pinfa

Phosphorus, Inorganic & Nitrogen Flame Retardants Association

Your newsletter for non-halogen fire safety solutions No. 86 November 2017

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Following the Grenfell Tower fire tragedy, calls are being made for a coherent update of fire safety regulations and their control and verification, in particular in construction, as well as increased research, testing and information. The UK fire sector is calling for the establishment of a National Fire Safety Agency. The European Commission has launched its "Fire Information Exchange Platform" (FIEP). pinfa attended the first meeting on 16th October 2017. The group identified as priority objectives: fire data, fire prevention, lessons and experience, new fire safety products and fire safety engineering. In this context, the review article by Marcello Hirschler on understanding fire Codes and Standards is highly topical. Lastly, experience in sectors where stringent levels of materials fire safety performance are applied is significant. The official report on the Chicago O'Hare Boeing 767-300 fire shows, yet again, that aviation material fire safety standards prevent catastrophes: an engine and fuel line fire did not spread into the aircraft cabin or through fuselage materials, despite the wide use of combustible polymers and composites in aircraft construction and finishing.

Smoke toxicity forum

"Low smoke, low toxicity" is often used in marketing of flame retarded polymers and cables. Do companies have the evidence to support this claim? What data can compounders and polymer suppliers provide to show that FR packages have lower toxic emissions in fires?

Pinfa, CREPIM and AMI are organising a forum to address these questions, following on from the presentation by CREPIM of a first review of impacts of PIN FRs on smoke toxicity.

At AMI FR in Plastics, Cologne
5th December 17h00

https://www.ami.international/events/event?Code=C847

ECOFRAM 2018

2nd International conference on

Eco-friendly Flame Retardant Additives and Materials

Metz, 28-29th March 2018, France

Call for papers: deadline 15th December 2017

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Aircraft fire report shows effectiveness of fire protection

The official report into the fire on American Airlines Boeing 767-300 in Chicago, 28th October 2016 is now available. Fire started in one of the plane's two engines during takeoff, when the plane was already moving at over 230 km/h. The pilot successfully aborted takeoff by braking. Media coverage suggests that the fire was caused by an engine fan disk flying apart and cutting a fuel line, leading to a major fire in the motor even before the plane had stopped moving. The NSTB report includes photos showing that the fuselage materials, windows and insulation resisted fire and states that "there were no flames inside the airplane or behind the ceiling and sidewall panels". Videos showing the plane engine bursting into flames as it moves down the runway have also been released. Over 160 people were on the flight, all were evacuated despite reports of panic on board, with only one serious injury incurred during the evacuation and no injuries due to the fire. This shows again the crucial importance of fire safety performance of materials used in aircraft, as well as the rapid and efficient intervention of the airport fire services and the effectiveness of the fire fighting foam used to extinguish the jet fuel fire.

NSTB Factual Report 29 June 2017 https://media.local10.com/document_dev/2017/07/07/NTSB%20AA%20Flight%20383%20Report_1499423840181_10063647_ver1.0.pdf and preliminary report https://www.ntsb.gov/investigations/Pages/DCA17FA021.aspx Video http://www.nbcchicago.com/investigations/Control-Tower-CFD-Video-Shows-Plane-Burn-at-OHare-Last-Year-438416823.html

Understanding US codes and standards

A detailed article by Marcello Hirschler in Fire & Materials presents and explains the procedures for development and revision of codes and standards relevant to fire safety in the USA. It is explained how different documents fit together: regulations, which are legally binding frameworks issued by the US Federal or by State governments or by agencies (such as the Consumer Product Safety Commission); codes, which give specific requirements for implementation of regulations in given environments; standards, which define how to test and quantify results; as well as guides and specification documents. Codes thus incorporate standards and specify pass/fail requirements for different standard test methods. The main US codes relevant to fire safety are development by ICC (International Code Council) and NFPA (National Fire Protection Association), and the main standards by ASTM (American Society for Testing and Materials), NFPA and UL (Underwriters Laboratory). All these organisations are private (not for profit) companies, and the code and standard development processes are fully open to interested parties and observers, mostly with restrictions to prevent over-representation by industry or other stakeholders, but in some cases only public officials are able to participate in the final votes. The code and standard processes are specific to each organisation, but all aim to be open, participative and consensus-based. It is therefore important that concerned industry sectors are involved and contribute technical information to relevant fire safety code and standard discussions.

