International **Antimony** Association

2018 Antimony Day

Brussels, 13-14 November 2018

Takeaways

Sustaining safe and effective flame retardant uses
How to balance management of chemical risk and fire safety?

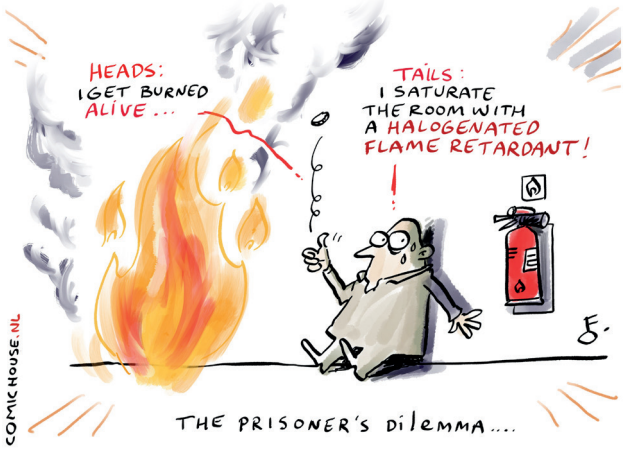
The history of use of flame retardants (FRs) goes back to their use in military applications in the early 1900's. In a society facing a rising use of combustible materials, coupled with a growing demographic concentration, increasing the time available for escape from fire is a must! 70 representatives from Industry, Academia, Market Analysis and other key stakeholders met in Brussels on 13-14 November to **debate about the use of Sb compounds with the biggest socio-economical footprint: synergist in FR solutions**.

The event aimed to discuss how the contribution to fire safety should trade off with the health and environmental concerns attributed to these solutions. The conclusion is that **there should be no trade off: both fire safety and chemical safety are needed**. It's all about mitigating chemical risks, without giving up fire safety.

Fire safety and/or chemical safety?

Standards provide the necessary reference to judge on the performance of all available solutions, and are key to preserve the minimum fire safety levels required today. The flame retardancy assessment must consider the material's final use and function, application area, and the presence of an electrical insulation/barrier. All properties need to be considered in addition to the flame rating.

The EU Commission Fire Information Exchange Platform and the EU Horizon 2020 ENFIRO project constitute well-established fora in which multiple aspects of fire safety are discussed, from societal and legal relevance to technical performance and substitution. These have concluded that fire losses (e.g. Grenfell tower) are mainly caused by non-compliance with existing regulations, and not a lack of regulations; and that the choice of FRs is application-specific, not only influenced by the intrinsic hazard.



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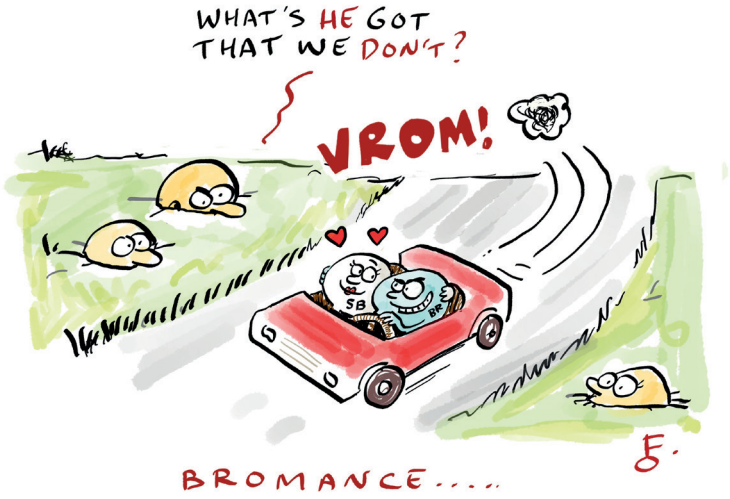
Sb based FR solutions: best in class

Sb-based solutions provide the highest flame retardancy performance at the lowest cost. The affordability of Sb compounds is coupled with its versatility and ability to deliver flame retardancy even when used in very small quantities, without disrupting the original functional properties of the matrix they are added to.

Despite numerous researches, substitution remains very application-specific, and where Sb-based solutions are used, this is due to the overall efficiency brought by such solutions in specific matrices and applications. **The composition or application of Sb-Br FR solutions may change over time to further minimize the chemical risk, but they are unlikely to disappear.** In the textile sector, polymeric solutions where the Sb-Br FR is produced within and trapped inside the polymer, are under development.



As regards their chemical safety, Sb compounds and the halogenated compounds they are used with, indeed have known toxicological properties. This is not specific to Sb and halogens, as all chemicals have specific toxicities, and all are needed for an urban, industrial, sophisticated life.

