TOXIC TOY OR TOXIC WASTE: OLD POPS IN NEW PRODUCTS

SUMMARY FOR DECISION-MAKERS

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Brominated flame retardants from electronic waste are present in a plastic children's toy

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IPEN is a leading global network of 700 non-governmental organizations (NGOs) working in more than 100 developing countries and countries with economies in transition. IPEN works to establish and implement safe chemicals policies and practices to protect human health and the environment. It does this by building the capacity of its member organizations to implement on-the-ground activities, learn from each other's work, and work at the international level to set priorities and achieve new policies. Its mission is a toxics-free future for all.

IPEN has been engaged in the SAICM process since 2003, and its global network helped to develop the SAICM international policy framework. At its founding, in 1998, IPEN focused on advancing the development and implementation of the Stockholm Convention on persistent organic pollutants (POPs). Today, its mission also includes promoting safe chemicals management through the SAICM process (where it holds the public interest organization seat on the SAICM Bureau), halting the spread of toxic metals, and building a movement for a toxics-free future.

INTRODUCTION

Brominated flame retardants have been widely added to foam and plastics used consumer and electronic products. PentaBDE has been used extensively in polyurethane foam, but also appears in electronics. OctaBDE has been used in ABS and other plastics used in electronics such as office equipment. DecaBDE is widely found in plastics used in electronics and is a common component of electronic waste. In 2009, delegates at Stockholm Convention COP4 agreed to list commercial PentaBDE and OctaBDE in Annex A for global elimination (Stockholm Convention 2009). The COP also agreed to create an exemption that permitted recycling of plastics, foam, and other materials containing these substances until 2030. Subsequently, the Convention POPs Review Committee developed recommendations on the recycling exemption for COP5. The Committee recommended to "…eliminate brominated diphenyl ethers from the recycling streams as swiftly as possible" noting that, "Failure to do so will inevitably result in wider human and environmental contamination and the dispersal of brominated diphenyl ethers into matrices from which recovery is not technically or economically feasible and in the loss of the long-term credibility of recycling." (Stockholm Convention 2011)

Delegates will examine the recycling exemption for PentaBDE and OctaBDE at COP8 in 2017. At COP7, delegates will decide on a draft format for submission of information for evaluation and review of brominated diphenyl ethers listed in the Convention. Currently the questionnaire does not include children's products or food contact materials (UNEP/POPS/COP.7/7). In addition, COP7 will decide on low POPs content limits for components of PentaBDE and OctaBDE and other POPs (UNEP/CHW.12/5/Add.2). These limits will trigger clean up actions under treaty requirements outlined in Article 6. Unlike most currently listed POPs that have a proposed low POPs content limit of 50 ppm, the draft proposes limits of 1000 ppm for PentaBDE and OctaBDE – a substantially weaker standard.

Arnika conducted a brief survey of PBDE flame retardants in Rubik's cubes, a children's product made of plastic. We asked whether PBDE substances commonly found in electronic waste were present in the toys and if they exceeded proposed low POPs content limits of 50 ppm.

RESULTS

Laboratory analysis of seven Rubik's cube samples from Belarus, China, Hungary, and Serbia found that six samples (86%) contained OctaBDE at concentrations ranging from 3 to 57 ppm (see Table No.1). Two samples (29%) contained OctaBDE at levels equal to or greater than 50 ppm – the provisional low POPs content limit in wastes proposed for most Stockholm Convention POPs such as PCBs (which PBDEs resemble). Six samples (86%) contained DecaBDE, a common toxic chemical found in electronic waste. Two of the samples contained DecaBDE at levels greater than 50 ppm. Taken together, four samples (57%) exceeded 50 ppm.

