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

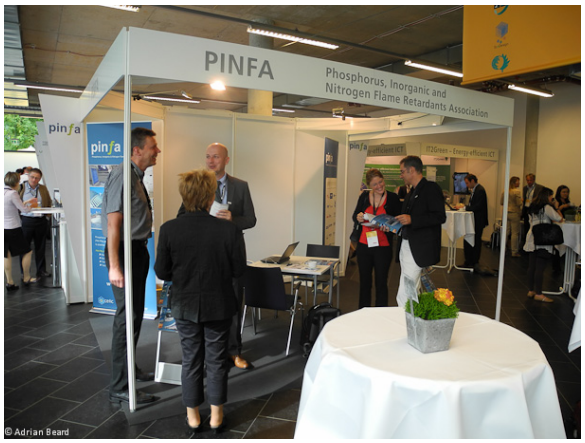
The iNEMI (see *pinfa* Newsletter n° 16) Workshop, Berlin, 9th September 2012 (held before Electronics Goes Green conference, see below) presented current electronics industry initiatives to move to environmentally sustainable products. Key leadership initiatives in this direction include “Halogen Flame 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