

TOY OR TOXIC WASTE?

An Analysis of 41 Plastic Toy and Beauty Products Made from Toxic Recycling



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Arnika - Toxic and Waste Programme

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Executive Summary

Brominated flame retardants (BFRs) have been widely used in electronics and in foam for furniture upholstery, car seats, and building insulation. The industry claimed that their purpose was to increase fire safety, but subsequent independent tests showed that was not true. Polybrominated diphenyl ethers (PBDEs), and hexabromocyclododecane (HBCD, or HBCDD), are commonly used BFRs. They are persistent organic pollutants (POPs) – substances that are toxic, very hardly decomposed in the environment, accumulate in the bodies of living organisms, and are able to travel far from the place of their release. The fact that they may contribute to a number of health problems is disturbing, such as nervous system disorders, reduced ability of children to concentrate, and impacts on our hormonal system. All these properties contributed to the unanimous decision by more than 150 governments to include them in the blacklist (Annex A) of the Stockholm Convention on Persistent Organic Pollutants (hereinafter "the Stockholm Convention") for global elimination. The treaty specifically aims to eliminate commercial penta-, octa-, and decabromodiphenyl ether (penta-, octa-, and decaBDE) and hexabromocyclododecane (HBCD).

The Stockholm Convention objective to eliminate brominated flame retardants is undermined by the existence of a recycling exemption for materials that contain them. Under this exemption, materials containing commercial penta- and octaBDE may be recycled into new products. The Stockholm Convention expert committee known as the POPs Review Committee (POPRC) examined this issue and warned that if this practice is not stopped, it will result in further contamination of products, humans, and the environment, and the dispersal of these toxic substances into products from which recovery is not technically or economically feasible. Recycling POPs is prohibited by the Stockholm Convention and the majority of the European directives in the field of chemical safety.

The Study

Our study is a continuation of the investigations of IPEN and Arnika that found octaBDE, decaBDE and HBCD in Rubik's cubes, children's toys and hair accessories, i.e., products that were not treated with these substances but made of recycled plastic. The previous study indicates that banned brominated flame retardants commonly found in hazardous electronic and building waste are recycled into new products where they were not present historically. We conducted additional sampling to further examine whether toxic substances are being recycled into children's toys on the Czech market.

In the current study, Arnika had 41 plastic toy and hair accessory products analysed. Laboratory analyses of 7 samples of toys made of black plastic, bought in the Czech Republic, showed that all the samples were contaminated by octa- and decaBDE in concentrations of 1 - 380 ppm, and 7 - 2234 ppm, respectively. One of the samples contained 91 ppm of HBCD. The levels of BFRs found in some of these products exceed regulatory limits. For example, four of them would not meet the POPs regulation concerning octaBDE concentrations. If the toys were electronics, two of them would exceed the regulatory limit because of high decaBDE concentration (1074 and 2234 ppm). These toys would also exceed the limit set by the European legislation, REACH. When these toys become waste, two of them would be regarded as hazardous waste if the protective limit of 1000 ppm were used. If the stricter protective limit for POPs waste, 50 ppm, were used, six of the seven analysed toys would exceed it, in particular because of the high decaBDE content.

Summary of the Findings

Table 1: Range of concentrations of BFRs (ppm) in hair accessories

Sample code	Jl_04	SIX_02	DM_02	Jl_12	STR_02	BL_04	BL_05	ROS_02
Sample	Hair clip	Hair clip	Headdress	Headdress	Hair clip	Hair brush	Hair comb	Hair comb
ΣPBDEs Polybrominated diphenyl ethers	183.11	1 623.44	7.94	234.88	99.09	188.42	662.42	231.57
HBCD hexabromocyclododecane	<0.01	7.71	<0.01	5.20	0.02	0.04	0.09	0.10

Table 2: Range of concentrations of BFRs (ppm) in toys

Sample code	Jl-08	Jl-10	STR-05	BL-10	Jl-11	STR-06	Jl-09
Sample	Transformer 1	Transformer 2	Car	Shoe toy	Cube (little mole)	Rubik's cube 1	Rubik's cube 2
ΣPBDEs Polybrominated diphenyl ethers	8.14	50.15	56.30	300.58	2614.34	344.24	1194.71
HBCD hexabromocyclododecane	< 0.01	< 0.01	0.40	91.07	0.76	0.30	0.98

Conclusion

The above-mentioned data indicate that toxic chemicals marketed as flame retardants present in electronic waste are recycled into plastic toys on the Czech market. The recycling process essentially loses control of these toxic substances – both in terms of concentration and which products contain them. In accordance with the previous studies, our research shows that children's products are an alarming consequence of toxic recycling. To prevent the recycling of toxic substances into new products, it is necessary to ensure the immediate end of the recycling exemptions. The second necessary step is setting a strict limit for BFRs in waste to prevent toxic recycling and export from Europe to developing countries where it they can impact human health in the case of women and children working in the unofficial recycling sector.

Circulation of toxic brominated flame retardants in waste, products, and the environment, may be ended by the following measures:

1. Ending the current Stockholm Convention recycling for materials containing penta- and octaBDE.
2. Ending exemptions introduced by the Stockholm Convention allowing use of decaBDE in certain applications, especially in situations when available alternatives exist.

3. Setting protective limits for waste at the level of 50 ppm for the sum of PBDEs and prohibiting export of toxic waste abroad to protect the health of people working in the recycling sector in the developing countries.

The two key studies that provided findings for this summary are available in Czech only on website of Arnika. Both papers are a part of TOXICS-FREE RECYCLING campaign.

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