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PINFA IN ACTION



Free webinar: innovative materials for EVs

pinfa-NA free webinar: EV battery enclosure materials and testing, with Ken Vessey, UL Solutions. Wed. 29th May, 11h30-12h30 EDT (17h30 -18h30 CEST). Ken Vessey has thirty years' experience of UL safety certification with expertise in plastics for electrical and electronic applications, electrical insulation systems and 3D additive manufacturing. He was instrumental in the development of the online Certificate of Compliance for RoHS and Non-Halogen Certifications and provides global support to UL engineers handling certification of materials and of E&E products. This free webinar will look at evolving materials for battery enclosures and end-use performance and fire safety screening tests.

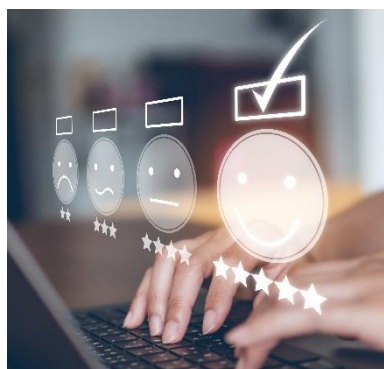
pinfa-NA's 9th Lunch and Learn webinar, Wed. 29th May, 11h30-12h30 EDT (17h30 -18h30 CEST). <https://www.pinfa-na.org/evmaterials>



Free webinar: FR research in the USA

pinfa-NA free webinar: what research on FRs is carried out, what is needed, with what funding, which stakeholders? Wed. 12th June, 11h30-12h30 EDT (17h30 -18h30 CEST). With Gary Wnek, Professor of Engineering and Professor and Chair of Macromolecular Science and Engineering at Case Western Reserve University. He will discuss the range of research addressing flame retardants, from longer-range, fundamental studies, for example on mechanistic understanding and development of new and sustainable FRs, to applied research intent on solving specific practical application challenges. The webinar will include examples of relevant research, an overview of research funding support and discussion of research needs.

pinfa-NA's 10th Lunch and Learn webinar, Wed. 12th June, 11h30-12h30 EDT (17h30 -18h30 CEST). <https://www.pinfa-na.org/frresearch>



pinfa-NA webinar attendee survey

Survey with five short questions aims to help pinfa-NA improve and develop its 'Lunch and Learn' one-hour webinar series. pinfa-NA launched these in February 2023 with a webinar on polymeric materials in fires (Feb. 2023), followed by the Boston Great Fire (March 2023), fire risks & fire tests (May 2023), electric vehicle developments (Sept. 2023), PIN FR commercial development (Oct. 2023), non-PFAS drip suppressants (Dec. 2023), regulation and sustainability (Feb. 2024), nursing home fires (March 2024).

pinfa-NA short survey for attendee feedback on the free Lunch and Learn webinar series: [HERE](#).



pinfa-NA explainer video - FR chemicals

6th 3-minute education video addresses the questions of health and environmental concerns and regulation of FRs. The video explains that regulators worldwide assess the risk of chemicals used in plastics, based on hazard and exposure. A small number of flame retardants have been banned, in particular when found to be PBT (persistent, bioaccumulative, toxic). Flame retardant producers and plastics formulators are working to improve flame retardants, to ensure plastics performance and polymer compatibility of FRs..

Previous pinfa-NA Value of Flame Retardant Containing Materials videos look at how flame retardants work, how they can prevent fires happening or reduce their gravity, different layers of fire protection, fire regulations, codes and standards and fire risk scenarios. See pinfa-NA FR explainer video n°5 in pinfa Newsletter n°157.

pinfa-NA FR explainer video n°6 "Environmental & Human Health Aspects of Chemical Flame Retardants in Commercial Products", 3 minutes, <https://www.pinfa-na.org/learnfrmaterials>

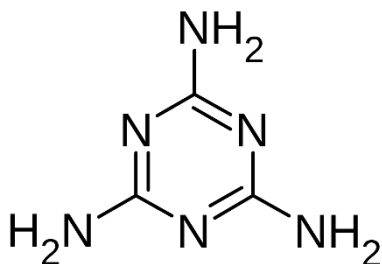


1 500 readers of PIN FR smoke toxicity study

Science publication of pinfa study on PIN flame retardant polymer smoke emissions downloaded more than 1 500 times after one year. The paper in 'Fire & Material's', by authors from CREPIM France and pinfa, presents results of tests on 72 formulations of 10 polymers. Results showed no significant increase in smoke density or toxicity with PIN FRs. See pinfa Newsletter n° 149.

