pinfa
Phosphorus, Inorganic & Nitrogen Flame Retardants Association

Your newsletter for non-halogen fire safety solutions
No. 103 July 2019

PINFA ASIA

pinfa Electromobility & Fire Safety workshop Tokyo

At its 2nd Electromobility and fire safety challenges workshop, Tokyo, 1st July 2019, pinfa brought together more than 60 stakeholders of the electromobility value chain: automotive companies, OEMs, plastic compounders and manufacturers of flame retardants. Held as a satellite workshop of the Electro Mobility and Circular Economy (EMCE) Conference, this workshop addressed the specificity of the Japanese market, extending the discussions kicked off last November in Shanghai (pinfa Newsletter n°96) and addressed the trends and challenges of the thriving electromobility market: Battery EV, Plug-in EV and Hybrid EV. Heavier batteries (up to 400kg) push further structural weight reduction in cars and metal parts are replaced by multi-material compounds (eg. polymeric resins, fiberglass, carbon fiber), with epoxy and polyurethane being among the most used polymers. Battery casings face increasing pressure to be lighter and more effective, while the size of the cells is plummeting, resulting in a higher flammability risk. Flame retardant formulations, either in the plastic or as intumescent coatings, are instrumental in keeping xEV safe. UN regulation R100-03 already prescribes flame retardancy from external source of ignition for battery packs and it is expected that international standardisation will address internal sources of ignitions in the near future. Speakers from automotive manufacturers Honda and Nissan shared presentations on the projected automotive trends towards the 2020s. Tomorrow's vehicles are expected to be CASE: Connected, Autonomous, Shared and Electric: MaaS (Mobility as a Service) is a paradigm change. With an expected life cycle of at least 15 years, flame retarded xEV parts must endure weathering with challenges of material stability. Recycling these parts is a developing industry. Non-halogen substances developed by the pinfa members are praised for their better environmental profile throughout the life cycle of the vehicle.

Supported by pinfa member companies Adeka, Clariant and Dupont, this workshop has received unanimously positive feedback from the participants. Presentations are available at https://www.pinfa.eu/mediaroom/pinfa-electromobility-fire-safety-challenges-workshop-japanese-edition/

Pinfa will be organizing a 3rd workshop in Darmstadt, Germany on November 12th, contact jcr@cefic.be

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pinfa China official WeChat account

On June 18th 2019, pinfa China launched its official WeChat account to provide information to the public and to industry about PIN flame retardants, and to communicate with members. The account includes menus providing information about PIN fire safety, exhibitions and events, news on government regulations, Chinese web links, pinfa China organisation profile, workshops organised by pinfa China and an online application form for new members to join pinfa China. To follow pinfa China's WeChat account, click the QR code.

Contact for pinfa China: Jingwen.Chen@clariant.com

REGULATORY


Official Journal of the European Union

RECOMMENDATIONS

COMMISSION RECOMMENDATION (EU) 2019/786
of 8 May 2019
on building renovation
(notified under document C(2019) 3352)
(Text with EEA relevance)

EU building recommendations point to fire safety

The European Commission has published in the Official Journal a "Recommendation … on building renovation" pointing to the importance of fire safety. The Recommendation addresses implementation of the Energy Performance of Buildings Directive (EPBD, 2018/844 amending 2010/31/EU), see pinfa Newsletter n°93). This Directive requires EU Member States to adopt a Long-Term Renovation Strategy for the national stock of public and private, residential and non-residential buildings and states in art. 2(a)7 "Each Member State may use its long-term renovation strategy to address fire safety …" and in art.7 that "Member States shall encourage, in relation to buildings undergoing major renovation, … fire safety …". The Recommendation specifically cites ventilation and sprinkler systems, smoke detectors and fire prevention policies (such as fire safety inspections, awareness raising). It also points to the EU Fire Information Exchange Platform (FIEP, see pinfa Newsletter n°99).

Update of EU Energy Performance of Buildings Directive, 2018/844, 30th May 2018 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0844

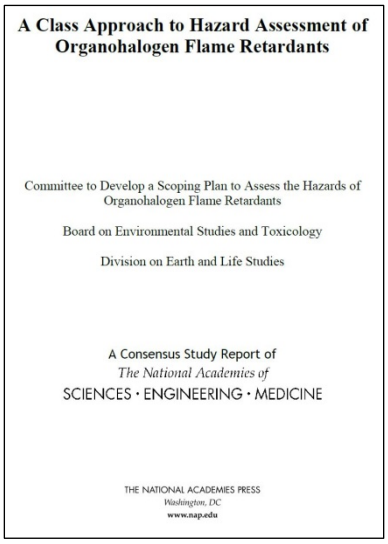
European Commission Recommendation 2019/786 of 8 May 2019 on building recommendation C(2019)3352 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0786

