pinfa
Phosphorus, Inorganic & Nitrogen Flame Retardants Association

Your newsletter for non-halogen fire safety solutions n° 131 November 2021

PINFA WORLDWIDE

European Fire Safety Week meets FRiP

pinfa online worldwide event, on fire safety of green energies, from AMI Fire Resistance in Plastics Düsseldorf, 1st December 2021, 16h – 17h30 CET. Speakers will include the US National Fire Protection Association, the National Research Council of Canada, EPRI (Electric Power Research Institute), European Commission (tbc), cable and PV suppliers (tbc), Efectis, Currenta, with videos of fire tests of batteries and PV systems.

Online and live from AMI Fire Resistance in Plastics, Düsseldorf, Wednesday 1st December 2021, 16h – 17h30 CET.

European Fire Safety Week Full 29 November – 2 December 2021
https://www.europeanfiresafetyalliance.org/european-fire-safety-week

AMI Fire Resistance in Plastics, Düsseldorf, Tuesday 30 November (18h) – Thursday 2nd December (15h30)
https://www.ami.international/events/event?Code=C1160

Registration here *https://www.europeanfiresafetyalliance.org/european-fire-safety-week/edition-2021/ (tick "Webinar #3: Energy transition and fire safety, Wednesday, December 1st")*

Luna: new pinfa-na new member

Innovative fibre-optics and communications solutions, from R&D to product, for, defense, health care, energy … Luna was founded in 1990 and is headquartered in Roanoke, Virginia, USA, and has today 420 staff at twelve locations worldwide. Luna is organised into two business segments that work together to transition ideas into products. The Lightwave Division is a developer and manufacturer of fibre-optics based technology products for the

aerospace, automotive, communications, defense, energy, infrastructure, security, and silicon photonics industries. The Luna Labs division partners with government and private organizations to innovate solutions for first responders, defense, and health care professionals around the world. Over seventy scientists and engineers in three research groups (Materials, Biotech, and Systems) collaborate to offer a tailored, multi-disciplinary approach to innovation in sectors including medical, materials (polymers, composites, protective materials, …) and systems monitoring and data analysis. This applied R&D and product development work includes focused projects to develop novel flame retardant solutions for customers.

https://lunainc.com and https://lunainc.com/lunalabs

Success of pinfa-NA formulators' training

The pinfa-NA - SPE formulators' training engaged around 90 participants, with strong interest in PIN FR developments. Led by plastics and compounding expert Roger Avakian, the four online sessions (4 x 2 hours), co-organised by pinfa North America and SPE (Society of Plastics Engineers) in June 2021, addressed in depth fire behaviour of materials and fire safety tests, non-halogenated flame retardant chemistry, flame retardant selection for different polymers, (in particular formulation of elastomers, thermosets, textiles, coatings), new developments and sustainability.

Participants from companies formulating polymer compounds were able to ask detailed questions concerning PIN FR solutions for specific materials to achieve different fire safety test standards, as well as questions about industry trends and technical developments.

The participant survey concludes that this training series is seen as a valuable and unique opportunity to find, in one place, full, objective technical information on different FR formulations, including case studies and examples.

Participants showed particular interest in:

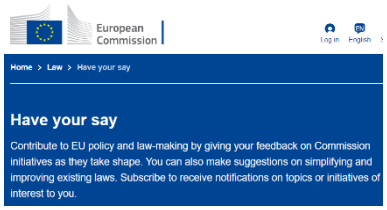
- low-smoke solutions and PIN smoke suppressant synergists
- gas-phase PIN FRs
- thermally stable PIN FRs for high temperature processing
- polymeric/oligomeric or reactive PIN FRs
- specific PIN FR solutions for polyolefins.

More generally, participants are also looking for sustainability information on PIN FRs, in particular on Life Cycle Analysis (LCA) and recycling.

Overall, this first session of formulator trainings showed to be a success, with demand to now develop the workshops for Europe and Asia, by including case studies and information on relevant standards and tests. SPE (Society of Plastics Engineers) view the webinar series as an outstanding success and are using it as a template for other webinars on specific polymer subjects.