"Procedures for development and revision of codes and standards associated with fire safety in the USA", M. Hirschler, Fire & Materials 1-14, 2017 http://dx.doi.org/10.1002/fam.2449
Regular information about ongoing code and standards development processes relevant to fire safety can be found in the monthly FSTB Fire Safety & Technical Bulletin, GBH International http://www.gbhint.com/fire-safety-and-technology-bulletin/

US Guidance on hazardous, non polymeric halogen FRs

The US Consumer Product Safety Commission has published regulatory guidance, to industry and the public, "to protect consumers (particularly children) from exposure from exposure to additive, non-polymeric organohalogen flame retardants (OFRs)" found in children's products, childcare articles and toys; in domestic upholstered furniture; in mattresses; and in plastic casings for electronics equipment. The Commission recommends to manufacturers to not use OFRs in these products, that retailers and distributors ensure that these products do not contain OFRs and that consumers request assurance from retailers that products they purchase do not contain OFRs. The Commission considers that OFRs pose a significant risk of exposure and can be considered "hazardous" [as under FHSA Federal Hazardous Substances Act 15 USC 126(1)g and (f)(1)(A)]. This published CPSC Guidance is not binding or enforceable. The CPSC has also voted to initiate further studies of the effects of OFRs as a class of chemicals to prepare possible federal rulemaking.

"Guidance Document on Hazardous on Additive, Non-Polymeric Organohalogen Flame Retardants in Certain Consumer Products", CPSC, 28th September 2017 Federal Register vol. 82 no 187 https://www.regulations.gov/document?D=CPSC-2015-0022-0215

ChemSec flags bad targeting of Sweden's E&E ecotax

Environmental NGO ChemSec has criticised the Swedish ecotax on certain flame retardants in electrical equipment. In an article on the NGO's website, its Director, Anne-Sofie Andersson, states "The tax also covers flame retardants based on phosphorus. However, some of the preferred alternatives to halogenated flame retardants are in this group. Even though this category is taxed at a lower rate, it still decreases the incentive to phase out halogenated flame retardants, which is very unfortunate. It would make more sense to handle the phosphorus-based alternatives case by case based on their hazardous properties." The NGO supports the principle of ecotaxation to incite companies to move away from use of problematic chemicals, but suggests to base this on the REACH list of SVHCs (Substances of Very High Concern) rather than creating new and complicated systems.

"Chemical tax can be very effective and more countries should try it", ChemSec News 12th October 2017 http://chemsec.org/chemical-tax-can-be-very-effective-and-more-countries-should-try-it/

'Fire Safe Europe' calls to regulate smoke toxicity

A meeting organised in the European Parliament building by the association Fire Safe Europe' and MEP Pavel Hoc underlined concerns about firefighter cancer risks (see pinfa Newsletter n°70) and called "to regulate smoke toxicity" in buildings, starting with testing and labelling of smoke toxicity for construction productions. Firefighters speaking at the meeting stated that cancer should be recognised as an occupational risk for firefighters, and that protective equipment against smoke must be improved and maintained, which requires resources. They underlined that smoke is the biggest danger to firefighters, because of smoke density which hinders interventions, and because of toxicity, and that action is needed on smoke emissions of building materials, including large scale testing and labelling. The European Commission indicated that a study is underway into possible regulation of smoke toxicity and is expected to be made public soon.

"Firefighters, researchers and European institutions look for solutions to the growing issue of firefighter's cancers", Fire Safe Europe press release following the meeting held in the European Parliament on 28th September https://firesafeeurope.eu/fseu-press-statement-following-mac-event-held-at-the-ep-28-09-2017

EUROPEAN COMMISSION
Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Industrial Transformation and Advanced Value Chains
Director

Brussels, 27. 09. 2017
GROW/C1/GK/elf ARES(2017)

Sent by e-mail

INVITATION

1st Meeting of the Fire Information Exchange Platform

VENUE: 16 October 2017 from 10.00 to 17.00, Brussels, CCAB (room 2.A), Rue Froissart 36, B-1040 Brussels

On behalf of the European Commission I have the pleasure of inviting you to participate to the 1st meeting of the **Fire Information Exchange Platform (FIEP).**

During the last years, technological developments and the need for more energy-performing buildings resulted in a large choice of new construction products offered in the market for buildings and their facades.

