2022

pinfa Advisory Board

Twelfth Meeting

Thursday 23rd June 2022
09:30 – 12:00 CET
VIRTUAL

pinfa

Contents of this report

pinfa Advisory Board Meeting Participants

External representatives

Krzysztof Biskup, European Fire Safety Alliance
Sophie Duquesne, Université de Lille
Diane Daems, Huntsman Polyurethanes
Hervé Feuchter, Crepim
Frank Kuebart, eco-INSTITUT
Lisa Melymuk, Masaryk University
Antonio Nerone, RadiciGroup
Rudolf Pfaender, Fraunhofer LBF
Franck Poutch, Crepim
Laurent Tribut, Schneider Electric

pinfa Representatives

Francesca Filippini, Sector Group Manager
Adrian Beard, Chairman

External moderators

Simon Levitt, Moderator, Harwood Levitt Consulting
Veronica Corsi, Assistant moderator, Harwood Levitt Consulting

The pinfa Advisory Board Meetings

Purpose of the pinfa Advisory Board meetings

A Sector Group of Cefic, the European Chemical Industry Council, pinfa is the Phosphorus, Inorganic and Nitrogen Flame Retardants Association. We represent the manufacturers and downstream users of non-halogenated phosphorus, inorganic and nitrogen flame retardants (PIN FRs).

United by a commitment to improve the environmental, health, and safety profiles of FR products, we constantly seek to foster dialogue between the FR and the fire safety and the environmental fields. Bringing together a diverse group of stakeholders, including FR manufacturers and downstream users, academics, and experts from testing and research institutes, our Advisory Board meetings provide a venue for engaging with world-leading experts in these areas, and share ideas and activities.

The meetings of the Advisory Board take place on a biannual basis. The meetings do not have fixed participation, and attendees are encouraged to extend the invitation to relevant stakeholders. This report does not capture the contents of the previous meetings. The latter are recorded in a separate document, available here.

The 12th pinfa Advisory Board Meeting

The 12th meeting of the pinfa Advisory Board was held virtually on 23rd June 2022.

In the first session, Lisa Melymuk, Assistant Professor in Chemical Pollutants and Human Exposure Routes at Masaryk University, presented the results of the European Human Biomonitoring Initiative (HBM4EU) and discussed the policy implications for the FR industry.

In the second session, Adrian Beard, pinfa Advisory Board Chairman, and Antonio Nerone, Electric and Electronic Market Expert at RadiciGroup, examined the new requirements and fire safety challenges posed by e-mobility, and explored the need and potential for PIN fire safety solutions for electric vehicles (EVs).

Competition, compliance and confidentiality

The meetings of the Advisory Board are held in strict compliance with EU and international antitrust laws, as well as Cefic dos and don'ts.
The meetings of the Advisory Board follow the Chatham House Rule, whereby attendance and the contents of the discussions are reported, but the affiliation of each individual speaker is not revealed.

The European Human Bio-monitoring Initiative: Results and Policy Implications for Flame Retardants

The focus of the first session was on human biomonitoring (HBM) of exposure of FRs and policy implications in the context of the European Human Biomonitoring Initiative (HBM4EU). A presentation by project contributor Lisa Melymuk (key points reported below) was followed by a group discussion.

The European Human Biomonitoring Initiative (HBM4EU)

The HBM4EU project was born in 2017 as a joint effort of 30 countries, the European Environment Agency and the European Commission, co-funded under Horizon 2020. The aim of the five-year initiative is to coordinate and advance HBM in Europe to provide better evidence of the actual exposure of people to chemicals and gauge the impacts of exposure on human health to inform policy making.

By measuring chemical substances themselves, their metabolites, or markers of health effects in the human body (typically through blood or urine samples), HBM enables to build a comprehensive picture of our exposure to multiple chemicals. This information is linked with health data to understand the potential effects of exposure on human health, and supported by further research activities to identify the dominant exposure pathways.

Objectives of HBM4EU

A major challenge to the reliable assessment of the potential risks from exposure to chemicals is the lack of harmonised information concerning exposure to chemicals across Europe. For example, there may be cross-national differences in terms of what chemical substances are being looked at, what groups of people are being examined (e.g. age groups), and through which fluid or tissue samples.

Therefore, the focus of the HBM4EU project is on the harmonisation HBM initiatives across the 28 participating countries. This provides the foundation for achieving a set of key objectives, including, for instance, developing harmonised HBM procedures to provide comparable data on exposure to chemicals at European level; linking data on internal exposure to aggregate external exposure and identifying the main dominant exposure pathways; and building knowledge of the latter into targeted policy measures that aim to reduce such exposure.

HBM4EU and FRs

FRs constitute one of several groups of substances examined in the course of the HBM4EU project, including, for instance, bisphenols, mycotoxins, and pesticides. Based on multiple prioritisation rounds, 62 FRs are selected, spanning across legacy FRs (e.g. polybrominated diphenyl ethers, PBDEs) and current use FRs (e.g. organophosphate esters, OPEs).

Analytical methods

Compared with other substances prioritised for research and assessment, for example lead, FRs are a highly heterogeneous group, defined not by common chemical identity, but by use. The upshot is that a variety of bio-monitoring methods is employed across the 62 FRs selected for study, depending on whether they are highly lipophilic and have higher persistence (e.g. PBDEs), or are metabolised in the body (e.g. OPEs). One method is through blood samples, in cases where FRs are lipophilic, meaning that they are best measured in stable lipid heavy matrices like blood serum, plasma or breast milk. In other cases, urine samples are taken, as certain FRs metabolise in the body and are best monitored through their metabolite, found in urine.

Discussion

Why was some of the analysis done on breast milk instead of, for example, blood or urine?

