

## ESTIMATION OF EXPOSURE TO PHTHALATE PLASTICIZERS OF THE SPANISH POPULATION USING WASTEWATER-BASED EPIDEMIOLOGY

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Phthalate diesters are high-production-volume chemicals that have been widely used in the manufacturing and processing of plastics for more than 80 years. Recently, they have been included in the priority lists of dangerous substances in most of the industrialized countries. Ingestion is considered the major route of exposure to phthalates, either by consuming contaminated food, accidental ingestion of contaminated dust and soil, or licking of products in which they are contained. Once in the human body, phthalates are hydrolysed to their corresponding monoesters and further oxidized or conjugated into glucuronide complexes and finally excreted.

Wastewater-based epidemiology (WBE) is a complementary approach to human biomonitoring to estimate the level of exposure to a substance through the analysis of its metabolic residues in urban wastewater [1], considering that raw wastewater is a highly diluted urine sample representing an entire community.

A sensitive analytical method was developed to quantitatively measure metabolites of 6 phthalate diesters in raw wastewater [2]. Thus, the objective of this study consisted of the application of the developed method to analyse wastewater samples collected in different locations in Spain and the evaluation of the exposure to phthalate diesters in the investigated cities. Raw wastewater from 17 wastewater treatment plants, serving a total population of 6.1 million inhabitants (13% of the Spanish population), was analysed. The results show that the highest population-weighted exposure loads were obtained for diethyl phthalate, followed by dimethyl phthalate and the isomers di-*i*-butyl phthalate and di-*n*-butyl phthalate.

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*References:*

- [1] Zuccato, E.; Chiabrando, C.; Castiglioni, S.; Bagnati, R.; Fanelli, R. *Environ. Health Perspect.* 2008, 116 (8) 1027–32  
[2] I. González-Mariño, R. Rodil, I. Barrio, R. Cela, J. B. Quintana. *Environ. Sci. Technol.* 2017, 51, 3902–3910