These modern ways of construction together with the need to renovate older buildings

EU Fire Information Exchange Platform (FIEP) launched

The European Commission announced in September (see pinfa Newsletter n°84), in a European Parliament debate following the Grenfell Tower fire, the launch of a “Fire Information Exchange Platform”, to bring together national authorities and stakeholders to discuss fire safety practices, new products and technologies and fire engineering principles. The first meeting took place in Brussels on 16th October The first meeting took place in Brussels on 16th October. 25 Member States and nearly 30 other organisations were present, including our sector group manager Philippe Salemis for pinfa. The European Commission presented the study which it has commissioned from BRE into possible regulation of smoke emissions from construction products (study underway, report expected soon). The meeting identified five main work objectives for the new FIEP platform: data collection and analysis, fire prevention, lessons learned from fires, new fire safety products and fire safety engineering, looking both at larger buildings and domestic fires.

“First meeting of European Commission-led Fire Information Exchange Platform (FIEP) lays out ambitious EU work plan for fire safety in buildings”, Fire Safe Europe Press Statement, 18th October 2017 http://mailchi.mp/firesafeeurope/fseu-news-update-fiep-meeting?e=dda78837c8
Meeting agenda etc. https://www.construction-products.eu/news-events/events/events/1st-meeting-of-the-fire-information-exchange-platform-fiep.aspx

Fire Sector Federation

UK fire sector calls for national fire safety agency

Brian Robinson, 35 years with the London Fire Brigade, President of the UK Fire Sector Federation (FSF), has called for the establishment of a national fire safety agency, to address fragmentation in fire safety regulation and provide an approach to fire safety independent of government. Such an agency should address standards, oversee enforcement, identify research needs and provide information. In a keynote speech to the Fire Summit (London 11th October) Mr Robinson said that the Grenfell Tower fire should not have happened if the wakeup call of the Lakanal House fire, 2009, had been heeded. Actions are needed to update building fire safety regulations, in particular to take account of changes in building design and use, to update testing, and to oversee regulation enforcement. The UK Fire Sector Federation brings together fire services, fire protection industries and other stakeholders.

“FSF President calls for new National Fire Safety Agency”, UK Fire Sector Federation, 13th October 2017 http://firesectorfederation.co.uk/news/post.php?s=2017-10-20-fsf-president-calls-for-new-national-fire-safety-agency

Need for research on fire safety – environment links

RISE (Norway) research institute considers that more fire research related to environmental impacts should be engaged. Research questions identified include the environmental impacts of materials used to protect against fire and of fire extinguishing products, and environmentally preferable substitutes; environmental impacts of fires, such as generation of problematic wastes; smoke production and smoke toxicity of new materials, and how fire services can deal with this; fire safety of environmental technologies such as electric vehicles or photovoltaic panels; how to improve fire safety as quantities of flammable materials present in furnishings and structures of buildings increase; improving environment and health profiles of flame retardants and ensuring compatibility with materials recycling.

“Fire safety and environmentally friendly technology”, K. Storesund & N. Reitan, Brandposten #56, 2017 https://www.sp.se/en/units/risesafe/safety/fire/brandposten/Sidor/default.aspx