MINNESOTA

Minnesota bans halogenated FRs in certain products

The Governor of the US State of Minnesota has signed into law a bill banning the sale or distribution of children's products, upholstered furniture, mattresses or residential textiles (such as window coverings) containing non-polymeric, non-reactive organohalogen flame retardants. Organohalogen FRs are defined as flame retardant chemicals containing one or more carbon and one or more halogen atoms (fluorine, chlorine, bromine, iodine). The ban applies to products containing organohalogen FRs at > 1 000 ppm. The enacted bill also makes it illegal for a manufacturer to replace a banned organohalogen FR by any chemical which is "identified on the basis of credible scientific evidence" by a public agency or regulator as "being known or suspected with a high degree of probability" to be carcinogenic, or have reproductive, endocrine or other systemic toxicity. Minnesota State had already banned four halogenated FRs (TDCPP, TCEP, decaBDE and HBCDD) in 2015, see pinfa Newsletter n° 54.

Minnesota Bill, chapter 47, H.F. no. 359 "An act relating to health; prohibiting the use of certain flame-retardant chemicals in certain products …." https://legiscan.com/MN/text/HF359/2019


A Class Approach to Hazard Assessment of Organohalogen Flame Retardants

Committee to Develop a Scoping Plan to Assess the Hazards of Organohalogen Flame Retardants

Board on Environmental Studies and Toxicology

Division on Earth and Life Studies

A Consensus Study Report of
The National Academies of
SCIENCES · ENGINEERING · MEDICINE

THE NATIONAL ACADEMIES PRESS
Washington, DC
www.nap.edu

Hazard assessment of organohalogen flame retardants

A US National Academy of Sciences report proposes that non-polymer, additive, organohalogen FRs, used in consumer products, cannot be treated as a single class for hazard assessment, but can be considered as 14 sub-classes. This responds to a US CPSC (Consumer Product Safety Commission) question, following acceptance by CPSC of a 2015 petition from certain stakeholders for consideration of a ban of all organohalogen FRs in some categories of consumer products (children's products, upholstered furniture, mattresses, electronics casings). The 14 classes are proposed, after consideration of some 161 different organohalogen FR chemicals, on the basis of a combination of structural, physico-chemical and biological properties. Stated objectives are more efficient assessments and avoiding regrettable substitutions of substances.

The 14 classes proposed by NAS are: Polyhalogenated alicycles, Polyhalogenated aliphatic carboxylate, Polyhalogenated aliphatic chains, Polyhalogenated benzene alicycles, Polyhalogenated benzene aliphatics and functionalized, Polyhalogenated benzenes, Polyhalogenated bisphenol aliphatics and functionalized, Polyhalogenated carbocycles, Polyhalogenated diphenyl ethers, Polyhalogenated organophosphates (OPs), Polyhalogenated phenol derivatives, Polyhalogenated phenol–aliphatic ether, Polyhalogenated phthalates/benzoates/imides, Polyhalogenated triazines

"Organohalogen Flame Retardants Used in Consumer Products Cannot Be Assessed for Hazards as a Single Class, But Can Be Assessed in Subclasses, Says New Report", US National Academy of Sciences, Engineering and Medicine, 15th May 2019 http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=25412 and report "A Class Approach to Hazard Assessment of Organohalogen Flame Retardants" https://doi.org/10.17226/25412

FIRE SAFETY

Barking De Pass fire: timber specifications inadequate

The UK wood materials industry organisation has taken position for more demanding fire safety specifications. The Timber Trade Federation and Wood Protection Association (TTF WPA) has taken position following the fire which impacted around 30 flats in Samuel Garside House, De Pass Gardens, Barking Riverside, East London (designed by Sheppard-Robson with MaccreanorLavington and KCAP, built by Mace and Bellway Homes in 2012) on 9th June. The wood used is said to have been "Thermowood" by Metsä Wood. Residents say that the building's external wooden balconies, balcony dividers and balustrading burst into flames in minutes and are now campaigning for removal of wooden cladding on all of the 1 400 flats of Barking Riverside Phase 1. TTF WPA states that the timber was Euroclass D, s2, d0, as legally required in the UK for buildings of <18m height, whereas flame retardant treatment would have achieved Euroclass B rating and so very different fire behaviour.*

TTF WPA statement, 12th June 2019 https://ttf.co.uk/industry-states-that-lack-of-flame-retardant-treatment-for-timber-was-inappropriate/