*Four training sessions: **1st, 8th, 15th, 21st June 2021.***
https://www.4spe.org/i4a/pages/index.cfm?pageid=6482

POLICY AND REGULATION



EU consultation on photovoltaics

pinfa underlined that specific fire safety risks of PV should be considered in EU Ecodesign, GPP and Ecolabel criteria. An EU Commission consultation on the 'roadmap' for environmental regulation of photovoltaics closed 28th October 2021. pinfa submitted input providing data on incidence of fires in PV systems (Arem et al., 2021, pinfa Newsletter n°127) and noting that the European Commission itself has recently indicated the need for PV fire safety (JRC, 2021, pinfa Newsletter 126).

"Energy labelling – European Commission to examine need for new rules on environmental impact of photovoltaics", EU consultation closed 28th October 2021 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12820-Energy-labelling-European-Commission-to-examine-need-for-new-rules-on-environmental-impact-of-photovoltaics_en

Batteries Regulation in EU Parliament

pinfa, via Cefic, has proposed amendments to include fire safety and toxicity in requirements for batteries sold in Europe, applicable to industrial and > 2 kWh vehicle batteries. The Batteries Regulation is currently under discussion in the European Parliament and Council (see pinfa Newsletter n°121). pinfa has proposed to add a "Fire Safety" requirement (in Annex V, Sustainability and Safety Requirements) covering fire safety, smoke toxicity and toxicity of fire extinction waters, and specifying testing of batteries and materials used in them for resistance to flammability, ignition resistance, heat release rate, smoke release and smoke toxicity.

EU Batteries Regulation proposal COM(2020) 798/3 - 2020/353 (COD) and Annexes

US EPA further restrictions on five PBTs

Tighter rules considered for five Persistent, Bioaccumulative, Toxic chemicals, including. DecaBDE, HBCD and PIP. This follows policy of the new Biden-Harris Administration and a consultation organised Spring 2021 (pinfa Newsletter n°125). PIP (phenol isopropylated phosphate 3:1) is used as a plasticiser and flame retardant. For PIP, the compliance deadline (No Action Assurance) is prolonged because of inadequate information from uses along the value chain. EPA expects to propose new rulemaking on the five chemicals in Spring 2023, probably including additional measures to reduce exposures for susceptible subpopulations and the environment.

"EPA Announces Plan for New Rulemaking on PBT Chemicals, Extends Existing Compliance Date to Protect Supply Chains", US Environmental Protection Agency, 3 September 2021 https://www.epa.gov/chemicals-under-tsca/epa-announces-plan-new-rulemaking-pbt-chemicals-extends-existing-compliance

Croatia's recovery plan refers to fire safety

National "Recovery and Resilience Plan" for EU Covid recovery funding states building renovations must include fire safety, The Plan, validated by the EU, notes that Croatia's building stock is largely old and energy-inefficient, often not meeting minimum fire safety requirements, and that comprehensive renovation requires increasing fire and seismic safety. The Plan states (p.7) "the Recovery Plan will encourage the comprehensive reconstruction of buildings with their fire and earthquake safety."

Croatia national Recovery and Resilience Plan 2021-2026 validated by the EU (in Croatian) https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility/recovery-and-resilience-plan-croatia_en

Presentation in English, "Energy Poverty Action Plan in Croatia", Dec. 2020
https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1608123206.pdf

Call to abolish Sweden's electronics ecotax

Swedish business organisations have called to abolish the tax, considered ineffective in promoting environmental progress. The statement signed by national trade federations covering electronics, IT & telecoms and technologies, notes that such a national measure is ineffective in driving global environmental policy and distorts competition, whereas action at the EU level is effective (citing examples of REACH, RoHS and the recent ban on PFAS halogenated chemicals). The statement notes the recent Sweden government decision to abandon a similar proposed ecotax on chemicals in clothing and footwear. The business federations consider that if the electronics ecotax is not withdrawn then it should be modified to include a 0% tax rate for products containing no specified chemicals, to remove the distinction between "reactive" and "additive" flame retardants (which is not related to substance's health or environment properties) and to tax only halogenated FRs.

"Näringslivets gemensamma position kring skatten på elektronik" (The common position of the business community around the tax on electronics), APPLiA, ElektronikBranschen, IT & Telekomföretagen, Svensk Handel, Svenskt Näringsliv, Teknikföretagen, September 2021
https://applianytt.se/wp-content/uploads/2021/10/Naringslivets-gemensamma-position-kring-skatten-p%C3%A5-elektronik.pdf

FIRE SAFETY

Rugs recall because of fire safety

US CPSC issues recalls for > 1000 rugs, of several types, sold on Amazon, which fail to meet federal fire safety requirements. CPSC (the US Consumer Product Safety Commission) indicates that the rugs pose a fire hazard. US federal law requires carpets and rugs to be tested and certified for surface flammability, with the

objective of reducing risks of death, injury and property damage from fires (16 CFR Part 1630 and 16 CFR Part 1631), or if not, to carry a label "Flammable … should not be used near sources of ignition". The testing assesses horizontal burning with a small flame source on top of the carpet. Testing is after ten wash cycles for FR materials.