DEROCA

Defining parameters in FR alternatives assessment

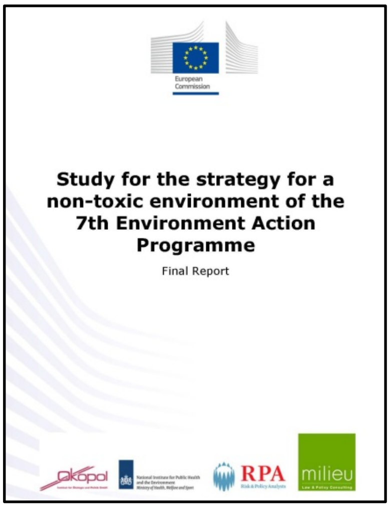
Within the EU-funded (FP7) project DEROCA, a "chemicals alternatives assessment" is carried out by authors from the European Commission (JRC) on six different flame retardants: DecaBDE, ATH (aluminium trihydroxide), multi-walled carbon nanotubes (MWCNT), red phosphorus, aluminium diethylphosphinate, N-alkoxy hindered amine reaction product (BASF Flamestab NOR 116 or CGL 116). The analysis critically compares GreenScreen and US EPA DfE (Design for the Environment) to available data on toxicology and ecotoxicology, DNELs (Derived No Effect Levels), in particular in the REACH dossiers. This analysis concludes that Persistence is not a relevant criteria, as inorganic FRs are inherently persistent without this having any relevance to toxicity or ecotoxicty and FRs of concern cannot be identified by low DNELs. Critical criteria are bioaccumulation and CMR (carcinogenic, mutagenic or reprotoxic effects). The paper also concludes that REACH registration dossiers provide a comprehensive source of publicly available hazard and fate information necessary for alternatives assessments.

"Chemical alternatives assessment of different flame retardants – A case study including multi-walled carbon nanotubes as synergist", K. Ashberger et al. (European Commission JRC), Environment International 101 (2017) 27–45 *http://dx.doi.org/10.1016/j.envint.2016.12.017*

Low smoke cable compounds recognised by UL

Teknor Apex, a global compounding leader, has obtained UL (Underwriters Laboratory) AATJ 2 recognition as low smoke and halogen free flame retardant (LS-HFFR) for seven cable components. The Halguard® 58000-58300 series offer high performance electrical and physical properties, adapted for demanding applications where low smoke generation is important such as data centres, control cables, energy supply. The 58600 series compounds (see pinfa Newsletter n°62) offer cost-effectiveness, as well as low post-extrusion shrinkage. This certification enables application of these cables in confined public spaces, or transport infrastructure.

"Low-smoke HFFR Wire and Cable Compounds from Teknor Apex Receive 'Halogen-Free' Assessment from UL", 23 January 2017 *https://www.teknorapex.com/low-smoke-hffr-wire-and-cable-compounds-from-teknor-apex-receive-halogen-free-assessment-from-ul* *"UL Certification for Halogen Free (HF) and Low Smoke Halogen Free (LSHF) Cables"* *http://industries.ul.com/blog/ul-certification-for-halogen-free-hf-and-low-smoke-halogen-free-lshf-cables?_ga=1.7123378.1432159669.1486466112* *See also pinfa Newsletter 62,52, 39.*


European Commission

Study for the strategy for a non-toxic environment of the 7th Environment Action Programme

Final Report

RPA milieu

EU non-toxic environment strategy

A 130 page report for the European Commission on the strategy for a non-toxic environment (required by the 7th EU Environment Action Plan) assesses and makes proposals for chemicals policy. The report particularly looks at substitution, chemicals in articles, protection of children and reproduction, very persistent chemicals, innovation and competitiveness, development of new non-toxic chemicals and early-warning identification of chemical risks. Halogenated flame retardants are identified as problematic (e.g. box p.34) and it is proposed to fix limit values for brominated flame retardants in the Drinking Water Directive (p. 72). pinfa comment: the non-halogenated substance TPP (triphenyl phosphate) is already proposed as a candidate for the Water Framework Directive WATCH list. Ensuring compatibility of chemicals with safe recycling (Circular Economy) is an identified priority and persistent flame retardants as an obstacle. Priorities are identified as persistent chemicals, understanding effects of combinations of chemicals, nanomaterials and endocrine disruptors. Proposed actions include increased human biomonitoring of chemicals, support to development of non-toxic substitute chemicals and their uptake by user industries and increased control of chemicals in articles, including imported articles.

