



The recycling of brominated flame retardants contaminates children's toys

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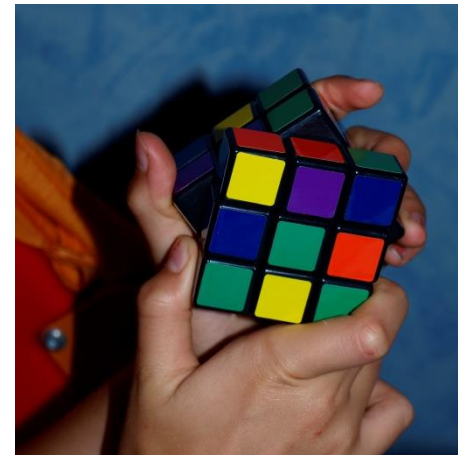
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Public Interest in Brominated Flame Retardants

- Many different consumer products in homes
- Commercial Penta-, Octa-, DecaBDE and HBCD are POPs
- Damage to the nervous (children IQ) and reproductive systems
- Toxic flame retardants increase danger of death in fires
- Dioxin and furan formation (when recycled or incinerated)

Impacts of Recycling Articles containing PBDEs

- What is the flow of PBDEs in recycled materials?
- What articles are contaminated?

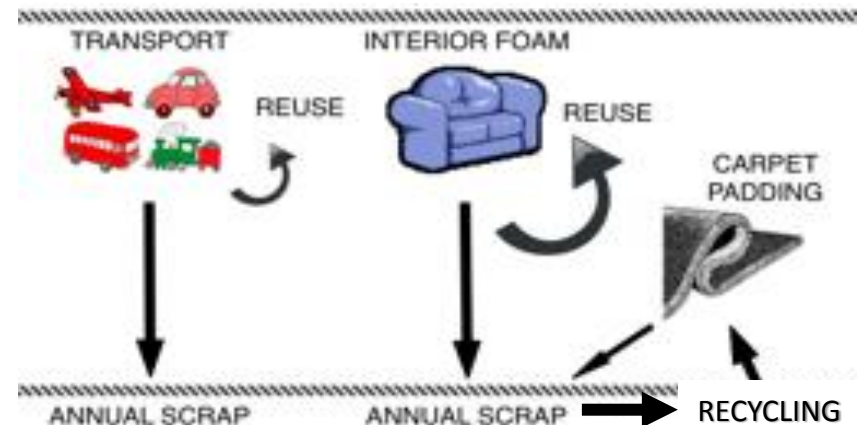


Contamination of Plastic Flow from Recycling of PentaBDE

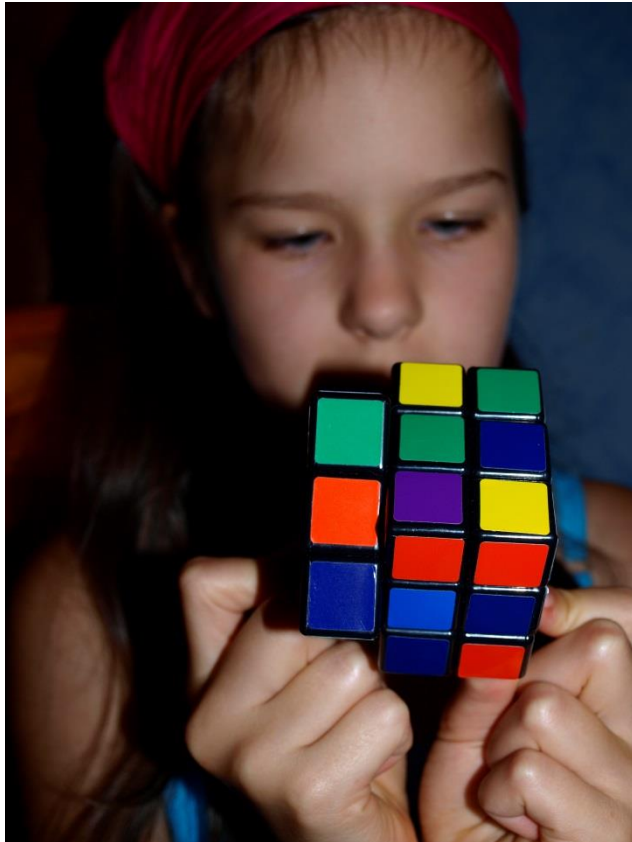
- Carpet padding made of PUR foam scraps which are bound together
- Samples collected in: Canada, Hungary, Nepal, Kyrgyzstan, Thailand, and USA