US Consumer Product Safety Commission recalls page https://www.cpsc.gov/Recalls - Amazon Suellen Roosevin recall – second recall – third recall

USA: c. 12 000 civilian fire injuries per year

USFA study indicates 11 650 non-firefighter injuries/year (2017-2019), of which ¾ in homes, in some 370 000 recorded fires. This is additional to the c. 3 700 fire deaths per year in the USA (NFPA data, see pinfa Newsletter n°117). This report by the US Fire Administration (USFA) covers only building fires and uses different data sources from NFPA, who estimate a larger number of fires (1.3 million fires in total, including vehicles etc). The USFA report estimates that the main cause of residential fires is cooking (31%) and the main human factor was "being asleep" (49%) (sic). Smoke inhalation accounted for 42% of injuries.

"Civilian Fire Injuries in Residential Buildings (2017-2019)", US Fire Administration, Topical Fire Report Series, July 2021, Volume 21, Issue 4 https://www.usfa.fema.gov/data/statistics/reports/civilian-fire-injuries-residential-buildings-v21i4.html

Torre del Moro tower cladding fire Milan

Combustible ACM cladding is again accused of causing fire spread over the 18-floor building, leaving 70 families homeless. The modernistic residential tower block was completed in 2011. A fire started on a Sunday afternoon in a flat on the 15th floor, possibly due to an electrical fault in an aircon unit. Videos show fire spreading through the ACM (aluminium composite material) cladding, engulfing the whole building in minutes. Reports suggest that fire spread may have been accentuated by the "sail" design of the building cladding, which left open space behind and that the cladding melted causing pools at the foot of the building. There were no casualties, probably because many residents were not at home on a Sunday afternoon and because the fire services gave priority to evacuating the building before attempting to fight the fire (unlike Grenfell where the initial strategy was "stay in your flat"). Investigations are ongoing as to the initial cause of the fire and to why it spread so rapidly through the cladding, but the Italian Interior Ministry has already stated that ""the rapid spread of the flames was due to the thermal covering of the building".

"Totally Vulnerable: After fire tears through a Milan apartment building, the high-rise's cladding is now under scrutiny", US NFPA Journal , 30th August 2021 https://www.nfpa.org/milan

ELECTROMOBILITY AND FIRE SAFETY

GM battery fire risk costs 1.8 billion US$

All Chevrolet Bolt electric cars ever produced (2017-2022, over 140 000 cars) have been recalled after several caught fire. The recall concerns a battery fault, in LG batteries, where a torn anode tab and a folded separator occurring together lead to a cell short-circuit. So far, GM has identified ten fires involving faulty batteries, apparently produced by LG in more than one different factory. Owners are asked to park their vehicles outside and not charge batteries more than 90% or less than remaining range 70 miles. The recall cost is of the same order as GM and LG joint recent announcement of 2.3 billion US$ investment to set up two new battery factories. The US Department of Transportation has launched an NHTSA ODI (National Highway Traffic Safety Administration, Office of Defects Investigation) initially based on three fires in which Bolt's caught fire while parked and unattended, with fire apparently starting in the battery compartment under the rear seat, then spreading into the passenger compartment. This confirms the need for fire safety both of EV batteries and of other vehicles parts such as seats and structure.