"Study for the strategy for a non-toxic environment of the 7th Environment Action Programme Final Report", for the European Commission (DG ENVI), Ökopol – RPA – RIVM, August 2017, ISBN 978-92-79-71778-9 http://dx.doi.org/10.2779/025 or https://publications.europa.eu/en/publication-detail/-/publication/89fbbb74-969c-11e7-b92d-01aa75ed71a1/language-en/format-PDF

PIN solutions to reduce polyurethane smoke & toxicity

A review of some 170 publications summarises currently knowledge on the thermal decomposition, smoke emission and smoke toxicity of polyurethanes, and on the effects of different flame retardants and additives on suppressing smoke emissions and toxicity. The paper notes that smoke emissions from polyurethanes (PU) depend on the polymer structure (PUs with carbodimide groups or aliphatic polyester polyols will generate more char, and so less smoke), and also depend on the fire conditions (oxygen concentration, irradiance temperature which causes polymer decomposition). The authors note that condensed phase flame retardants (PIN char generation) can reduce smoke release from PU, as can some nitrogen PIN FRs and carbon-based FR additives, and that metal hydroxides (e.g. the PIN FRs: ATH, MDH) have high specific surface areas and can absorb smoke and toxic gases. FRs which act mainly in the gas phase or release acidic gases (such as chlorine containing TCPP, or liquid phosphate DMMP or DOPO-phosphonamidates) can increase smoke and carbon monoxide. The paper summarises a range of metal-based PIN FR synergists (ferrites, copper oxides, copper cobalate, zinc stannates/hydrostannates, zinc-aluminium, zinc-iron, zinc-boron and zinc-tin compounds, boric silicon, molybdenum compounds, organic metal compounds such as ferrocenes, sulphur compounds, organic acids) and also metal chlorides.

"Recent studies on the decomposition and strategies of smoke and toxicity suppression for polyurethane based materials", X. Liu, J. Hao & S. Gaan, RSC Advances 2016: 6 74742-74756 http://dx.doi.org/10.1039/c6ra14345h

PIN FR reduces smoke emission of acrylic resin

Acrylic resin is often used as a component of intumescent coating systems. In this study, the smoke emission from a typical such system (12% acrylic resin, 50% phosphorus carbon nitrogen intumescent, 13% titanium dioxide pigment and 25% solvent which evaporates away after application) was studied in detail. Smoke density of a 2 mm coating was studied using ASTM E 662 static smoke evaluation and TGA (thermogravimetric analysis). Pure acrylic resin showed a significantly higher smoke density and (nearly 2x higher) total smoke emission compared to the intumescent coating (calculated per litre product applied). The resin (12% of the content) generates nearly 35% of the total smoke from the intumescent coating.

"Smoke density evaluation of acrylic resin and intumescent flame retardant coatings", Z. Li et al., Pigment & Resin Technology, Vol. 45 Issue: 2, pp.86-92, https://doi.org/10.1108/PRT-03-2014-0023

FR synergist for low-corrosion technical polyamides

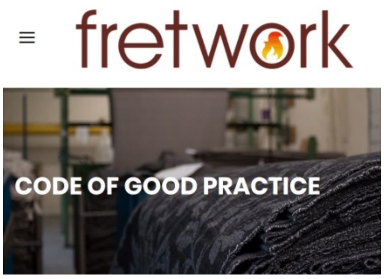
Dow Performance Silicones has launched a new non-halogenated FR synergist. This is a specialist silicon based additive for polyamides (PA6, PA66) used at 1-2% which enables high fire performance with reduced flame retardant loadings, with high char formation and reduced heat release. 30% glass fibre polyamide with 2% silicone synergist and 10% aluminium phosphinate achieve UL-94 V0 at 1.6mm. Synergist – phosphorus flame retardant combinations can thus achieve demanding polyamide mechanical performance (impact, elongation at break, maximum force at traction), reduced corrosivity, and lower formulation costs. Applications include glass-fibre reinforced polyamides used in electrical components in the construction, electrical and electronics and automobile sectors.