The use of Sb-based solutions is mature and the adverse effects of Sb and halogenated compounds are well identified. REACH and CLP-compliant classifications (mandatory or self-classifications) and Safety Data Sheets are in place to inform users about the intrinsic properties and the recommended conditions of use of the compounds. From this, there is an understanding on their likelihood of causing harm.

As regards exposure (even with hazard, there can be no risk without exposure), a number of programs are in place to ensure environmental and workers' protection (BSEF's VECAP and i2a's Workplace Exposure Monitoring Campaign).

Sb and halogens are naturally occurring chemicals, which means they will be omnipresent in their relevant environmental background concentrations (e.g. algae contain Br), and difficult to distinguish from the anthropogenic sources. VECAP provides best practice recommendations to minimize the environmental release of Br during manufacture and use.

As regards worker's exposure, this is controlled through a number of measures which bring the level of exposure below the level of hazardous effect. In order to avoid hazard-based regulations and perceptions, exposure data must be collected with standardized sampling and analytical methods, from various producers and users of Sb substances, and assessed on the basis of detailed contextual information. **i2a's Campaign will kick-off with a workshop on 21 February 2019 at which the standard methods and tools developed by i2a with IOM will be presented. This Campaign should start delivering in 2021**, with at least two producing companies per Sb substance, and two companies per use of each Sb substance.

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Rethink, Recycle, Resource

The materials containing FRs also provide circularity opportunities. As Sb is replaced by alternatives in Pb batteries, the antimonial lead recovered from spent batteries constitutes an important secondary source of Sb. Furthermore, there seems to be a reasonable Sb feedstock potential in the Sb contained (together with Br) in various polymeric streams.

These can be sorted out based on density, and rather than being incinerated and landfilled, can be recycled into plastic, or the Sb recovered from the incineration ashes.

This however, does not appear to be economically viable yet; i.e. the increasing complexity of materials makes it difficult for recyclers to match prices of virgin materials, and there is a need to find regulatory acceptance for the safe storage/use of certain impurities in the appropriate matrices.

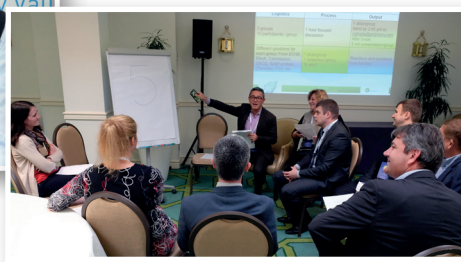
Achieving a Circular Economy for Sb would involve defining a global overview of the flow of Sb in the value chain, and require an open discussion on the strengths and weaknesses across this chain.

Users of FRs can moreover use tools such as SAFR® to identify the safest FR solution to be used, depending on the exposure potential associated to the matrix or application in which it is incorporated. Despite the existing efforts, Industry recognized that **more can be done to document the current exposure associated to FRs, also at consumer and end-of-life/waste/recycling stages**.

HAZARD + EXPOSURE ⇒ RECOMMENDATION

HAZARD / EXPOSURE	LOW	MEDIUM	HIGH	UNACCEPTABLE
LOW POTENTIAL	RECOMMENDED	RECOMMENDED	ACCEPTABLE	TO BE PHASED OUT
MEDIUM POTENTIAL	RECOMMENDED	ACCEPTABLE	NOT RECOMMENDED	
HIGH POTENTIAL	ACCEPTABLE	NOT RECOMMENDED	NOT RECOMMENDED	

For example, work is being commenced to measure how much Sb is released out of PVC and other matrices. Alternatively, this can be predicted on the basis of measurements done to predict the amount of Br released from FR matrices, since Sb is generally used in a ratio of 1:3 to the Br fraction. In textiles, the FR solution is used in the back-coating, not intended to come into contact with the user. Only worn-out textile could possibly yield exposure to the back-coating and its FR content.
Yet again, the chemical risk is known and manageable.



During the debate, it was recognized that stakeholders who have reservations or are against the use of FRs are much more proactive and vocal in communicating than Industry. Industry's communication is typically based on scientific and regulatory facts which are less accessible to the general public than fears and concerns. Industry's information is, for instance, reported in EU REACH Registration Dossiers. Also, the socio-economic footprint of such solutions is not quantified and reported objectively enough. i2a is working with Roskill to develop this information so it can be shared together with the available hazard and exposure evidence.