"The impact of halogen free phosphorus, inorganic and nitrogen flame retardants on the toxicity and density of smoke from 10 common polymers", H. Feuchter, F. Poutch, A. Beard, *Fire and Materials*. 2023;1-21, <https://doi.org/10.1002/fam.3145>

POLICY AND REGULATION



Melamine & melamine cyanurate

pinfa has updated our Q&A on regulatory classification of melamine and implications for melamine-based PIN FRs. Additional information is included on the implications on melamine-based flame retardants of possible inclusion of melamine itself in REACH Annex XIV (possible authorisation requirement for melamine, see ECHA consultation closed 5th April 2024, below). The pinfa Q&A confirms that melamine-based FRs are not affected unless they contain ≥0.1% free melamine. Indeed, several melamine-based FRs are validated in labels or certifications such as TCO or Ökotex. The updated Q&A also notes that melamine cyanurate has now been self-classified by the manufacturers as H351, H361f, H373 (*) and that this does not imply REACH authorisation (the substance is not considered SVHC).

* *Carc. Cat. 2 and Repr. Cat. 2 (suspected human carcinogen and suspected reprotox, GHS)*

“pinfa frequently asked questions (FAQ) about melamine-based flame retardants and recent regulatory risk management measures on melamine, updated 17th April 2024 https://www.pinfa.eu/wp-content/uploads/2022/05/pinfa-Melamine-based-FRs_QA_final.pdf

For information concerning melamine itself, see EMPA (European Melamine Producers Association) regulatory page <https://melamine.cefic.org/regulatory-status/>

ECHACHEM database <https://chem.echa.europa.eu/> – Melamine cyanurate [HERE](#).

ECHA (European Chemicals Agency) “Consultation on draft recommendation for inclusion in the Authorisation list” of Melamine and four other substances, closed 5th April 2024. <https://echa.europa.eu/draft-recommendation-for-inclusion-in-the-authorisation-list-consultation>



Electronics industry criticises ecotax

Organisations say Sweden’s ecotax on FRs and chemicals in electronics is unfair, ineffective, economically damaging. Four Swedish electronics, technology and games industry federations, in a 35-page joint report, say the tax has nearly doubled since 2022 (+71%) despite claiming not be intended to collect revenue, resulting in significant price increases in Sweden (+ 60 € on a low-price TV). This results in purchases moving abroad and reduced competitiveness. The tax is ineffective in driving chemical selection, as Sweden is not a significant market for global electronics production, and can be counter-productive by inciting regrettable substitution and by penalising re-use (second-hand electronics are also taxed). The industries call instead to accelerate the phase-out or restriction of hazardous chemicals in electronics products at the international or EU level.

“Den ohållbara Elektronikskatten” (The unsustainable electronics tax. How it affects the environment, the consumer and the economy), Elektronik Branschen; Tknikföretagen, Datspelsbranschen, TechScerige, 22nd April 2024, <https://www.techsverige.se/2024/04/den-ohallbara-elektronikskatten/>



Proposal to UN for plastics chemicals

Rwanda, Cook Islands and Norway have proposed to the United Nations to “avoid and minimise” many plastics chemicals. The three countries proposed to [UNEP INC-4](#) to ban ten chemicals or families of chemicals which are today identified as CMR (carcinogenic, mutagenic or reprotoxic), including the halogenated flame retardant TCEP. They also propose to list to “avoid and minimise” further families of chemicals because “structurally similar chemicals can have” CMR properties. These proposed families are very wide including plasticisers, UV protection additives, antimony and several other metal compounds, and brominated, chlorinated and organophosphorus flame retardants.

pinfa supports the regulatory grouping of flame retardant chemicals into families with similar properties (see pinfa/Fisk study on grouping of organophosphorus PIN FRs (see pinfa Newsletter n°142). However, grouping all organophosphorus PIN FRs together makes no sense: this would conclude that all the organophosphorus chemicals widely present in our bodies (e.g. DNA/RNA, ...) and in food (e.g. phytate) are CMR (these natural organophosphorus chemicals can be extracted from food wastes and used as PIN flame retardants).