"GM recalls every Chevy Bolt ever made, blames LG for faulty batteries", 23/8/2021 https://arstechnica.com/cars/2021/08/gm-recalls-every-chevy-bolt-ever-made-blames-lg-for-faulty-batteries/

"General Motors to Recall Additional Bolt EVs", 20/8/2021 https://media.gm.com/media/us/en/gm/home.detail.html/content/Pages/news/us/en/2021/aug/0820-bolt.html

US DoT NHTSA ODI: https://static.nhtsa.gov/odi/inv/2020/INOA-PE20016-7505.PDF

EV fires an opportunity for materials

IDTechEx market report points to new equipment needs for EVs and material and new demands for fire safe materials. The report analyses new system trends in EVs and related component and material opportunities. The analysis underlines the high cost and media impact of EV recalls related to battery fire risk: see GM Bolt recall above, but also Hyundai 100 000 EVs (recall cost 900 million US$), Ford (33 000 EVs, 400 million US$). Fast charging and increasing battery power accentuate fire risk, as do technology developments such as the move from Si IGBT power inverters for traction to SiC MOFSETs, with higher switching frequency, higher power density and so increased heat dissipation problems. At the same time, new EV fire safety regulations are being developed, as in China (see pinfa Newsletter n°120). These challenges offer opportunities for material suppliers of thermal interface materials, flame retardant materials and fire protection materials.

"EV Fires: A Disaster for Automakers, But an Opportunity for Material Suppliers, Reveals IDTechEx", 10th August 2021 https://finance.yahoo.com/news/ev-fires-disaster-automakers-opportunity-121700321.html

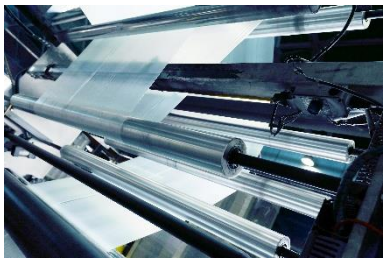
PIN FR INNOVATION AND RESEARCH

Low Smoke Zero Halogen (LSZH) FR trends

Specialchem expects strong growth in LSZH FRs, driven by cable demand, regulations, EVs and new PIN FRs. An online market overview by Polymer-Additives.Specialchem.com cites MarketsandMarkets forecasts of nearly 9% CAGR growth in non-halogen FRs to 2025 (from 4.1 billion US$ worldwide in 2020). MarketsandMarkets expects PIN FR demand to be driven by increasingly strict building fire safety regulations and by synergists to improve performance. Specialchem sees as drivers for LSZH FR growth: demand in the cable market in construction, defence and mass transit, regulations limiting use of halogenated FRs and of antimony trioxide and some zinc compounds and high-performance cables for electromobility. Combination of LSZH FRs with nano-fillers and lubricants (stearates, waxes) offer opportunities for development of PIN FR solutions for cables.

"Halogen-Free Flame Retardants Market by Type (Aluminum Hydroxide, Organophosphorus), Application (Polyolefins, UPE, ETP, Styrenics), End-Use Industry (Electrical & Electronics, Construction, Transportation), Region - Global Forecasts to 2025", MarketsandMarkets, December 2020 https://www.marketsandmarkets.com/Market-Reports/halogen-free-flame-retardants-market-32144405.html

"Low-smoke Halogen-free Flame Retardants", Polymer-Additives.Specialchem.com , Feb. 2021 https://polymer-additives.specialchem.com/tech-library/article/low-smoke-halogen-free-flame-retardants



PIN FR masterbatches for clear polyethylene

Ampacet has launched two halogen-free FR solutions for PE film, with high transparency and optical performance, compatible with the company's colour portfolio. Ampacet indicate low loading rates, compliance with health and environment requirements including ISO14001 and OHSAS 18001, 94/62/EC (EU Packaging and Packaging Waste Directive) and automotive norm VDA 232-101 (Global Automotive Declarable Substance List). Ampacet underlines the avoidance of "flame retardant agents containing bromine and antimony [which] are toxic to the environment and hazardous to the health of humans and living organisms when products burn or are recycled". Fire performance achieved can include B2 (DIN4102), VTM0 (UL94) and Euroclass close equivalents, with self-extinguishing, low dripping and low smoke. Applications include flexible polyethylene and films in carpets, industrial packaging, insulation and lining materials in construction in domestic, railway and other public buildings. Ampacet is a global plastics solution provider, developing innovative plastics formulations since 1937.

