

Health risks through heavy metals from toys

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Toys must be safe, and they must not endanger the health of children. This must specifically be taken into account when defining limit values for toys, because children engage with toys for several hours a day. In consequence, toys can be an important source of exposure to heavy metals for children.

Already during the consultation process for the new toys safety directive 2009/48/EC, the Federal Institute for Risk Assessment (BfR) pointed out that the new regulations in some instances lower the protection level for children. Thus for the elements antimony, arsenic, barium, lead and mercury, limit values are established which permit a higher intake from toys than the old regulations (Table 1). In the opinion of the BfR, these allowed higher intake values for some heavy metals are not acceptable for both health and preventive reasons.

For arsenic and lead, the ALARA principle should be applied when defining limit values. ALARA stands for “As Low As Reasonably Achievable” and means that exposure to a substance should be reduced to the lowest level practically possible. The ALARA principle is applied when, from a toxicological viewpoint, no certain limit value can be determined for a specific substance up to which a health risk can reasonably be excluded. The ALARA principle is also used where the intake from other sources such as food or drinking water already exceeds such a limit value. For arsenic and lead, the intake from food alone reaches a critical level. High levels of lead can have a negative impact on the development of intelligence in children, whereas arsenic can trigger cancer or lead to critical skin disorders.

The migration limit value for barium in the new toys safety directive 2009/48/EC for scraped-off toy materials, leads to a maximum permissible intake which exceeds the current value 18-fold (Table 1). If the tolerable daily intake value (TDI value) deduced by the World Health Organisation is used as a basis, the barium intake from toys permitted in the future would exceed the TDI value by a factor of 3. A health risk might be possible under these circumstances. Excessive intake of soluble barium can lead to high blood pressure and have an adverse effect on kidney function. For this reason, the BfR recommends that the current significantly lower limit value is retained. Given good manufacturing practice, it has been easily possible to comply with this limit value by manufacturers.

For inorganic antimony which is classified as carcinogenic and also for mercury, the current lower limit values must also be left unchanged, even though no health impairments are to be expected as a result of the increase of these limit values. Experience shows that manufacturers can easily comply with these lower limit values.

Below, the BfR has assessed, with a view to the new limit values, the possible health risks for children resulting from the intake of antimony, arsenic, barium, lead and mercury from toys.

¹ Replaces BfR opinion No. 042/2011 from 12 January 2011

Table 1: Comparison between the maximum permissible daily intake values in accordance with German law (as specified in the 2nd GPSGV) and the old toys safety directive 88/378/EC respectively and the maximum permissible intake values for scraped-off, dry and liquid toys migration values calculated on the basis of the new toys safety directive 2009/48/EC.

	Maximum permissible intake according to the 2nd GPSGV and Directive 88/378/EEC	Maximum permissible intake in accordance with Directive 2009/48/EC			Factor
		Scraped-off toy material*	Dry, brittle, powder-like or pliable toy material**	Liquid or sticky toy material***	
	Overall				
	µg/d	µg/d	µg/d	µg/d	
Antimony (Sb)	0.2	4.5	4.5	4.5	22.6
Arsenic (As)	0.1	0.4	0.4	0.4	3.6
Barium (Ba)	25	448.0	450.0	450.0	18.0
Lead (Pb)	0.7	1.3	1.4	1.4	1.9
Mercury (Hg)	0.5	0.8	0.8	0.8	1.5

If (*) 8 mg of scratchable material, (**) 100 mg of dry material or (***) 400 mg liquid or sticky material is swallowed.

The full version of this BfR Opinion is available in German on <http://www.bfr.bund.de/cm/343/gesundheitsliche-risiken-durch-schwermetalle-aus-spielzeug.pdf>