ADVICE OF THE SCIENTIFIC PANEL ON CONTAMINANTS IN THE FOOD CHAIN ON A REQUEST FROM THE COMMISSION RELATED TO RELEVANT CHEMICAL COMPOUNDS IN THE GROUP OF BROMINATED FLAME RETARDANTS FOR MONITORING IN FEED AND FOOD

(Question N° EFSA-Q-2005-244)

Adopted by written procedure on 24 February 2006

SUMMARY

Based on the analytical feasibility to measure the chemical compounds routinely in accredited laboratories, the production volumes, the occurrence of the chemical compounds in food and feed, their persistence in the environment and their toxicity, the inclusion of the following compounds in the **core group** of brominated flame retardants (BFRs) in a European monitoring programme for feed and food is recommended:

- polybrominated diphenyl ethers (PBDEs): BDE congeners #28, 47, 99, 100, 153, 154, 183 and 209.
- hexabromocyclododecane (HBCD): total amount (isomer specific analysis of a limited number of samples and/or pools in case of significantly elevated levels or increasing trends).
- polybrominated biphenyls (PBBs): BB congener #153.

Optionally, the following BFRs could be included in this monitoring programme:

- additional PBDE congeners
- decabromodiphenyl ethane
- hexabromobenzene
- bis (2,4,6-tribromophenoxy)ethane

BACKGROUND

Brominated flame retardants (BFRs) are anthropogenic chemicals that are added to a wide variety of consumer/commercial products in order to improve their fire resistance. There are 20-25 classes of BFRs in present production with at least three major classes: tetrabromobisphenol A and its derivatives, polybrominated diphenyl ethers and hexabromocyclododecane (including three isomers). Polybrominated phenols, decabromodiphenyl ethane and brominated phthalic acid derivatives are another three chemicals or classes of chemicals in use.

Concern has been raised by the occurrence of several chemical compounds from the group of BFRs in the environment, including feed and food, and in human tissues and fluids. This has led to bans on the production and use of two technical products of polybrominated diphenyl ethers (PBDEs), penta-brominated diphenyl ether and octa-brominated diphenyl ether, within the EU.

In recent risk assessments it is acknowledged that the currently available occurrence data on brominated flame retardants in feed and food do not allow a comprehensive assessment of contamination in all feeds and foods.

Therefore it is important that the monitoring of this class of chemicals in feed and food is reinforced across the EU. In order to ensure comparability of data, requirements for the analytical determination as well as a common reporting format will be elaborated. It is also the intention to elaborate a common list of compounds within the group of brominated flame retardants for which the monitoring in feed and food is of relevance. For the elaboration of this list, the assistance and advice from EFSA is requested.

From the literature, the following compounds could be identified as possible candidates (non-exhaustive list) to be included in the monitoring programme:

- tetrabromobisphenol-A (TBBPA)
- hexabromocyclododecane (HBCD) (three isomers α-, β-, and γ-HBCD)
- polybrominated diphenyl ethers (PBDEs) (BDE congeners 47, 99, 100, 153, 154, 209).
- polybrominated biphenyls (PBBs)

TERMS OF REFERENCE

In accordance with Art. 31 (1) of Regulation (EC) No 178/2002, the Commission asks EFSA to provide assistance and advice on the determination of chemical compounds (congeners, isomers) within the group of brominated flame retardants, of relevance to be included in a monitoring programme on the presence of these compounds in feed and food.

ASSESSMENT

BFRs are chemicals which have been added to different consumer products such as computers, furniture, and textiles in order to reduce fire-related injuries. In general, BFRs can be divided into “additive” and “reactive” compounds. While additive BFRs (such as PBDEs, PBBs, HBCD) are merely blended physically with the polymer or are incorporated into the products and therefore may gradually escape from the product, reactive BFRs (such as TBBPA) are covalently bonded to the product and thus are normally not released into the environment as easy as additive BFRs. Moreover, the reactive BFRs are less lipophilic and show a much faster metabolism and/or degradation due to their OH-groups.

The CONTAM Panel used the following criteria as the basis for its selection of chemical compounds in the group of BFRs:

- analytical feasibility to measure the chemical compounds routinely in accredited laboratories
- production volume
- occurrence of the chemical compounds in food and feed
- persistence
- toxicity

Based on these criteria the CONTAM Panel recommends inclusion of the following compounds in the **core group** of BFRs in a European monitoring programme for feed and food.

- PBDEs: BDE congeners #28, 47, 99, 100, 153, 154, 183 and 209.
- HBCD total amount (isomer specific analysis of a limited number of samples and/or pools in case of significantly elevated levels or increasing trends).
- PBBs: BB congener #153.

The selection of the PBDE congeners is based on scientific data within the public domain, which report that these compounds can be predominantly found in feed, food and human samples. Limited data are available on these compounds from a toxicological point of view; however new toxicology data can be expected in the near future.

The monitoring of HBCD is of particular interest as this group of BFRs is mainly used in Europe compared to the U.S and Asia. The CONTAM Panel did not see the need to determine the three isomers of HBCD (α, β or γ) separately because the analyses of total HBCD can easily be combined with the analyses for PBDEs and PBBs. In toxicological studies commercial products containing mixtures of HBCD have been used. Therefore, it is currently not possible to distinguish between the effects of the different isomers. However, the CONTAM Panel recommends to perform isomer specific analysis of HBCD when total HBCD is found to be significantly elevated or when these levels show significantly increasing trends over time.

Although no major amounts of PBBs are known to be produced anymore, the CONTAM Panel recommends to include BB 153 into the monitoring programme because of its high persistence (it can still be found in the environment and in food) and its toxicological profile. The CONTAM Panel noted that an unambiguous differentiation between BB 153 and BDE 154 is mandatory because these two compounds might coelute under certain analytical conditions.

The CONTAM Panel considered that the following BFRs as **optional** for inclusion into the monitoring programme:

- additional PBDE congeners
- decabromodiphenyl ethane
- hexabromobenzene
- bis (2,4,6-tribromophenoxy)ethane

Furthermore, the CONTAM Panel pointed out that it would be desirable to initiate a specific research programme for reactive flame retardants such as TBBPA and its derivatives. TBBPA is widely used in Europe. However, it is mainly found in sediments, and generally not in food items. Given the difficulties in chemical analysis of TBBPA, its short half-life in humans, and its much lower occurrence levels compared to PBDEs, the CONTAM Panel recommends to develop reliable analytical methods for BFRs such as TBBPA, which may decompose during sample preparation etc.

Research projects on polybrominated dibenzofurans, which do not belong to the group of BFRs, but may be formed during incineration of PBDE products (such as electronic equipment) should also be considered.

SCIENTIFIC PANEL MEMBERS

Jan Alexander, Herman Autrup, Denis Bard, Diane Benford, Angelo Carere, Lucio Guido Costa, Jean-Pierre Cravedi, Alessandro Di Domenico, Roberto Fanelli, Johanna Fink-Gremmels, John Gilbert, Philippe Grandjean, Niklas Johansson, Agneta Oskarsson, Jirí Ruprich, Josef Schlatter, Greet Schoeters, Dieter Schrenk, Rolaf van Leeuwen, Philippe Verger.

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