"Ampacet Offers Halogen-free Flame Retardant Masterbatches", November 2020 https://www.ampacet.com/ampacet-offers-halogen-free-flame-retardant-masterbatches/

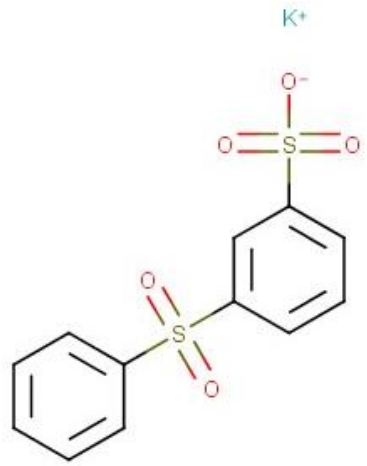
PIN FR system for reinforced polyamides

Budenheim's new PIN FR system for glass-fibre reinforced polyamides offers no migration and low corrosion. The HFFR (halogen-free flame retardant) package is based on melamine polyphosphate, acting in the solid phase (charring) with a polymeric synergist (phosphorus acting in the gas phase). The HFFR system is heat stable up to 340°C, facilitating processing. The benign interaction of the synergist and melamine polyphosphate ensure low corrosion while processing. Fire performance UL 94 V-0 at 0.8 mm and GWIT (glow wire ignition temperature) above 800°C are achieved in glass-fibre reinforced PA66 at 21% loading. Weathering tests show very low migration due to the polymeric structure. A low smoke toxicity and smoke density profile allows the use in railway and other transportation applications. The HFFR is suitable for glass fibre reinforced polyamides (PA 66, PA 6), especially for E&E applications (switches, connectors, circuit breaker and housing).

Budenheim https://www.budenheim.com/en/solutions/plastics/polyamide-pa/

Compounding World, December 2020
http://download.polympart.ir/polympart/EMag/CW-Dec-2020.pdf

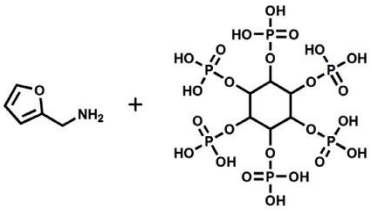
Credit photo: ma-k/iStock-Getty Images Plus/Getty Images



PIN FR replacing perfluorinates

Arichem, Alabama, reports increasing demand for its non-halogenated sulphonate PIN FR for polycarbonate, resulting from listing as SVHC (substance of very high concern) of potassium perfluorobutane sulphonate (and analogues). Arichem's potassium 3-(phenylsulphonyl)benzenesulphonate (EINECS 264-097-3) is not Hazard classified. It can be used as a PIN flame retardant in both transparent and opaque polycarbonates, achieving e.g. UL 94 v-0 3.2 mm at 0.2% loading or 1.6 mm at 0.6% loading with 4% phenyl methyl siloxane another PIN compound containing silicon) in transparent polycarbonate. The potassium PIN FR can also be used in synergy with phosphorus PIN FRs such as RDP or BDP. Applications include light and LED housings, automotive, electronics, interior decoration.

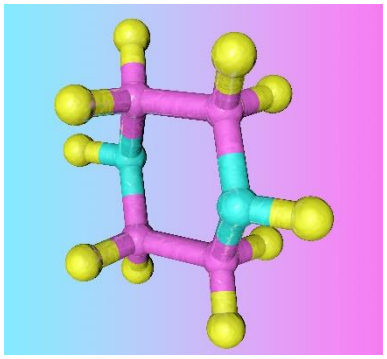
http://www.arichem.com/



Biobased P-N FR for PLA

Phosphorus and nitrogen PIN flame retardant from plant-based phytic acid and furfurylamine (from furfural). Phytic acid is the molecule in which plants store phosphorus in seeds, and is not digestible by humans, pigs and poultry. Furfurylamine is produced from furfural, derived from non-food plant ligno-celluloses (see pinfa Newsletter n°110) and ammonia (synthetic or can be recovered from e.g. anaerobic digesters). Phytic acid and furfurylamine are reacted in water and the resulting phosphorus – nitrogen PIN flame retardant recovered by evaporation and drying. This PIN FR, at 2% w/w loading in PLA (polylactic acid), increased LOI from 19.5 to 22 and achieved UL 94 V-0 (3 mm, neat PLA: Not Rated) and significantly reduced smoke (TSP), but with impacts on the mechanical properties of the polymer. The FR effect is identified as resulting from generation of melting droplets which disperse heat, reduced release of combustible products and improved compactness of char.