TABLE 1: CONCENTRATION (PPM) OF PBDES IN PRODUCTS FROM BELARUS, CHINA, HUNGARY, AND SERBIA

	Cube "Toys"	"Magic cube"	Cube "QJ"	Rubik ´s cube®	Cube "Toys" small	"IQ Magic cube"	Cube "Toys" big
Country of purchase	Belarus	Belarus	China	Hungary	Serbia	Serbia	Serbia
PentaBDE[1]	0.0	0.0	0.0	0.0	0.8	0.2	0.2
OctaBDE[2]	3.2	5.3	13	0.0	50	13	57
DecaBDE[3]	134	153	36	0.0	37	47	36

1 PentaBDE contains TetraBDE and PentaBDE listed in Annex A of the Stockholm Convention

2 OctaBDE contains HexaBDE and HeptaBDE listed in the Annex A of the Stockholm Convention

3 Currently under evaluation by the Stockholm Convention POPs Review Committee

Conclusion and recommendations

This brief survey indicates that the Stockholm Convention POPs Review Committee correctly predicted the dispersal of POPs into products where they should not be present as a result of recycling materials such as plastics that contain them. The results add to concerns about the Stockholm Convention recycling exemption for PentaBDE and OctaBDE as well as what levels are set for triggering waste management obligations under the Convention.

Toxic recycling

The data shows that OctaBDE and DecaBDE used in plastics for electronics are being recycled into a plastic children's toy. This finding is in accordance with the study of Chen et al. (2009) and an analysis of the POP-BDE stream in the Netherlands by Leslie et al. (2013) illustrating that 22% of the POP-BDE in waste electrical and electronic equipment is expected to end up in recycled plastics. This survey also complements a recent study by Samsonek and Puype (2013) which found flame retardants from electronic waste recycled into plastic food contact materials such as thermo cups and kitchen utensils. The problem of recycling materials containing POPs and contaminating "new products" also occurs in recycled foam products such as carpet padding (DiGangi J, Strakova J, Watson A 2011).

POPs listed in the Stockholm Convention such as PentaBDE and OctaBDE should not be present in children's products, consumer products, food contact materials, and other products. These articles should also not contain DecaBDE since the Stockholm POPs Review Committee in 2014 agreed that DecaBDE, "...is likely as a result of its long-range environmental transport to lead to significant adverse human health and environmental effects such that global action is warranted."(Persistent Organic Pollutants Review Committee 2014).

Clearly, an evaluation of the recycling exemption for PBDEs at COP8 is very important. The questionnaire in UNEP/POPS/COP.7/7 should contain a longer list of possible articles including children's products and food contact materials to help further inform a decision about ending the recycling exemption.

Action levels for triggering POPs destruction

The Stockholm Convention requires that after the treatment of POPs waste, it should no longer exhibit POPs characteristics. This has resulted in an effort by the COP to define low POPs content thresholds. The Basel Convention has taken the lead to define these limits (UNEP/CHW.12/5/Add.2) and 50 ppm has been proposed for PCBs, HBB, aldrin, DDT, dieldrin, endrin, heptachlor, HCB, mirex, PFOS, and toxaphene. However, very weak limits of 1000 ppm have been proposed for PentaBDE, OctaBDE, and HBCD (another brominated flame retardant). A study by ESWI/BiPro (2011) illustrates that for a limit of 1000 ppm, a negligible proportion of waste containing POP-PBDEs would be actually be classified as POPs waste.

The survey data shows that two toy samples contained OctaBDE at levels equal to or greater than 50 ppm. In addition, two different samples contained DecaBDE at levels greater than 50 ppm. These levels raise concerns because PBDEs are very similar in structure to PCBs. In their evaluation of OctaBDE, the POPs Review Committee noted that, "There is an increasing evidence suggesting similar toxicological profiles and therefore, equivalent hazards and concerns, between PBDEs and PCBs..." (UNEP/POPS/POPRC.3/20/Add.6).

Substances such as PBDEs that resemble PCBs should not have weaker low POPs content limits. The low POPs content limit should be 50 mg/kg or less for

PentaBDE, OctaBDE, and HBCD. In addition, the 50 ppm low POPs content limit should be tightened as it is not a health-based standard and should be much lower considering the properties of POPs.

