INTERFLAME

Synergising INTERnational Studies of Environmental Contamination with Organic FLAME Retardant Chemicals

A Marie Curie International Research Staff Exchange Scheme (IRSES) Project
Project duration: 1st January 2012- 31st December 2014

The overall vision of INTERFLAME is to enhance scientific understanding of how and to what extent organic flame retardant (FR) chemicals present in consumer goods and materials contaminate the environment, with particular reference to humans and wildlife. INTERFLAME's twin foci are exposure arising from indoor contamination and monitoring the efficacy of recent actions designed to reduce environmental levels.

Recent research has demonstrated that the substantial application of FRs within consumer goods and materials has led to contamination of indoor environments with consequences for human exposure. Moreover, the hydrophobicity and environmental persistence of many FRs means that following release to outdoors, there is significant potential for a second wave of human and wildlife exposure via incorporation and bioaccumulation into the food chain. As a result of concerns about the adverse effects of some FRs like polybrominated diphenyl ethers (PBDEs) and hexabromocyclododecane (HBCD), various jurisdictions worldwide have introduced bans and restrictions on the manufacture and new use of such chemicals. INTERFLAME therefore addresses the global need to monitor temporal trends in environmental contamination in response to such restrictions.

INTERFLAME's international harmonisation of studies and exchange of knowledge is a necessary response to the substantial global variations in FR usage patterns and legislation – e.g. the far greater usage of tetrabromobisphenol-A (TBBP-A) in Asia. Its synergistic relationship with the EU-funded Marie Curie ITN **INFLAME (/research/activity/inflame/index.aspx)** will permit comparison and contrast of exposure scenarios for FRs that prevail in Europe with those elsewhere. This will facilitate prediction of future scenarios around the globe; for example where use of a given class of FRs has yet to begin in one region, that region can learn from the experience of those where the same FRs are deployed already.

A further illustration of the insights that may result from such international collaboration relates to the commercial FR product pentabromodiphenyl ether (Penta-BDE). Industry figures reporting substantially greater manufacture of PBDEs in the Americas than elsewhere are reflected in PBDE body burdens of North Americans that exceed by an order of magnitude those of Europeans. In contrast, research has shown that dietary exposure to Penta-BDE is similar in both Europe and North America; hence evidence that concentrations of Penta-BDE in indoor dust in North America exceed significantly those in Europe, have added substantially to the weight of evidence that ingestion of indoor dust is one of the principal human exposure pathways for Penta-BDE. In summary, INTERFLAME's collaborative and dynamic transfer of information and expertise through staff exchanges will better inform efforts to monitor and understand the origins of exposure to such chemicals, leading to more effective strategies to minimise such exposure.

To achieve its overall vision, INTERFLAME has two overriding strands of research. These are:

- Strand 1 Synchronisation of international studies of the causes and exposure implications of indoor contamination with organic FRs, and
- Strand 2 Furthering knowledge of the rates, pathways and products of metabolism of organic FRs and how such metabolism confounds interpretation of temporal trends in contamination of biota.

The research within these strands is designed to achieve **8 research objectives (/schools/gees/research/projects/interflame/research.aspx)** conducted within **10 workpackages (/schools/gees/research/projects/interflame/research.aspx)**, and facilitated via a series of staff **secondments (/schools/gees/research/projects/interflame/secondments.aspx)** between the 10 INTERFLAME partners, and supported by **3 workshops (/schools/gees/research/projects/interflame/workshops.aspx)**.

FRs covered by INTERFLAME

While to date, global production and use - and consequently scientific focus - has centred around PBDEs, HBCD, and TBBP-A; as noted above, recent legislation by various jurisdictions has led to restrictions on use of PBDEs and HBCD. As such restrictions have not been accompanied by any relaxation in fire retardancy requirements, scientific focus has widened to incorporate study of organic FRs that may be used as alternatives to PBDEs. These include organophosphate flame retardants (OPFRs) like triphenyl phosphate (TPP) or tris(1,3-dichloropropyl) phosphate (TDCPP) and "novel" brominated flame retardants (NBFRs), such as decabromodiphenyl ethane (DBDPE). Hence, while INTERFLAME will remain open to study of emerging organic FRs not currently attracting scientific attention; its remit at its outset will incorporate PBDEs, HBCDs, TBBP-A, OPFRs, and NBFRs.

© University of Birmingham 2015