Surat coaching centre fire, India

22 young people died in a fire in an academic coaching centre in Surat, Gujarat State, India, 24th May 2019. The fire is said to have started with an electrical short-circuit and to have then destroyed the only escape route, a wooden staircase. The coaching centre was in a "makeshift dome" on a third floor terrace. The fire has led the NGO United Human Rights Federation (UHRF) to call on politicians for stronger national fire safety legislation in India. At the same time, India is increasingly moving to tighten fire safety. For example, the State of Thiruvananthapuram has issued over 10 000 notices in early 2019 to buildings failing to respect fire safety requirements. 650 second notices have already been served, which is the next step towards legal enforcement proceedings.

https://www.abc.net.au/news/2019-05-25/india-fire-kills-19-students/11149704

http://www.newindianexpress.com/states/kerala/2019/may/22/fire-safety-over-10000-buildings-served-with-notices-in-two-months-1980153.html

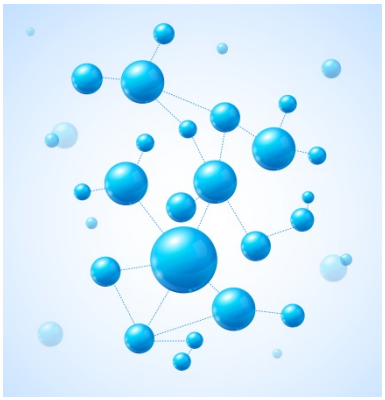
RESEARCH

Summary of 3rd UL furniture flammability summit

UL (Underwriters Laboratories) has published the proceedings of the third Furniture Flammability and Human Health Summit, organised with Emory University, Atlanta, 13-14 December 2017. This summarises inputs from nearly thirty speakers from research, industry, firefighters and regulators, covering fire statistics, furniture fire testing, smoke toxicity, chemical safety and different approaches for furniture fire safety. Marty Ahrens indicated that the US NFPA's most recent data shows that although only 2% of reported US fires started in upholstered furniture, these fires caused 18% of civilian fatalities, and one in twelve such fires resulted in a death. Discussion suggested that application of fire test standards is one of the factors contributing to the reduction in fire deaths related to upholstered furniture, and many participants agreed the "urgent need" to have a national furniture fire test standard in the USA, with a "strong recommendation" to develop a test for both open flame smouldering ignition. Smoke toxicity was significantly discussed, underlining fire fighters' concerns about smoke toxicity and cancer risk, noting the need for more information about emissions of smoke, soot, carbon monoxide, hydrogen cyanide, polycyclic aromatic hydrocarbons and other chemicals. C. Carignan, Michigan State University, presented data suggesting that exposure to certain organophosphorus FRs (1) is statistically correlated to lower human male and female fertility. The overall conclusion was support for further research and testing for furniture fire safety, fire prevention, chemicals safety and smoke toxicity, to develop new solutions for healthier fire safety protection.

(1) TDCIPP = tris(1,3-dichloroisopropyl)phosphate, mono-ITP = monosubstituted isopropylated triaryl phosphate, TPHP = triphenyl phosphate

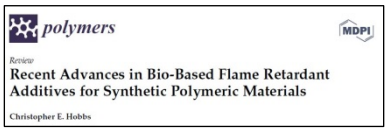
"Proceedings of the Furniture Flammability and Human Health Summit", 13-14 December 2017, Atlanta, Georgia. https://ulchemicalsafety.org//wp-content/uploads/2019/02/2017-FF-Summit-Proceedings.pdf



Natural sourced mineral nanoparticles as FRs

Magnesium hydroxide nanoparticles were produced by adding sodium hydroxide to filtered seawater to precipitate magnesium dihydroxide, calcing to magnesium hydroxide, then grinding. Calcium hydroxide nanoparticles were produced by calcining cleaned egg shells (food industry by-product). Both minerals were then tested as flame retardants in EVA (ethylene vinyl acetate) at loadings of 60%, with varying proportions of magnesium and calcium hydroxide. Results showed a reduction in peak heat release rate of over 80% for all of the mineral combinations, with a slightly greater reduction when a mixture of both minerals was used rather than 60% of one or the other. The mixture of two minerals also generated a more coherent char residue.