For the breast milk studies, what we were doing was looking back at data that had been generated over a long span of time. We know that chemical exposures can vary across and within age groups and gender for a lot of reasons. Breast milk is a good sample when we need to compare across studies, because it comes from a relatively homogeneous population of women of childbearing age, while we would get bigger variations if we were comparing, for example, children from a study in China with adults from a study in the US. Persistent FRs are found in breast milk and serum in the body, so generally speaking the trends that would be seen in either of these are similar.

From a policy perspective, was the main conclusion from the HBM4EU project that when action is taken, this does have an impact, i.e. restrictions are an effective way of responding to a concern that has been identified?

Another big implication is that we need a better awareness of chemical mixtures. The same 2000 children that revealed high exposure to OPEs also showed detectable levels of a wide range of other chemicals, so we know that every individual is exposed to a complex mix of multiple chemicals. We usually set a threshold for one chemical and say whether or not this chemical is safe. The current risk assessment framework - as it is implemented at the European level - does not address mixtures. We need a better way to set a threshold that considers mixtures. That is really difficult to achieve from both a science and policy perspective, but some initiatives around this are starting.

New Fire Safety Challenges from Electric Vehicles

The focus of the second session was on the fire safety challenges in e-mobility, and the need and potential for FR solutions to electric vehicles (EVs). A presentation by Adrian Beard, pinfa Advisory Board Chairman, and Antonio Nerone, Electric and Electronic Market Expert at RadiciGroup, was followed by a group discussion.

New challenges from electric vehicles

The architecture of electric vehicles (EVs) or hybrid electric vehicles (HEVs) is vastly different from internal combustion engine vehicles (ICEVs). Electric motors include components that are not as critical in ICEs: for instance, in EVs and HEVs, the insulated gate bipolar transistors (IGBTs) need to be more powerful than in conventional vehicles in order to convert power supply, and high-voltage connectors (HVCs) can operate at up to 1000 V compared with 24 V in conventional vehicles.

Other key elements that need not be underestimated include, for example, the busbars, which are typically regarded as items that need not cost very much, and should instead be treated as a critical element in power-intensive electrical applications, and the charger, which can operate at a very high currents, such as the Tesla Supercharger, and may create risks for charge points.

In sum, the amount of energy generated in EVs and HEVs is on a high level similar to ICEVs (with a full tank of petrol); this, coupled with the complexity of the design, may create fire safety risks.

Challenges for plastics producers and potential FR solutions

The complexity of combining classic FR and insulation properties with the chemical and mechanical requirements from the automotive market poses new challenges for plastics manufacturers. A key challenge relates to lack of standardisation, with different countries upholding different standards.

For instance, in China, under the former standard, the fire test used to look only at the ability to extinguish the flame. Under the latest, more stringent standard, the fire test considers the ability to extinguish the flame without explosion occurring. Under the former standards, the vibration test used to employ employed sinusoidal waves, whereas it now employs random waves.

Here, a key industry concern is around contact corrosion, which may generate short circuits that lead to overheating and eventually lead to explosion. From a plastics manufacture point of view, this is extremely challenging, in that requires more sophisticated FR systems to avoid overheating of the battery pack and ensuing explosion.

Another key ask that the FR industry is well placed to provide solutions for is the increasing demand for phosphorus or nitrogen compounds.

Other challenges for consideration

Beyond manufacturing challenges, a major challenge is faced by firefighters. The key learning from the fire brigades is that burning EVs can be extinguished, but if the battery is on fire, it will take a long time and large amounts of water to extinguish. EV batteries behave very differently from petrol engines, in that there is a high risk of quick rapid reignition as soon as the water is taken away. Therefore, the vehicle needs to be placed in a secure area.

In addition, extinguishing water is a hazardous waste due to the presence of special pollutants. This is a particular issue in underground carparks without efficient ventilation systems, where these corrosive emissions can cause major damage to buildings and materials

Discussion

Individual OEMs are setting their own standards, individual countries – be it France, Germany, or China – have their own approaches and activities, the authorities may not do very much, and looking back at other fire safety issues, it will take a big accident to really bring attention to this. Would it be desirable that this community – including firefighters, suppliers, and others – proactively raise this issue with the authorities, such as European Commission? To say that this is a disaster waiting to happen, and there is a need for standardisation?

I think so, because Europe is also building the infrastructures, and with the infrastructures, there will be higher density of charging stations and higher density of power. This means that the risk of having multiple electric cars beside one other, and the possibility of one catching fire and extending the fire to others is very high. This is definitely something that must be considered. Sometimes underground parking areas forbid access to gas fueled cars, but are no specifications for electric cars. In the future, this is also something that must be tackled.

As a firefighter, being responsible for training colleagues, I was aware of the hazards from electric cars, and from the energy transition more broadly. Firefighters receive good trainings, but the environment is changing so quickly that it is challenging to keep up with all new developments. This is why we have developed a European Fire Safety Action Plan – the key message being that fire safety cannot be decoupled from the energy transition, and fire safety issues should be included in European activities in this area.

Conclusion and Next Steps

The participants of the Advisory Board meeting were again positive about the initiative. The fact that there were participants from the scientific community was especially welcomed, as the range of backgrounds in the room provided the conditions for sharing expertise and learnings across fire safety and environmental topics.

There was a recognition that the structure adopted within the meetings of the Advisory Board, which provides a venue for these worlds to come together and dialogue, is an effective way of sharing knowledge and will yield positive outcomes.

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Once agreed by the participants, this document can be used by any member of the group for discussions with others, to show the areas of exchange and to encourage collaboration on the topics involved.

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A sector group of Cefic

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EU Transparency Register no 64879 I 42323-90

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