The [UNEP INC-4](#) website continues to refer to the criteria* proposed for prohibition or regulation of chemicals put forward by the UNEP secretariat in 2023. These proposed criteria target chemicals which are CMR, endocrine disruptors, PBT, vPvB**, PMT, vPvM**, ozone depleting or are impede recycling**, polymers “of high concern” and “potential migration/release from plastic”.

* [UNEP/PP/INC.4/3](#) (part II – 2), 23rd December 2023, “Revised draft text of the international legally binding instrument on plastic pollution, including in the marine environment” and [UNEP/PP/INC.2/INF/4](#) (Annex II – B – i), 23rd May 2023, “Additional information linked to potential options for elements towards an international legally binding instrument”.

** brominated flame retardants are cited for these criteria.

“Conference Room Paper. Chemicals of concern in plastics: Proposal by Norway, Cook Islands and Rwanda for an approach to criteria and lists, including initial lists”, submitted to United Nations fourth Intergovernmental Negotiating Committee to develop an international legally binding instrument on plastic pollution, Ottawa, Canada, from 23-29 April 2024
https://resolutions.unep.org/incre/uploads/chemicals_of_concern_in_plastics_proposal_by_cook_islands_rwanda_and_norway.pdf

FIRE SAFETY



Fire risks in rural China

Ten years' data shows increasing fires in China, especially in rural areas, with electrical systems the leading fire cause. Analysis of fire statistics 2012-2022 and nearly 2000 detailed questionnaires with rural populations show that number of fires in China and resulting economic losses have both increased two to five times over this decade. Fire deaths and injuries fell through to 2020, but have since then increased back to 2012 numbers. The authors attribute the increases in fires to new energy technologies and batteries, increased home working, increased internet use since Covid. The proportion of fires occurring in rural areas has risen from c. 30% to >55%, despite a population shift towards urban areas (rural areas: c. 1/3 of China's population by 2022). The main cause of fires in rural areas is electrical (over 1/3 of rural fires), careless handling of fires (1/5), agricultural production activities, funeral ceremonies and fireworks. A significant problem is occurrence of fires in "self-built" buildings. The authors propose an eight-point action strategy to address rural fire risks, including public fire awareness and education, addressing storage of flammable materials, staffing and equipping of rural fire brigades, improving electrical systems and fire safety inspections.

"Examining China's rural fire protection within the rural revitalization strategy: An in-depth policy research", Y. Li, X. Du, Fire and Materials, 2024;48:394-407 <https://doi.org/10.1002/fam.3191>



29 killed in Istanbul nightclub renovation fire

Fire in Masquerade Club, closed for renovation, started with sparks from work and burned to third floor of 16-floor building. Victims were mainly workers engaged in the renovation and nightclub staff. Authorities have suggested that the club did not have a permit for the renovation work and that construction materials stored may have been ignited by sparks from the renovation work. Six people have been arrested including club owners and manager and the person responsible for the renovation. This fire shows the importance of fire resistance of construction materials not only in buildings but also during work phases of storage, installation and dismantling.

"Dozens dead in Istanbul nightclub fire", BBC 2nd April 2024 <https://www.bbc.com/news/world-68715163>

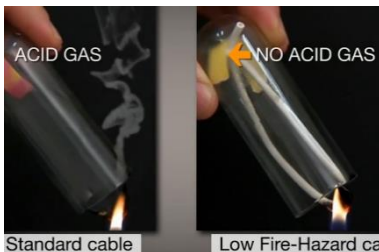


Denmark historic monument & museum fire

Copenhagen stock exchange, one of Denmark’s most famous buildings, with many valuable paintings, was destroyed by fire on 16th April. The 400-year old building is around half destroyed and the iconic spire collapsed in the fire. Some of the paintings and other artwork in the building were rescued by fire services and passers-by during the fire. The cause of the fire is unknown, but the building was undergoing renovation and the fire seems to have started underneath the copper-covered roof (similarly to the Paris Notre Dame fire 2019). Officials have said that the building will be rebuilt.