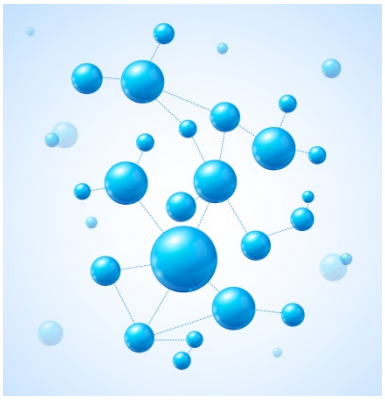
"Development of metal hydroxide nanoparticles from eggshell waste and seawater and their application as flame retardants for ethylene-vinyl acetate copolymer (EVA)", M. Oualha et al., International Journal of Biological Macromolecules 128 (2019) 994–1001
https://doi.org/10.1016/j.ijbiomac.2019.02.065



Review of bio-based flame retardants

A thirty-one page review paper, based on nearly eighty publications, summarises developments and perspectives for bio-based PIN flame retardants for synthetic polymeric materials. Renewable PIN FRs discussed are based on: tannic acid, phytic acid (a plant molecule containing 60% phosphorus by weight), isosorbide, diphenolic acid, DNA, lignin and β-cyclodextrin. Main applications illustrated are in epoxy, EVA, PPE and PLA (polylactic acid). An important challenge identified is incompatibility between low-molecular weight, hydrophilic bio-based molecules and hydrophobic polymers and research is addressing this by rendering bio-based PIN FRs "reactive" (covalent bonding to the polymer) but this can impact material properties. Another challenge is bottlenecks in supply of relevant bio-based molecules.

"Recent Advances in Bio-Based Flame Retardant Additives for Synthetic Polymeric Materials", C. Hobbs, Polymers 2019, 11, 224 https://doi.org/doi:10.3390/polym11020224

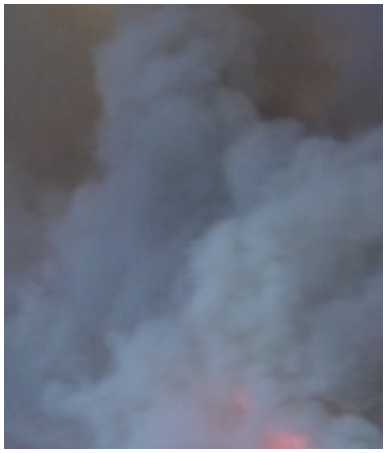


Modified rectorite improves PIN intumescent coating

The natural mineral clay rectorite (which contains aluminium, calcium, silicon and sodium) was modified by reaction with sodium pyrophosphate then tested at 10% in a waterborne PIN intumescent fire retardant coating, consisting of ammonium polyphosphate, melamine, titanium oxide and pentaerythritol. A 2 mm coating was applied to 5 mm steel plates by brush. The coatings were tested with a non-standard test method, using alcohol burning on the steel plates' surface as the heat source for 60 minutes. With no intumescent coating, the back of the steel plates reached 200°C in 30 minutes, whereas the temperature with the intumescent coatings was around 20% lower. At 60 minutes, the control and the standard intumescent coating plate both reached around 225°C whereas the plate with the coating including modified rectorite only reached around 200°C. The authors conclude that this modified rectorite clearly improved the intumescent coating on steel, enabling generation of a more uniform and compact intumescent foam structure, giving a ceramic-like effect protecting the foam and improving adhesion to the steel plate.

"An emerging mineral-based composite flame retardant coating: Preparation and enhanced fireproof performance", W. Xie et al., Surface & Coatings Technology 367 (2019) 118–126
https://doi.org/10.1016/j.surfcoat.2019.03.073

See also the summary of UL fire testing of upholstered furniture in pinfa Newsletter n°102



Gas release from incomplete burning of PIN FR cables

A study analyses gases released during incomplete combustion of three different cable types: one PVC-based sheath (poly vinyl chloride) and two PIN flame retarded (EVA/PE with/without cross linking, with c. 60% ATH flame retardant: ethyl vinyl acetate, polyethylene, aluminium tri hydroxide). Emissions from charring combustion between 600°C and 900°C were analysed using PCFC-FTIR (pyrolysis combustion flow calorimeter – Fourrier transform infrared). The PVC sheath cable results are presented in more detail, showing detection of gases including benzene and derivatives, naphthalene and derivatives, toluene, xylene, 2-ethyl hexanol and phthalic acid and its esters at temperatures 300°C to 600°C. The fraction of cable carbon content converted to partly oxidised gases (e.g. carbon monoxide, methane) is significantly lower at temperatures between 650°C and 800°C for the PIN FR cables (all cables show carbon conversion to nearly 100% CO_2 above 800°C). The authors suggest that this could imply a higher risk of re-ignition for PVC cables in real fire conditions, which are often under-ventilated.