"Restoring Mechanical Properties and Reducing Corrosivity in Flame retardant PA Compounds using new patent-pending Dow Corning® 43-821 Additive in your formulation" www.dowcorning.com See also Dow Corning in pinfa Newsletters n°s 77 (polyethylene cables), 71 (transparent polycarbonates)

New chemical resistant PIN FR performance material

PolyVisions, a Pennsylvania based specialist compounder (a wholly owned subsidiary of Bemis Associates Inc.), has launched DuraPET™ FR, a new material offering exceptional chemical resistance, fire performance and impact strength, temperature tolerance of -40 – 180°C and fire performance to UL94 V0 (1.5 mm). The material is based on polyethylene terephthalate (PET) which is graft modified and includes a phosphorus-based polymeric flame retardant from pinfa member FRX Polymers. It can be processed by injection moulding, sheet and film extrusion, and thermoforming. A version based on recycled polyester is available. Applications include automobile, transport, medical equipment, construction, and electrical and electronic housings.

"PolyVisions fights flames with help from FRX", Plastics News, 27 September 2017 http://www.plasticsnews.com/article/20170927/BLOG07/170929913/polyvisions-fights-flames-with-help-from-frx



Textiles supply chain information on chemicals

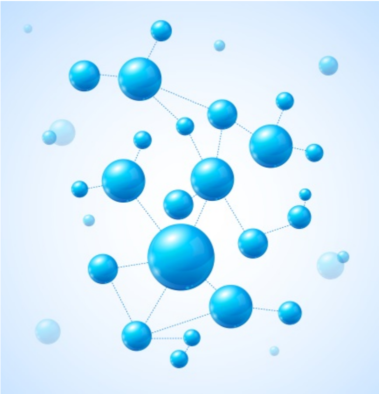
The FRETWORK (Flame Retardant Textiles Network Ltd. http://fretwork.org.uk) FCoGP (Code of Good Practice) aims to ensure that respect of regulations and standards in production of flame retardant textiles conform to the UK Furniture Fire Safety Regulations. The code means a commitment to demonstrating process control over the textile production process, and not only conformity of the final product to the required fire testing standards. The objective is to ensure that all companies manufacturing or processing textiles in the UK are fully informed about chemicals supplied to them, including those in formulations, conform to COSHH (Control of Substances Hazardous to Health) and REACH (EU chemicals regulation) requirements. Commitments include ensuring that legal requirements attached to using and applying chemicals are fully understood and properly applied, assessment of use systems and end-uses, updating of information substances, compliance with requirements for end performance. pinfa supports this initiative and will engage in supplying information and engaging its member companies and customers.

FRETWORK Code of Good Practice http://fretwork.org.uk/code-of-good-practice/

EU project to develop P-N FRs from fish waste

The EU-funded (Horizon 2020) project "DAFIA" (Biomacromolecules from municipal solid bio-waste fractions and fish waste for high added value applications, 2017-2020) aims to produce PIN flame retardants from fish processing waste (marine rest raw materials MRRW). Europe generates some 1.3 million tonnes of MRRW annually. Fish spawn and serum contain high levels of DNA and RNA, which can be processed to provide effective flame retardants (see pinfa Newsletter n°29). The project aims to produce flame retardants adapted for high performance sectors, including automobile. The project is coordinated by AIMPLAS, Spain, brings together 16 partners including Arkema, Mine Colours (masterbatches), Nutrimar and research centres and companies across Europe.

SINTEF, January 2017: https://www.sintef.no/en/projects/dafia-biomacromolecules-from-municipal-solid-bio-w/



Comparison of FR performance in glass-fibre PBT

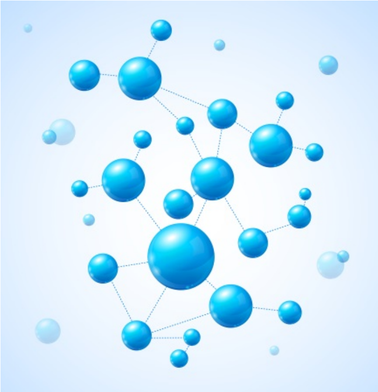
Effectiveness of a polymeric brominated - antimony flame retardant system (brominated polystyrene 10% + antimony trioxide 5%) BFR-ATO was compared to PIN FR systems (aluminium diethylphosphinate 15% with/without nanoclay 2.5% OMMT organically modified montmorillonite) in glass fibre reinforced PBT poly(butylene terephthalate). The BFR-ATO system achieved the lowest heat release rate (HRR), but the PIN system reduced both HRR and mass loss, especially with nanoclay addition. Smoke emission was lowest with no flame retardant, and highest with BFR-ATO, whereas carbon monoxide emission was also lowest with no flame retardant but highest with the PIN systems. The authors consider that these differences in effects of FR systems are due to the BFR-ATO system acting mainly in the gas phase. They note that LOI and UL94 tests do not identify these differences, and also do not identify the differences in smoke emissions.

