BISPHENOL A RELEASING BY PLASTIC CONTAINERS WITH GAS CHROMATOGRAPHY TANDEM MASS SPECTROMETRY

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The made-man chemical, Bisphenol A (BPA) (2,2-bis(4-hydroxyphenyl)propane) is an Endocrine Disrupting Chemical, because acting as an estrogen receptor that can interfere with the endocrine system, affecting health, growth and reproduction of animals and humans [1].
The BPA is a monomer that is mainly used in combination with other chemicals to manufacture plastics heavily used in the production of various types of food and drink containers to the quotidian use such as baby bottles, water bottles and water carboys; and epoxy resins are used in the internal coating for food and beverage cans. It has been a great concern, since it can migrate from these containers, increasing the potential risks of exposure to BPA [2]. Therefore, contamination is widespread in the environment leading to a myriad of exposures.
The aim of this study was to assess the evidence for BPA migration from different plastic containers of low density polyethylene (LDPE), polyethylene terephthalate (PETE), polypropylene (PP) and polycarbonate (PC) in order to evaluate its concentration in the contents. Optimization and validation of a method based on a solid phase extraction (SPE) methodology coupled with gas chromatography tandem mass spectrometry was used to analyze water samples. For derivatization the 2,2,2-trifluoro-N-methyl-N(trimethylsilyl)acetamide (MSTFA) was used [3]. Matrix-induced chromatographic response enhancement was avoided by using matrix-standard calibration solutions and heteroscedasticity has been overtaken by a weighted least squares linear regression model application [4]. Deuterated bisphenol A was used as a quality control internal standard, for process evaluation through recovery studies, being added in a constant amount to all analysis prior to extraction. High temperatures, as microwave heating and exposure to boiling water, as well as sequences of washing and rinsing were also tested. Concluded, BPA can be released in small amounts to into water stored in different plastic containers, including baby bottles, after simulated normal use.

[1] U. S. Food and Drug Administration (FDA) (2010). "*Update on Bisphenol A for Use in Food Contact Applications*." from http://www.fda.gov/Food/FoodIngredientsPackaging/ucm166145.htm, acessed in 27-05-2011.
[2] European Food Safety Authority (EFSA). "Bisphenol A - Food Contact Materials." from http://www.efsa.europa.eu/en/topics/topic/bisphenol.htm acessed in 26-05-2011.
[3] Quintana, J. B., J. Carpinteiro, et al. (2004). "Determination of natural and synthetic estrogens in water by gas chromatography with mass spectrometric detection." Journal of Chromatography A **1024**(1-2): 177-185.
[4] Mansilha, C., A. Melo, et al. (2010). "Quantification of endocrine disruptors and pesticides in water by gas chromatography-tandem mass spectrometry. Method validation using weighted linear regression schemes." Journal of Chromatography A **1217**(43): 6681-6691.