BDE	Samples containing specific BDE	Range (ppm)
PentaBDE	77%	1 – 1130
OctaBDE	65%	1 – 263
DecaBDE	89%	1 – 166



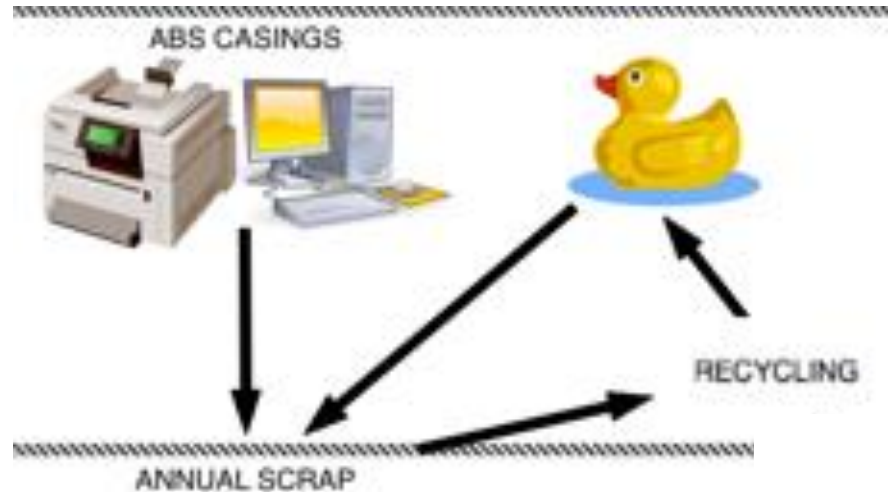
Contamination of Plastic Flow from Recycling of Octa-, DecaBDE and HBCD



Purchased in	No of samples	OctaBDE (ppm)	DecaBDE (ppm)	HBCD (ppm)
Argentina	3	0 - 342	0 - 359	0 - 1586
Bangladesh	2	27 - 41	33 - 96	1 - 5
Belarus	2	3 - 5	134 - 153	NA
Brazil	2	1 - 5	1 - 6	0
Canada	4	9 - 280	20 - 297	1 - 20
China	6	3 - 58	2 - 36	0/NA
Czech Republic	6	0 - 75	2 - 96	0 - 42
Germany	2	1	3 - 4	0
Hungary	2	0 - 6	0 - 58	0/NA
India	6	0 - 336	0 - 516	0 - 78
Indonesia	5	0 - 52	0 - 63	0 - 541
Japan	4	2 - 17	1 - 17	0
Kenya	3	15 - 226	18 - 171	0 - 1280
Mexico	5	20 - 178	17 - 152	0 - 2
Nepal	3	17 - 58	19 - 234	0 - 1
Nigeria	14	18 - 1174	25 - 672	0 - 9
Philippines	4	2 - 108	5 - 293	0 - 13
Poland	4	0 - 51	0 - 79	0
Russia	3	1 - 362	0 - 217	2 - 691
Serbia	3	13 - 57	36 - 47	NA
Slovakia	1	26	98	0
South Africa	3	57 - 509	98 - 281	1 - 60
Sri Lanka	2	46 - 48	44 - 131	0 - 1
Sweden	1	0	0	0
Thailand	2	25 - 48	21 - 23	0 - 5
United Kingdom	3	36 - 210	10 - 400	0 - 5

Examples: Concentration (ppm) of PBDEs in different consumer products

Item	Octa BDE	Deca BDE
hair headband	9	33
thermo cup	3	6
hair clip	19	18
toy - finger skateboard	95	121
hockey stick	6	9
toy - robot	0	1



*Portable XRF spectrometer: device for identifying and separating POPs-brominated flame retardants from waste stream



Discussion and Conclusions

- PentaBDE used in upholstering is recycled into PUR carpet padding
- OctaBDE, DecaBDE, and HBCD used in plastics for electronics are recycled into plastic children's toys
- The Stockholm Convention POPs Review Committee (POPRC) correctly predicted the dispersal of PBDEs
- The results add to concerns about the existing Stockholm Convention recycling exemption
- The neurotoxic effects of PBDEs are similar to those observed for PCBs
- Recycling of POPs material decreases credibility of recycling
- Toxic substances need need to be avoided from material flow to maintain safe circular economy



THANK YOU FOR YOUR ATTENTION

<http://ipen.org/>

<http://english.arnika.org/>



**POPS RECYCLING CONTAMINATES
CHILDREN'S TOYS WITH TOXIC FLAME
RETARDANTS**



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<http://ipen.org/documents/pops-recycling-contaminates-childrens-toys-toxic-flame-retardants>