An inappropriate definition of low POPs content creates a loophole that allows responsible parties to select disposal options that may be less costly, but that leave behind substantial POPs residues. This is inconsistent with the intent of the Convention and permits the use of POPs waste disposal options that cannot truly be considered environmentally sound. Such disposal options result in significant new releases of POPs to the environment which are harmful to human health and ecosystems. A weak low POPs content limit such as 1000 ppm opens the door for permitting the production and sale of products that contain unacceptably high levels of POPs as contaminants. It also further facilitates the export of hazardous, POPs-contaminated wastes from developed to developing countries. Finally, as long as these less costly options are allowed by using weak low POPs content limits, superior POPs waste disposal technologies that are able to destroy all the POPs content of the waste, and that leave behind virtually no POPs residues may remain economically non-viable.

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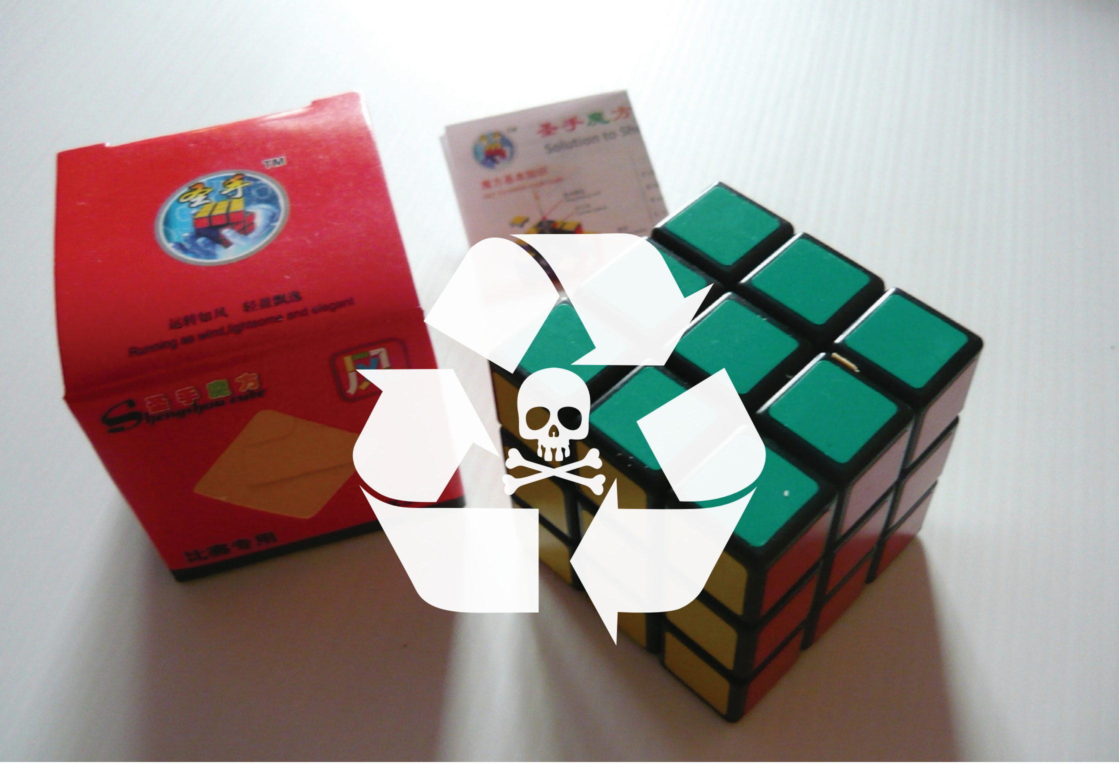
ANNEX 1. METHODS

The black parts of Rubik's cubes were tested because manufacturers often blacken the colour of recycled plastics for aesthetic reasons. Samples were analyzed for PBDEs at the Institute of Chemical Technology, an accredited laboratory in the Czech Republic. Brominated flame retardants were extracted by n-hexane and the leachate transferred into isooctane. Identification and quantification of flame retardants was accessed via gas chromatography/mass spectrometry in the mode of electron ionization (GC-MS/MS-EI). The limit of detection for was 0.1 ppb and the main components of congeners listed in the Stockholm Convention were analyzed.



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