"Fire performance of brominated and halogen ‐free flame retardants in glass ‐fiber reinforced poly(butylene terephthalate)", M. Suzanne et al., Fire and Materials, 2017:1-10
http://dx.doi.org/10.1002/fam.2453

Different ferrites effective in reducing smoke emissions

In a cone-calorimeter study by some of the same authors as above, 5% zinc- copper- and nickel-ferrite were separately tested as smoke suppressants in flame retarded polyurethane-polyisocyanurate foams (the flame retardant used was 20% TCPP tri (2-chlorylpropyl) phosphate and 10% DMMP dimethyl methylphosphonate). Smoke density and carbon monoxide production of the FR foam was 25-42% lower with ferrite addition, with the best results for the zinc ferrite, but was still significantly higher than non-FR foam. The zinc ferrite also reduced the peak heat release rate, and the ferrite + FR foams all show lower heat release than non FR foam. The authors suggest that the increased smoke production increase is a result of the gas phase action of the flame retardants used. Based on TG-FTIR and XRD, they suggest that the metal ferrites are reducing release of gaseous products by phosphonate pyrolysis of the polymer and generating metal phosphate residues which can contribute to char formation.

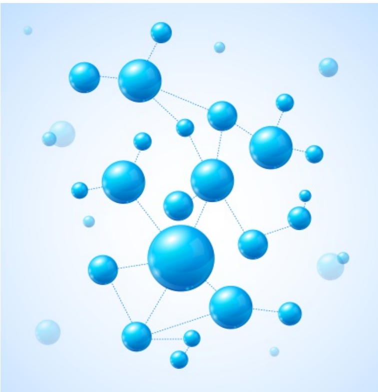
"Smoke and toxicity suppression properties of ferrites on flame-retardant polyurethane–polyisocyanurate foams filled with phosphonate", X. Liu et al. J Therm Anal Calorim (2016) 125:245–254 http://dx.doi.org/10.1007/s10973-016-5356-3



Screening metal compounds as possible PIN FRs

Research supported by pinfa member William Blythe has preliminary assessed around 150 metal compounds for potential as a PIN flame retardant or synergist for polyamide. 151 compounds were produced from low toxicity, water soluble ions or complexes of magnesium, aluminium, calcium, manganese, iron, copper, zinc, tin boron, silicon, phosphorus and nitrogen (NO_2). Of around 200 possible reaction compounds, 142 were successfully isolated. After excluding compounds already known to be marketed as PIN FRs, these were then screened for potential use as FRs by testing in 25% loading in polyamide 6.6 (PA66) with thermal degradation/mass loss tests (char formation potential, compatibility with processing of polyamide at 290°C), so selecting 19 compounds for further study, and finally 7 were selected and successfully synthesised large scale (100g of compound): aluminium, zinc, tin tungstates; tin (II) phosphite, triphosphate and phenylphosphonate; iron (II) aluminate and hyphosphosphite. These showed varying but limited flame retardant effects, including on peak and total heat release rate, leading to the conclusion that they would not be effective flame retardants on their own but could be potentially interesting synergists to FR systems.

"Synthesis and thermal analytical screening of metal complexes as potential novel fire retardants in polyamide 6.6" A. Holdsworth et al., Polymer Degradation and Stability 144 (2017) 420e433 http://dx.doi.org/10.1016/j.polymdegradstab.2017.09.002



