

Survey of bisphenol compounds in toys and other articles intended for children



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Survey of bisphenol compounds in toys and other articles intended for children
Undersøkelse av bisfenolforbindelser i leker og andre produkter beregnet på barn

Summary - sammendrag

26 samples of toys and other articles intended for children were analysed for bisphenol compounds. Bisphenol A was detected in small amounts in a few samples, but in most of the samples analysed, none of the substances were found. The articles were only analysed for content of bisphenol compounds and migration analysis were not conducted.

26 leker og andre produkter breregnet for barn er undersøkt for innhold av bisfenolforbindelser. Bisfenopl A ble funnet i små mengder i noen av produktene. De fleste produktene inneholdt ikke bisfenolforbindelser. Produktene ble kun analysert for innhold av bisfenolforbindelser og utlekkingsanalyser ble ikke gjennomført.

4 emneord

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All photos

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1. Summary and conclusion

A screening survey of bisphenols was conducted with 26 samples of toys and articles intended for children. The articles examined were made from different plastic materials, both soft and hard materials, but type of plastic is unknown. Samples were analysed for several bisphenol compounds. Only bisphenol A (BPA) was detected in some of the samples, but the majority of samples did not contain any of the substances analysed.

The detection of BPA in some of the samples examined may give rise to some concern, since small children are likely to place everything in their mouths. However, as migration analysis were not conducted as part of this project, the risk of BPA exposure, cannot be estimated.

Det er gjennomført en undersøkelse av innhold av bisfenolforbindelser i 26 leker og produkter beregnet for bruk av barn. Produktene var av plast, både myk og hard kvalitet, men type plast er ikke kjent. Prøvene ble undersøkt for innhold av ulike bisfenolforbindelser. Kun bisfenol A (BPA) ble påvist i noen få prøver. Funn av BPA i noen av prøvene kan gi grunn for en viss bekymring siden små barn har en tendens til å putte det meste i munnen. Men siden det ikke utlekkingsanalyser ikke var en del av dette prosjektet er det ikke mulig å si noe om risiko for eksponering.

2. Background

Chemicals are an essential component of our daily lives, and are important for function and properties of the articles we use and need every day. Some chemicals, however, may be harmful for humans and/or for the environment. Some chemicals may interfere with the endocrine (hormone) systems of humans and wildlife, with potentially adverse effects. These chemicals, such as BPA, are referred to as endocrine disrupters (ECDs).

Babies and young children are also especially vulnerable to exposure from ECDs, both because their bodies and organs are not fully developed and are changing rapidly, and because their intake of substances relative to their body weight is high compared to adults.

Children spend a lot of time interacting with their toys, and toys are subject to close body contact as well as being sucked on, bitten into and licked. Small children even suck, chew or lick on articles not classified as toys. There is a huge potential for exposure of harmful substances to children from toys or other articles through the skin or via oral intake. It is important to minimize children's risk of exposure to harmful chemicals via their toys, and toys in Europe are strictly regulated with respect to harmful chemicals. There is, however, a lack of specific regulations concerning ECDs in toys, and to how to handle substances with known or suspected endocrine disrupting properties at low concentration. There is also a lack of knowledge regarding the potential for occurrence of ECDs in toys. The present survey was conducted as a screening of the presence bisphenol compounds in toys and other children's articles on the Norwegian market.

BPAA is classified as toxic to reproduction, with the risk phrase "may damage fertility", harmful to eyes, irritating to the respiratory tract and allergenic by skin contact. The EU Toy Directive 2009/48/EC states that CMRs shall not be used in Toys, and Appendix II, No. III on chemical properties of toys provides a general prohibition on content of CMR substances (ie

also bisphenol A) in all kinds of toys. The threshold value here is the classification limit for the substance. For BPA the threshold limit is 3000 ppm.

3. Aim of the project

Children are particularly vulnerable to endocrine disrupters. Hence, the current project is focused on articles intended for children, and more specifically the parts of the articles that can (and are likely to) be put in the mouth by a child. The type of articles were not limited to articles for very young children, who are generally more inclined to mouthing of toys and other items, but were selected from items that also older children may be likely to suck, chew or lick on. In addition to oral exposure, the potential for dermal exposure or leaking of chemicals into children's indoor environment was considered when selecting articles. A total of 26 toys and other articles for children were purchased for the project. The articles were predominantly made from hard and soft plastics/polymers and rubber/silicone.

Articles were purchased in toy stores, bookstores and sports shops in the period April - June 2016.

The samples were analyzed by ALS Laboratory Group Norway AS or their sub-contractors, in the period September - October 2016.