“Copenhagen vows to rebuild fire-hit stock exchange”, BBC, 17th April 2024 <https://www.bbc.com/news/world-europe-68834447>

COMMUNICATION



Demonstration video: cable fire safety

Flame test video by Europacable, compares dangers of non-fire safe cable to fire safe cable. Europacable is the European cable manufacturers’ federation, with members including the largest cable producers in the world as well as specialised medium and small companies. In the video flame test, PIN flame retardant cable shows no smoke, does not release acid gas, provides more time to escape, ensures a less hazardous environment for rescue teams. A six-page guide to understanding EU Construction Products Regulation (CPR) class labelling and certification for cables is also provided, explaining Performance Classes, additional classifications (smoke, flaming droplets, acidity), product certification and Notified Bodies.

“Have you ever seen a cable burning?”, fire demonstration video,(1 minute) <https://cpr.europacable.eu/en/cpr/have-you-ever-seen-cable-burning> “Understanding CPR Cable Classes and certification”, 6 pages https://cpr.europacable.eu/sites/default/files/2019-10/CPR_Cable_Classification_Europacable_en.pdf



CPR CE-mark and export

The EU CE-mark is necessary to sell construction products in the EU, but also brings credibility and added-value for export, for example for timber and wood products used in both commercial and residential buildings. An article published by Burnblock explains that the CE-mark guarantees fire performance and is verified by AVCP (Assessment and Verification of Constancy of Performance) level 1/1+, that is subject to external audit by an EU-recognised ‘Notified Body’.

This is detailed in [NB-CPR/SH02/19/832r2](#). [Burnblock](#), Denmark, offers non-toxic, biodegradable, non-hazardous impregnation flame retardants for timber, plywood and boards, coatings and natural fibres. Burnblock also benefits from [EPD®](#) (Environmental Product Declaration) and Gold-level [Cradle-to-Cradle®](#) certification.

“CE Mark is the foundation, Burnblock, 2024 <https://burnblock.com/ce-mark-is-the-foundation/>”

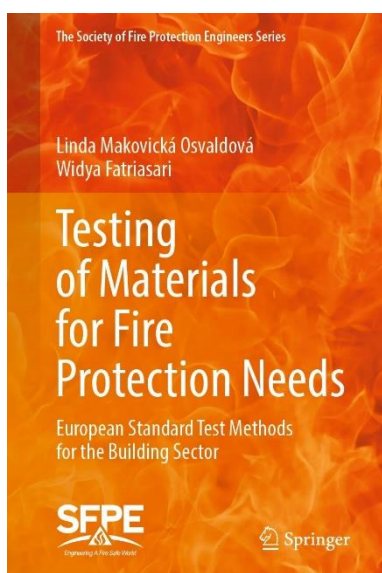
“See also PIN FR VOC emissions free” in pinfa Newsletter n°148



Home fire safety video

Video shows side-by-side room fire tests with UK fire-safe and US non fire-safe furniture – and how families react. Two identical open-front mock-up rooms were furnished with two sofas (one UK Furniture Fire Safety Regulations standard, using flame retardant FR, and one not fire safety treated), plus curtains, shelves, table, etc. A small flame source is placed on the cushions of one sofa in each room. After 2 ½ minutes, the non-FR sofa shows a large fire, whereas the UK sofa is scarcely burning. After 4 ½ minutes the non-FR room reaches flashover, with the whole room engulfed in flames from floor to ceiling, whereas the FR sofa has self-extinguished. Members of the public invited to see the tests react: “The flame is big enough and the smoke, in a minute, it really puts into perspective how serious this is ...”, “Honestly, I don’t think anyone is prepared, it’s enough to change your mind completely”.