PIN FR for paper fibres

PIN flame retardants based on ammonium phosphate were tested in laboratory produced papers and paper boards. In an older paper, fire resistance and smoke emission were tested for 9mm paper boards using FR-7 PIN flame retardant (Recytech) containing ammonium phosphate, ammonia, potassium hydroxide. The FR was integrated into the paper during the production process from fibres. This showed a smoke coefficient (indicator of smoke opacity) reduced by around -75% at 10% FR loading and reduced by more than -90% at 20% loading. This PIN FR also significantly improved fire resistance, increasing time to ignition by over 50% and oxygen index by over 25%. In a more recent publication, a laboratory synthesised experimental phosphorus - nitrogen – (silica) mineral - carbon PIN flame retardant (silane modified ammonium polyphosphate diatomite = APPd) was tested as a flame retardant for two papers. This paper compares only modified and unmodified ammonium polyphosphate, concluding that the modified APPd resulted in significantly lower heat release rate but higher heat and peak carbon monoxide release.

"Effect of surface modification of ammonium polyphosphate–diatomite composite filler on the flame retardancy and smoke suppression of cellulose paper", H. Zhao & L. Sha, J. Bioresources and Bioproducts. 2017, 2(1): 30-35. "Combustion and Mechanical Properties of Fire Retardant Treated Waste Paper Board for Interior Finishing Material", H-S. Yang, J. Fire Sciences, vol. 20, Nov. 2002 http://dx.doi.org/10.1106/073490402031471

Other News

California consultation on priority products: California the Department of Toxic Substances Control (DTSC) has opened public consultation (**to November 6th**) on which "product categories" should be considered in its Work Plan 2018-2020. Currently, amongst others, the following product categories (relevant to flame retardants) are considered: building products, furniture and furnishings (household and office), clothing, office machinery. In these categories, exposure to "candidate chemicals" is assessed, and these include: brominated flame retardants, some chlorinated FRs, and some other flame retardant chemicals t-Butylphenyl diphenyl phosphate, Tricresyl phosphate, Trimethyl phosphate, Triphenyl phosphate, Trixylyl phosphate, 2-Ethylhexyl diphenyl phosphate, Dimethylphosphate, Isodecyl diphenyl phosphate, Isopropylated triphenyl phosphate, Resorcinol bis(diphenyl phosphate)

"CalSAFER provide comments regarding the 2018-2020 Priority Product Work Plan", consultation to 6 November 2017 http://dtsc.ca.gov/SCP/PriorityProductWorkPlan.cfm

San Francisco votes flame retardant ban: the City of San Francisco has voted an ordonnance which will ban all flame retardants in a range of products for children and in upholstered furniture, where sold in the City including online sales, from January 2019 (July 2019 for products with electrical or electronic components). The ban covers any "Flame Retardant Chemical" defined as "any chemical or chemical compound for which a functional use is to resist or inhibit the spread of fire. Flame Retardant Chemicals include, but are not limited to, halogenated, phosphorous based, nitrogen based, and nanoscale flame retardants". Rhode Island recently passed a ban (H5082) on halogenated flame retardants in residential furniture and which will come into effect in 2019.

"SF may ban controversial flame-retardant chemicals", San Francisco Chronicle 25 July 2017 http://www.sfchronicle.com/politics/article/SF-may-ban-controversial-flame-retardant-chemicals-11349686.php and City Board of Supervisors ordinance detail https://sfgov.legistar.com/Legislation file # 170867

POPs Committee confirms ban on DecaBDE: The 11th meeting of the Persistent Organic Pollutants Review Committee (POPRC.11), 19-23 October, Rome, adopted the Risk Management Evaluation of the brominated flame retardant DecaBDE, and confirmed the decision of the COP POP meeting April 2017 (see pinfa Newsletter n°81) to add DecaBDE to Annex A of the Stockholm Convention. This effectively means a worldwide ban on production and use. POPRC.11 confirmed exemption from this ban for some automotive and aviation spare parts. The meeting also adopted the Risk Profile on short-chained chlorinated paraffins (SCCP) and established a working group to now define a Risk Management Evaluation for this substance.

"Eleventh meeting of the Persistent Organic Pollutants Review Committee (POPRC.11)" http://www.pops.int/TheConvention/POPsReviewCommittee/Meetings/POPRC11/Overview/tabid/4558/mctl/ViewDetails/EventModID/871/EventID/553/xmid/13837/Default.aspx[includes links to the DecaBDE and SCCP report documents

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For abbreviations see: www.pinfa.org