"One-step and green synthesis of a bio-based high-efficiency flame retardant for poly (lactic acid)", G. Ye et al., Polymer Degradation and Stability 192 (2021) 109696
https://doi.org/10.1016/j.polymdegradstab.2021.109696



Phosphonic acid - piperazine PIN FR

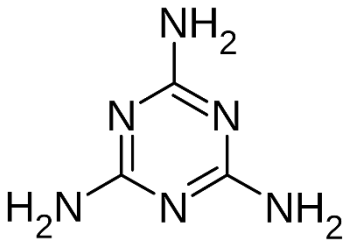
Effective smoke suppression and flame retardancy for epoxy with "eco-friendly" phosphorus – nitrogen PIN FR. A commercially available phosphonate (titrilotriemthylene triphosphonic acid ATMPA) was reacted in water with piperazine to produce a polymeric n- P salt (poly-amino trimethylene phosphonic acid piperazine salt PTPAP). This was then tested at 0 – 8 % loading in epoxy resin. UL 94 V-0 (3.2 mm) was achieved at 6% PTPAP with no dripping and LOI increased to 28 from 21 (neat epoxy). At 6% PTPAP, total smoke production (TSP, m^2/kg) was reduced to 20 from 29 (neat epoxy). Analysis suggests that the FR and smoke suppression effects result from early degradation and charring of the epoxy and generation of intumescent and sealed char, as well as release of $PO^{\cdot}$ which traps radicals in fire gases and inert gases which dilute fire gases. The authors consider that the synthesis of PTPAP is "eco-friendly". See also in pinfa Newsletter n°129 a biobased N-P FR synthesised from piperazine and phytic acid, but which required 15% loading in epoxy to achieve UL 94 V-0 (3 mm).

"Eco-friendly phosphonic acid piperazine salt toward high-efficiency smoke suppression and flame retardancy for epoxy resins", X. Xu et al., Journal of Materials Science volume 56, pages16999–17010 (2021)
https://doi.org/10.1007/s10853-021-06384-1

PIN FR from recycled waste textiles

Waste PPS (polyphenylene sulfide) filter textiles were tested as a PIN FR in epoxy, showing reduced PHHR and smoke. PPS fibre bag-filters are widely used for high-temperature industrial gas cleaning, for e.g. combustion plants, metallurgy … Material recycling by re-spinning is difficult and so the resulting waste bags are generally disposed by incineration. In this research, the waste bags were ground to powder (75 – 100 µm) then tested as a PIN FR at 0 – 15 % loading in epoxy. UL 94 V-1 was achieved with 15% loading, with a >40% reduction in peak heat release rate (PHRR), nearly 30% reduction in peak smoke production rate (PSRR) and 45% reduction in peak carbon monoxide production. The FR effect is considered to be related to sulphur content, through char formation and release of non-flammable volatiles which dilute fire gases. The powdered bag material contained some fluorine, because the bags are treated with fluorinated latex for hydrophobicity. pinfa notes that contaminants in the dust removed from offgases during the bags service life should also be considered.

"A new recycling strategy for preparing flame retardants from polyphenylene sulfide waste textiles", H. Wang et al., Composites Communications 27 (2021) 100852
https://doi.org/10.1016/j.coco.2021.100852

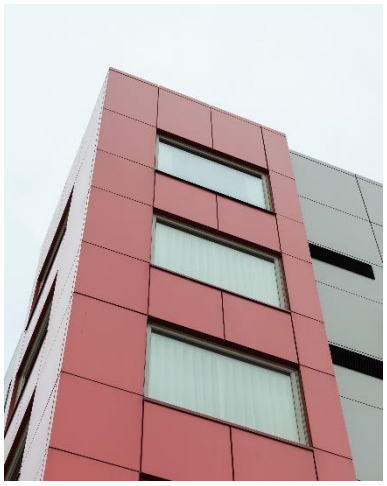


Innovative melamine compound as PIN FR

A phosphite derivate of melamine was successfully tested, with SiO_2, as a PIN FR solution for polypropylene (PP). Melamine compounds are recognised N-based PIN flame retardants, and their effectiveness is improved by synergy with phosphorus. MPHP melamine phenyl hypophosphite) was here synthesised from melamine and phenyl hypophosphorus acid. It was tested in PP in combination with silicon dioxide (SiO_2). PP with 30% loading of MPHP, UL 94 V-0 (3.2 mm, no dripping) was achieved, and this fire performance was maintained if up to 5% of the MPHP was replaced by silicon dioxide, but not at 20% MPHP / 10% SiO_2. Substitution of part of the 30% MPHP by SiO_2 improved some aspects of fire performance but deteriorated others (lower heat release rate but also lower LOI), and also improved tensile strength but deteriorated elongation at break. The authors conclude that the phosphorus-containing melamine derivate MPHP acts as a PIN FR by releasing inert gases, by P radicals in the gas phase and by char formation, and that SiO_2 may be a useful catalyst by forming a mineral protective layer in combination with charring.