"Study of gases released under incomplete combustion using PCFC-FTIR", A. Decimus, R. Sonnier, et al., J. Thermal Analysis and Calorimetry 2019 https://doi.org/10.1007/s10973-019-08160-5

INDUSTRY

High performance bio-based PIN polyphthalamide

Dupont has launched a new non-halogentated flame retardant, bio-based polyphthalamide (PPA) compound for electrical components, including SMT connectors (surface mounted component). PPA (polyphthalamide) are aromatic polyamides. The compound can replace metals, performance polymers such as such as LCP (Liquid Crystal Polymers) and thermoset polymers in sectors including automotive and electronics, in components such as circuit breakers, connectors and miniaturised electronics. Safety qualities include UL94-V0 fire performance at 0.4 mm, GW (glow wire flammability) standards and high CTI (comparative tracking index). The material offers operational reliability at elevated temperatures and humidity, and processing advantages including high flow, low mold deposit and no equipment corrosion, good weld line strength and high temperature soldering resistance up to 280°C.

"New Zytel HTN Offering for SMT Connectors and Electrical Components", Zytel HTNFR42G30NH, 15 October 2018 http://www.dupont.com/corporate-functions/media-center/press-releases/zytel-htn-smt-connectors-electrical-components.html

PIN FR cables for 100 Norway wind turbines

Reka Cables (Neo Industrial cables group) will supply over 200 km of PIN flame retardant, 36 kV medium voltage cables, for energy transfer for 100 wind turbines to be installed in Norway by Linka AS. The turbines in onshore wind parks of Geitfjellet, Harbaksfjellet and Kvenndalsfjellet will have an installed capacity of 420 GW. The PIN FR cables can be installed directly in the ground and can be used in repeatedly and continuously wet soil.

"Reka Cables to provide cables for 100 turbines in Norwegian wind parks", 25th March 2019 https://otp.tools.investis.com/clients/fi/neo_industrial1/omx/omx-story.aspx?cid=1798&newsid=66408

Low smoke zero halogen fibre optic hybrid cables

RHC, Jackson, Missouri, one of the world's largest manufacturers of audio and video cables and interfacing has launched new low smoke zero halogen flame retardant fibre optic HDMI hybrid cables. The ProCo cables are for home and professional applications, connecting devices such as computers, TVs gaming consoles, projectors, etc. The cable offers adaptable HDMI or micro-HDMI connection via fibre optic, ensuring signal integrity for long distance links without external power supply.

"ProCo Sound to Unveil Fiber Optic Hybrid HDMI Cables at InfoComm 2019", 9 May 2019
https://www.livedesignonline.com/gear/proco-sound-unveil-fiber-optic-hybrid-hdmi-cables-infocomm-2019

pinfa presentation to car producers

Vincente Mans presented non-halogenated fire safety to a JAMA meeting (Japanese Automobile Manufacturers Association) at CLEPA (European Association of Automotive Suppliers) in Brussels, June 4th. He outlined the increasing fire safety challenges for materials used in cars, resulting from increasing use of plastics in both bodywork and mechanical parts and the increased fire risks posed by electrical vehicles (increased electrical power, batteries), at the same time as demanding electrical, mechanical and aesthetic material performance demands. Discussion centred on identifying PIN replacements for halogenated FRs facing restrictions either by regulation or by industry sustainability criteria. The pinfa product selector www.pinfa.eu/product-selector was presented as a source of information and pinfa's role in providing support along the value chain was underlined.

Pinfa presentation available on request pinfa@cefic.be

PIN FR 3D-printing filament

Formfutura has launched a non-halogenated, self-extinguishing PIN flame retardant filament for 3D-printing. The ABSPro filament contains ABS, polycarbonate and PIN flame retardants, enabling to meet UL94-V0. It is available in black only and offers low printing temperatures and mechanical performance (dimensional stability, interlayer adhesion, high gloss).

"High-performance industrial graded filaments", DSM Formfuture ABSpro
https://www.formfutura.com/shop/product/abspro-flame-retardant-black-301

Non-halogenated flame retardant market to grow

Data Bridge Market Research predict the global non-halogenated flame retardant market to grow at over 8.4% per year, to over 8.2 billion US$, driven by regulations imposing environmentally friendly FRs and by fire safety regulation. Challenges identified are levels of loadings needed in materials and implementation in production.

"Halogen-Free Flame Retardant Market worth 5.37 Billion USD by 2022" Data Bridge Market Research, 14 May 2019 https://industryreports24.com/225319/halogen-free-flame-retardant-market-worth-5-37-billion-usd-by-2022/

PUBLISHER INFORMATION:

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