retardants"

US National Fire Protection Association Journal NFPA Nov/Dec 2012 "Fire safety + green buildings" http://www.nfpa.org/publicJournalDetail.asp?categoryID=2724&itemID=59217

US National Fire Protection Association Journal NFPA July/Aug 2009 "It's not lightweight construction. It's what happens when lightweight construction meets fire." http://www.nfpa.org/publicJournalDetail.asp?categoryID=1857&itemID=43878

Magnesium hydroxide applications research

The mineral PIN flame retardant magnesium hydroxide (MDH) offers a recognised contribution to environmentally safe fire safety, both by releasing water vapour in fire situations which inhibits burning and by contributing to protective char formation. Magnesium hydroxide can by produced synthetically, or by mechanically processing naturally occurring minerals such as brucite. Research is developing new applications, crystal forms offering specific performance advantages, and synergies with other PIN flame retardants. Al-Mosawi looked at magnesium hydroxide for fire safing aircraft tires, showing improved thermal erosion resistance. "Whisker" crystal forms of magnesium hydroxide (MDH), or MDH combinations with other minerals (eg. sulfates), in crystals of diameter < 1µm and length 5 – 10 000 x the diameter, enable both flame retardant performance and improved mechanical properties in polymers, for example by contributing to tensile strength, as has been shown in thermoplastic elastomers (high and low density polyethylene, ethylene propylene diene) and ABS. Magnesium hydroxide is also being developed with polyolefins for low smoke, self-extinguishing cable materials.

"Increasing flammability resistance for aircrafts tires by using magnesium hydroxide", A. Al-Mosawi et al., Academic Res. Int., vol. 3, n°2, Sept. 2012 http://www.savap.org.pk/journals/ARInt./Vol.3(2)/2012(3.2-01).pdf

"Study on flame-Rretardant LLDPE/EPDM thermoplastic elastomers with magnesium hydroxide sulfate hydrate whiskers", H. Lu et al., Polymer-Plastics Technology and Engineering, 51, pages 578–582, 2012 http://www.tandfonline.com/doi/abs/10.1080/03602559.2012.659306

"Research on flame retardance and application of magnesium hydroxide sulfate whiskers to HDPE", J. Xue et al., Advanced Materials Research, vols. 239-242, pages 743-747, 2011 www.scientific.net

"Study on the flame retardant property of magnesium hydroxide whiskers / PE composites", Y. Jiang et al., Advanced Materials Research, vol. 454, pages 93-96, 2012 www.scientific.net

"Study on the performances and interfacial structure of magnesium hydroxide whiskers/ ABS composites", Y. Jiang et al., Advanced Materials Research vol. 109, pages 46-50, 2012 www.scientific.net

"Low-smoke self-extinguishing cable and flame-retardant composition comprising natural magnesium hydroxide", European patent EP1940932B1 (WO2007/049090) 2012 https://data.epo.org/publication-server/rest/v1.0/publication-dates/20120208/patents/EP1940932NWB1/document.pdf

Move towards use of PIN FRs in US furniture

A study analysing the different flame retardants in polyurethane foams from cushioning of 102 couches purchased in the USA from 1985 to 2010 indicates a trend towards use of PIN flame retardants (non-halogenated, mainly phosphorus based) since the phase-out of the brominated flame retardant PBDE (PentaBDE) in 2005. Halogenated flame retardants were also detected (TDCPP widely used, but also TBB, TBPH, TCEP, V6). The study suggests that the use of PIN flame retardant solutions is increasing, with 16% of all post-2005 couch samples (including TPP, TBPP). In the post-2005 samples, there was no significant difference in the amount of flame retardant used in couches sold in California (which has furniture fire safety legislation TB-117) and outside California, suggesting that the California furniture fire safety requirements have become recognised as a US-wide standard.

"Novel and High Volume Use Flame Retardants in US Couches Reflective of the 2005 PentaBDE Phase Out", H. Stapleton, Environmental Science & Technology (ACS Publications), 2012 in print http://pubs.acs.org/doi/abs/10.1021/es303471d

PIN FR for bio-sourced polycarbonate

Polycarbonates offer performance advantages in electronics applications, including impact resistance, strength, heat resistance and electrical insulation. Polycarbonates can be renewably produced from bio-sourced aliphatic diols, and these polycarbonates offer better tensile strength and scratch resistance than synthetic ones. Two 2012 US patent applications show that V0 fire performance rating can be achieved in such bio-sourced polycarbonates using phosphorus based PIN flame retardants, including in combination with styrenic epoxy, anti-drip agent (TSAN) or talc filler.