“Home Fire Safety Video. The fire safety of home furnishings 3 minutes”, 3 minutes, NAFRA <https://www.flameretardantfacts.com/benefits-of-flame-retardants/home-fire-safety/>

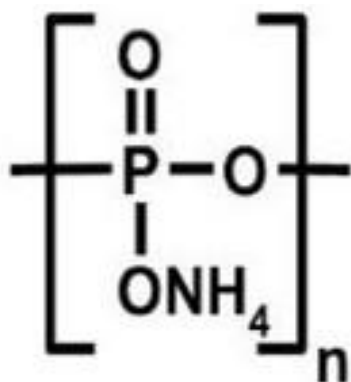


Book: materials fire testing methods

300-page book presents fire resistance testing of construction materials, insulation, cables, furniture, textiles, furniture, and also dust and liquids, smoke and toxicity and science of fire modelling and large scale tests. Both standardised test methods and specialised specific tests are presented, in particular for the building sector (construction materials and building contents). Principles of flame retardancy are presented and effects of flame retardants on the different tests are considered. The book aims to assist students and scholars in deepening understanding of materials fire behaviour and to contribute to future improvements of testing methods and so improved fire prevention.

“Testing of Materials for Fire Protection Needs. European Standard Test Methods for the Building Sector”, L. Osvaldová, W. Fatriasari, 2023, Society of Fire Protection Engineers Series (SFPES), ISSN 2731-3638I, <https://doi.org/10.1007/978-3-031-39711-0>

RESEARCH AND INNOVATION



Functionalised APP for different polymers

Ammonium polyphosphate is an effective, non-toxic PIN FR. Innovative coatings improve performance and compatibility.

Peil et al. encapsulated APP in cross-linked lignin (a bio-based polymer from plants) stabilised by polyglycerin polyricinoleate (PGCR, a food additive). The encapsulated APP was tested as a PIN flame retardant in PLA foams (poly lactic acid, a bio-based plastic). Encapsulation improved dispersion in the polymer matrix, resulting in smaller foam cells and higher foam density. LOI (limiting oxygen index) increased from 21% to 24.5% (20% PIN FR) and UL 94 V-0 (3 mm) was achieved with only 9% PIN FR. The PIN FR foam could provide a bio-based and biodegradable material for lightweight packaging and construction applications.

Chu et al. review over sixty studies of application of APP in unsaturated polyester resins. Microencapsulation or surface modification are widely used to improve interfacing with the polyester matrix, so improving mechanical performance of the PIN FR resin, and to reduce water absorption by APP. Synergy with compounds used in the surface treatment of the APP can also enhance the smoke reduction effect of APP. In particular, nitrogen compounds (e.g. chitosan, imidazoles, amines) and silicon compounds (e.g. silanes) are cited. Studies of different synergists with APP are also reviewed, including metal oxides/hydroxides, phosphorus FRs, clays.

Zheng et al. review studies of differently functionalised APP in epoxy resins. Compounds combined with APP include metal compounds, which catalyse char production and suppress smoke release, and can also facilitate crosslinking of APP to the epoxy, in particular iron, copper, zirconium, cobalt compounds. Studies also show a range of organic molecules used to functionalise APP, enabling cross linking with epoxy and improving mechanical performance. These can include P or N, so also improving fire performance. Bio-based organic molecules are also reported. Studies of synergies with inorganics such as silicates or carbon nano-fillers are also noted.

“Encapsulation of Ammonium Polyphosphate in Lignin Nanocontainers Enhances Dispersion and Flame Retardancy in Polylactic Acid Foams”, S. Peil et al., ACS Appl. Polym. Mater. 2024, <https://doi.org/10.1021/acsapm.4c00787>

“The application of ammonium polyphosphate in unsaturated polyester resins: A mini review”, T. Chu et al., Polymer Degradation and Stability 225 (2024) 110796 <https://doi.org/10.1016/j.polymdegradstab.2024.110796>

“Review. Recent advances in constructing new type of epoxy resin flame retardant system using ammonium polyphosphate”, P. Zheng et al., Safety Science and Resilience 5 (2024) 179–193, <https://doi.org/10.1016/j.jnlssr.2024.03.002>

PUBLISHER INFORMATION

This Newsletter is published for the interest of user industries, stakeholders and the public by pinfa (Phosphorus Inorganic and Nitrogen Flame Retardants Association), a sector group of Cefic (European Chemical Industry federation) www.pinfa.org. The content is accurate to the best of our knowledge, but is provided for information only and constitutes neither a technical recommendation nor an official position of pinfa, Cefic or pinfa member companies. For abbreviations see: www.pinfa.org