

TESTING OF PHTHALATE CONTENT IN POLYMER TOYS

*Zorica Blagojević, Milan Milenković, Danica Arandelović, Katarina Jovanović,
Margarita Dodevska*

Institute of Public Health of Serbia Dr Milan Jovanović Batut, Belgrade, Serbia

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Background: Phthalates, a group of synthetic organic compounds, have been subject of numerous studies due to their harmful effects on health. The use of bis(2-ethylhexyl)-phthalate (DEHP), dibutyl-phthalate (DBP), benzyl-butyl-phthalate (BBP) and diisobutyl-phthalate (DIBP) in concentrations equal to or greater than 0.1% by weight in plasticized materials is prohibited due to their classification as reproductive toxicants. Before ban, phthalates were used as polymer softeners in production of flexible, soft toys. Phthalates do not chemically bind to polymer, but are only incorporated into polymer structure, so they can migrate from plastic and thus pose a health hazard.

Methods and Objectives: The testing of phthalate content included 90 polymer toys from the Belgrade market. The content of DEHP, DBP, BBP and DIBP was determined using HPLC-DAD (Agilent Technologies 1200 Series).

Results: Baby teething toys (10) and toys made of hard polymeric materials (30) didn't contain phthalates (rattles, blocks, cars, figurines, kitchen sets). Of 30 doll samples, 15 (50%) had elevated levels of DEHP (0.15%-43.2%), and 6 of these also contained DBP (0.1%-0.30%). High phthalate content was found in softest parts: head, hands, and feet. The average DEHP content was 23.5%, which represents almost a quarter of percentage content of the plasticized material. Of 20 tested flexible samples (soft animal figures, unicorns, ducklings, dinosaurs, balls), 45% had elevated levels of phthalates. 9 samples contained DEHP (0.15%-21.9%), of which 5 also contained DBP (0.1%-12.5%). The average DEHP content was 9.3%, and DBP 4.6%, which is 93 times, and 46 times, higher than maximum allowed value.

Conclusions: Testing phthalate content provides insight into the potential exposure of sensitive population groups. The study showed an increased risk of exposure to phthalates from flexible, soft toys. In order to protect and improve health and prevent disease, continuous monitoring and measures to reduce and eliminate exposure to phthalates are necessary.

Keywords: phthalates, toys, HPLC-DAD, DEHP, DBP