"Flame retardant bio-based polymer blends", US patent application US2012/0296020A1, Nov. 2012 www.freepatentsonline.com/y2012/0296020.htm and "High-heat and flame retardant bio-sourced polycarbonate", US patent application US2012/0296019A1, Nov. 2012 http://www.freepatentsonline.com/y2012/0296019.html

Fire tests confirm critically short escape time

An assessment has been published of over 400 fire tests carried out by the MFPA Leipzig testing organisation from 1996 to 2012, including 44 full-scale furnished room fire tests. These tests confirm that in a modern furnished room, the time between the start of a fire and untenable conditions (temperatures reaching 600 – 100°C ranges from about 1 ½ to 10 minutes. This confirms results published by the US research institute NIST in 2007, showing that escape times have been reduced by a factor of around 5x since 1975, from 17 to around 3 minutes, because of increasing fire loads of consumer goods, flammable materials, plastics and synthetic materials in our homes. PIN flame retardants can prevent fires starting and slow their spread and development, so improving the chances of occupants' escape and reducing risk for fire fighters, particularly when smoke alarms and sprinklers are also implemented.

Access to the revised NIST study, including explanations of modifications, etc. Bukowski, R.W. et al.., revised 2008, "Performance of Home Smoke Alarms, Analysis of the Response of Several Available Technologies in Residential Fire Settings" NIST Technical Note 1455 (396 pages) http://smokealarm.nist.gov/

"Der Brand in Räumen Auswertung von Originalbrandversuchen im Vergleich mit analytischen Rechenverfahren- Teil1", in German (Room fires: conclusions from real situation testing compared with analytical modelling), article in "vfdb-Zeitschrift für Forschung, Technik und Management im Brandschutz", 6-2, 2012 http://www.baufachinformation.de/zeitschrift/Der-Brand-in-Räumen-und-seine-Wirkungen/2012069003173

PIN FR insulation foams key to China's energy objectives

China's Ministry for Housing and Urban Construction has fixed ambitious energy saving objectives of 65 – 75% for different regions of China by 2020. Polyurethane insulation foam is considered a key material for achieving this, but this requires appropriate fire performance standards to avoid risk of fire spread. According to the company, PIN flame retardants offering low smoke and low toxicity are essential to achieve this, whilst ensuring high processing performance and mechanical properties, as well as the excellent insulation properties of polyurethane foams. Inorganic material – polyurethane composites can further improve performance and safety.

Dongguan Topology Industrial Co. China 6/5/2011: http://www.top-china.com.cn/en/news.asp?id=57

LSN China 17/10/2012: http://www.zhuangan.com/Index/newsview/id/365.shtml?l=en

Experts confirm effectiveness of California fire regulation

California is currently reassessing its TB-117 fire safety regulation for upholstered furniture. A number of experts and independent researchers have taken position supporting the fire safety requirements and answering questions about the effectiveness or safety of flame retardants (FRs) raised in some media articles (see *pinfa* Newsletter n°12, Chicago Tribune articles). NIST (US National Institute of Standards and Technology) Senior Research Scientist Richard Gann indicates that his institute's tests show that heat release from FR treated materials is 25% that from non-treated material and that the quantity and toxicity of fire gases were much lower for treated products. FRs "did decrease the overall fire hazard of their host products … escape time for building occupants can rise significantly with the use of FRs". Other experts emphasise that product fire safety regulation drives innovation, that "thousands of scientists decades of work reported in thousands of peer-reviewed papers" demonstrate that flame retardants are effective, and that some opponents to FR use are simply ignoring the evidence of lives being saved.

"Fighting fires – flame-retardant chemicals ignite a debate over safety, efficacy, and fire-safety standards", Chemical & Engineering News, 29th October 2012 http://cen.acs.org/articles/90/i44/Fighting-Fires.html

New PIN FRs for miniature and integrated electronics

DSM has added two PIN new halogen-free flame retardant resins to the Stanyl® range of high performance, high temperature polyamides for automotive and electronics applications. Stanyl® SC50 and MC50 offer mechanical resistance, processability and avoids corrosion of injection molding equipment, with respectively UL94 V-0 or V-2 flammability ratings. They are particularly suitable for use in electronics miniaturisation and integration, as well as connectors, sockets and other electronics components. Halogen-free DSM products already available include Stanly ForTii™, offering high temperature, high stiffness and low moisture adsorption (IPC/JDEC J-STD 2020D – level 2), Stanyl CR offering excellent flow and UL94 V-0 flammability rating, and Arnitel® XG, a high performance copolyester solution for cable jackets and wiring insulation. DSM consider that these products enable electronics manufacturers to move towards the use of PIN flame-retardans whilst maintaining product performance and production processing qualities.