"Synthesis of melamine phenyl hypophosphite and its synergistic flame retardance with SiO_2 on polypropylene", L. Ai et al., J. Thermal Analysis and Calorimetry 2021 https://doi.org/10.1007/s10973-021-10953-6

FIRE TESTS AND SAFETY OF BUILDING CLADDINGS



A special issue of 'Fire and Materials' brings together eight studies on building façade fire safety and testing.

FAM (Fire & Materials) Special Issue: Façade Fire Safety, pp 583-696, Aug. – Sept. 2021 https://onlinelibrary.wiley.com/doi/10.1002/fam.2868

Building claddings can be fire safe

Marcello Hirschler summarises updates of façade requirements in the 2021 US IBC (International Building Code). He underlines that the NFPA 285 test in place since the 1980's has shown to ensure fire safety, in that the US has had zero fatalities in cladding fires where systems have passed this test. NFPA 285 is a full-scale test, using a complete wall assembly at least 5m high x 4m wide, including a mock-up room with a window opening in the wall, and a complete wall assembly with cladding, attachments, joints, etc. The primary aim is to ensure that fire does not spread upwards to the next storey. Test criteria include vertical and lateral flame spread, fire penetration, temperatures reached and propagation between compartments. It is recognised that testing of materials is insufficient, and that fire testing in the full-scale structure is essential. However, minor modifications from tested assemblies are accepted, subject to expert judgement that this will not significantly modify overall fire performance. In addition to this full-scale test, further specific tests are defined for different types of building material, such as barriers to prevent fire penetration and light-transmitting wall panels.

FR claddings show limited fire spread

Agarwal et al. present large-scale fire test results on twelve different ACM (aluminium composite materials) and HPL (high-pressure laminate) cladding assemblies. They conclude that non-FR thermoplastic core ACM systems show accelerated flame spread within minutes, irrespective of the combustibility of the insulation material. They also conclude that flame-retardant ACM and HPL claddings show limited fire spread. The non-FR systems had polypropylene or polyethylene core. The FR systems had FR-polyethylene or FR-cellulosic core.

Increases in building cladding fires

Yuen et al. summarise building cladding panel fire incidents, regulations and perspectives. Numbers of significant fires worldwide related to cladding are accelerating rapidly from only around ten per

year in the early 2000's to around one hundred in 2014, continuing to rise rapidly with 160 fire incidents in 2018. Cladding fires can show rapid surface fire spread, penetration across claddings (due to heat conduction and/or deformation/delamination, often related to core melt or disintegration), vertical spread of fire by insulation cavities, fire penetration into buildings (e.g. via windows), ignition of surrounding structures by falling burning materials and debris, smoke emission. In Australia, a Senate Committee has identified problems of cladding regulation, including imported low-cost cladding products, fire safety compliance documentation fraud, inappropriate product substitution in construction products (for cost reasons) and a lack of clarity in building codes. Research and testing of cladding materials are summarised, concluding that the core material is the main contributing factor to fire spread.

OTHER NEWS

Dermal exposure review: a review paper on dermal exposure to flame retardants shows very little published science, citing data from only four studies (Frederiksen 2016, Abdallah 2016, Pawar 2017, Zheng 2017, Fatunsin 2020) and for only eight FRs (HBCD, TBBPA, TCEP, TCIPP, TDCPP, TPHP, EHDPP, TEHP). This data particularly concerns dermal uptake via dust and it is noted that this may be more significant than oral intake. It is suggested that brominated FRs may have generally higher dermal bioaccessibility than organophosphorus FRs, with dermal exposures for FRs estimated as 0.1 – 4 ng/kg bw/day (Pawal 2017). Rates of release of FRs from materials are not considered, despite these are important in defining potential exposure. Overall the conclusion is the need for more data on dermal exposure to FRs, especially new FR molecules, and on dermal metabolism and dermal bioavailability of FRs.

"A review of the success and challenges in characterizing human dermal exposure to flame retardants", E. Zini Moreira Silva et al., Archives of Toxicology 2021 https://doi.org/10.1007/s00204-021-03130-z

PUBLISHER INFORMATION

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For abbreviations see: www.pinfa.org

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