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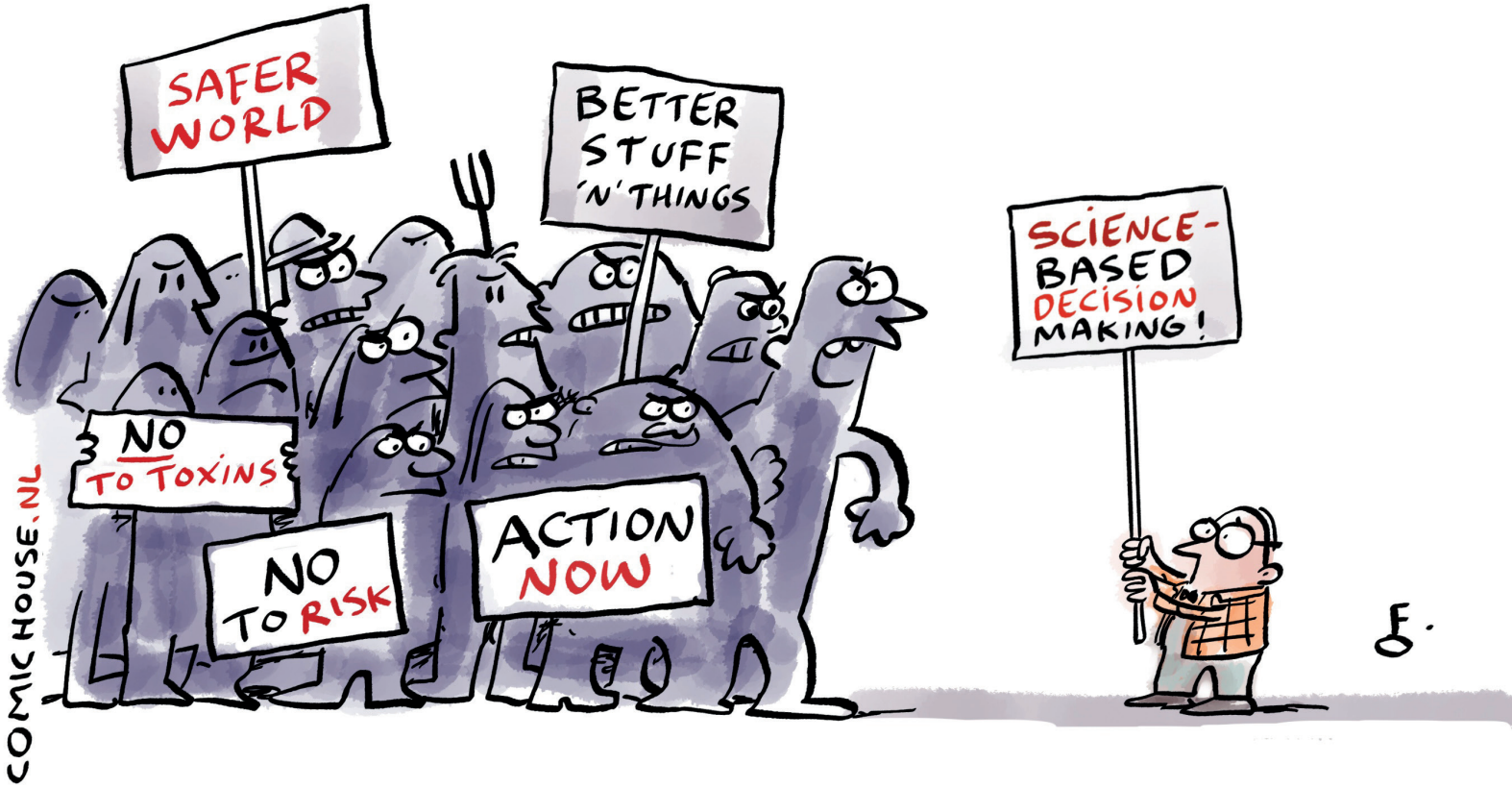
What science says

There is a need to invest in science (FR performance, hazard, exposure, risk assessments), but also in the communication of the scientific results. Science should be used to build trust, reduce the polarization between parties, bring connections between them, and enable to reach a consensus of opinions on the basis of facts. If Industry sits back and does nothing, other voices will be considered as the majority's perception, and will influence and decide.

i2a is working to move from a reactive to an upfront and transparent communication approach, as communication is a prime pillar of any product stewardship initiative. Beyond 'just' generating hazard, exposure, and socio-economic information, or promoting the safe use and circularity of Sb FR solutions, this information and intentions should be communicated to the broader community of Sb stakeholders.

This resource-intensive journey can only be successful through a true collaboration between Industry (producers, traders, users) and Academia/Fire scientists, inside and beyond i2a.



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