DSM Stanyl® range: http://www.dsm.com/en_US/html/dep/stanyl.htm

"DSM Launches New Halogen-free Flame Retardant Stanyl Products for Electronics Market", 29th October 2012: http://www.dsm.com/en_US/html/dep/news_items/2012-10-29-DSM-Launches-New-Halogen-free-Flame-Retardant-Stanyl-Products-for-Electronoics-Market.htm

Other News

Canada has opened until 22/1/2013 public consultation concerning its POP implementation plan update (Persistent Organic Pollutants). Proposals are to add 11 substances to the POP list, including the halogenated flame retardants PeCB, HBB and PBDEs (Hexa, Hepta, Tetra, Penta).

UN experts have recommended putting HBCD on the Stockholm Convention international POP ban list, but with a period of exemption for use in expanded and extruded polystyrene, to allow time for safer substitutes to be developed. In 2011 already (pinfa News n°14), it was agreed to take action on HBCD, the recommendation is that this action should be Annex A listing, which would ban the substance globally.

Canada has opened until 9/1/2013 public consultation on TBBPA, a brominated flame retardant still used in printed circuit boards and other epoxy resin applications. The proposed draft 'Screening Assessment Report' suggests that TBBPA should be considered "Persistent" but that quantities currently entering the environment do not pose a health or environmental danger and that risk management should address potential industrial releases. This follows proposals in Canada to ban two other brominated FRs HBCD (pinfa News n° 24) and Deca-BDE (pinfa News n°5).

62 different flame retardants were analysed in household dust from 16 California homes in 2006 and in 2011 shows that halogenated FRs continue to be present but are decreasing (PBDEs, HBCD, TBB in 100% of samples in 2006 and 2011), TCEP, TCPP, TDCPP and TBBPA are increasing (10-20% of sample in 2006, 100% in 2011) and PIN (phosphorus) FRs show different patterns (TBEP, TCP, EHDPP present in 100% of samples in both 2006 and 2011, TEP, TiBP and TnBP decreasing, TPP not detected).

Canada POP implementation plan update consultation:
http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=E0F02793-1

Canada consultation on TBBPA http://www.ec.gc.ca/toxiques-toxics/Default.asp?lang=En&n=EF7AFCF2-1

"After the PBDE Phase-Out: A Broad Suite of Flame Retardants in Repeat House Dust Samples from California", R. Dodson, Environmental Science & Technology (American Chemical Society), 2012
http://pubs.acs.org/doi/abs/10.1021/es303879n

Abbreviations

See pinfa website: http://www.pinfa.eu/library/glossary-of-abbreviations.html

Agenda

Events with active pinfa participation are marked: ►

********** 2013 **********		
28-30 Jan	San Francisco, USA	Fire and Materials 2013 http://www.intersciencecomms.co.uk
19-21 Feb	San Diego, California	IPC APEX Electronics Industry exhibition and conference http://www.ipcapexexpo.org/
5-7 March	Cologne, Germany	Cables 2013 (AMI Conference) http://www.amiplastics.com/events/Event.aspx?code=C495&sec=2821
16 Apr	Indianapolis, USA	'Modern Vehicles: Techniques and Technology' workshop in FDIC (Fire Department Instructors Conference) http://www.fdic.com/attend/conference/workshops.html
7-8 May	Miami, Florida	Bioplastics Compounding and Processing 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C513
14-15 May	Miami, Florida	Polymers in Cables 2013 http://www.amiplastics-na.com/events/Event.aspx?code=C512
18-19 May	Guangzhou, China	4th International SKZ Conference on Flame Retardants: Chinese and International Markets Requirements, Challenges and Innovations. Abstract submissions: jtroitzsch@troitzsch.com
10-13 Jun	Chicago, Illinois	US National Fire Protection Association NFPA conference www.nfpa.org
13-14 Jun	Denver, Colorado	► Fire Retardants in Plastics (AMI) http://www.amiplastics-na.com/events/Event.aspx?code=C516
24-26 Jun	Windsor, UK	Interflam 2013 www.intersciencecomms.co.u
25-28 Jun	Lund, Sweden	6th European Combustion Meeting http://www.ecm2013.lth.se/
30 Jun – 4 July	Lille, France	► 14th FRPM (Flame Retardancy and Protection of Materials) http://www.frpm2013.eu
11-12 Sept	Würzburg, Germany	13th SKZ Conference on Trends in Fire Safety and Innovative Flame Retardants in Plastics. Abstract submissions: jtroitzsch@troitzsch.com
9-10 Oct	Basel, Switzerland	6th Eurofire (European fire safety engineering) Conference www.eurofireconference.com