4. Materials and methods

Bisphenols were extracted with an organic solvent in an ultrasound bath, and determined by GC-MS according to ASTM D7574:2009. LOQ for all bisphenols were 1 mg/kg. Uncertainty in measurement is 20 %. There were conducted parallel analysis of each sample.

Details of which substances were determined are listed in table 1.

Table 1: List of substances measured in the determination of bisphenol compounds

Substance	Cas no
BPA	80-05-7
BPAF	1478-61-1
BPAP	1571-75-1
BPB	77-40-7
BPBP	1844-01-5
BPC	79-97-0
BPC2	14868-03-2
BPE	2081-08-5
BPF	87139-40-0
BPFL	3236-71-3
BPG	127-54-8
BPM/P	13595-25-0/2167-51-3
BPPH	24038-68-4
BPS	80-09-1
BPT	
BPZ	843-55-0

5. Results and discussion

In total, 26 samples of toys or other articles for children were analysed for substances described above. The results are given as an average of the two analysis.

Details of samples, analysis and results are presented in appendix 1. Pictures are presented in appendix 2.

Only BPA of the analysed bisphenol compounds was detected. BPA was found in 8 of 26 samples, in range from 2,3 ppm - 29,5 ppm. This is far below the threshold limit for BPA in toys which is 3000 ppm. Some of the samples where the highest levels of BPA were detected were pendants or appendages of such size and shape that children may place them in the mouth. If BPA was to migrate from these articles, there may be a risk of oral exposure of BPA from these articles. However, as migration analysis were not conducted as part of this project, the risk of BPA exposure, cannot be estimated.

6. Concluding remarks



















Only BPA of the analysed bisphenol compounds was detected, but the results show that the content was far below threshold limit for BPA in toys. If BPA was to migrate from these articles, there may be a risk of oral exposure of BPA. However, as migration analysis were not conducted as part of this project, the risk of BPA exposure, cannot be estimated.

7. Appendices

7.1 Appendix 1 – Results

Overview of samples, which analysis were conducted and concentration of substances		
Articles	Findings mg/kg	
	Bisphenol A (BPA)	Bisphenols other than BPA
Pencil case (butterfly - pendant)	6,3	<1
Pencil case (butterfly - textile)	2,6	<1
Mini pencil case (horse - pendant)	16	<1
Mini pencil case (horse - textile)	26,5	<1
Bracelet (eraser star)	<1	<1
Pencil (blue eraser)	<1	<1
Pencil - eraser	<1	<1
Eraser	<1	<1
Iphonecover	<1	<1
Swimming goggles (Pro Aqua blue- eyeglass)	12	<1
Swimming goggles (Pro Aqua blue- plastic ring around eyeglass)	<1	<1
Swimming goggles (Bestway - plastic ring around eyeglass)	<1	<1
Swimming goggles (Bestway - plastic strap around head)	<1	<1
Swimming goggles (Bestway -eyeglass)	29,5	<1
Sun goggles (Sunglasses -eyeglass rod)	<1	<1
Sun goggles (Sunglasses -eyeglass)	<1	<1
Sun goggles (Sunglasses -eyeglass frame)	19	<1
Necklace and ring (butterfly)	<1	<1
Necklace (pendant)	<1	<1
Disty snap band	<1	<1
Hair rubber band (rubber band)	<1	<1
Hair rubber band (decoration)	<1	<1
Hair rubber band (rubber band spiral)	<1	<1
Necklace (lollipop - pendant)	<1	<1
Necklace (goodies - pendant)	<1	<1
Children jacket (Mandor JKT - pendant)	2,3	<1

7.2 Appendix 2 – Pictures

	Pencil case		Disty snap band
	Mini pencil case		Hair rubber band
	Bracelet (eraser star)		Hair rubber band spiral
	Pencil (blue eraser)		Necklace (lollipop - pendant)
	Pencil - eraser		Necklace (goodies - pendant)
	Eraser		Children jacket (pendant)
	Iphonecover		
	Swimming goggles (Pro Aqua blue)		
	Swimming goggles (Bestway)		
	Sun goggles (Sunglasses)		
	Necklace and ring (butterfly)		
	Necklace (pendant)		

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We implement and give advice on the development of climate and environmental policy. We are professionally independent. This means that we act independently in the individual cases that we decide and when we communicate knowledge and information or give advice.

Our principal functions include collating and communicating environmental information, exercising regulatory authority, supervising and guiding regional and local government level, giving professional and technical advice, and participating in international environmental activities.