

# Sulfonamide residues in coastal marine sediments

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**Introduction:** According to European Environment Agency European marine biodiversity faces an unprecedented range of pressure derived from the "old" contaminants whose negative effects will continue for decades and new substances as residues from pharmaceutical products. Among the pharmaceuticals special attention should be paid to antibiotics, designed to have biological effect on human or animals. These bioactive compounds may strongly affect bacterial populations and induce biological responses in nontarget organisms due to prolonged exposures, potentially disrupting ecosystem processes and finally influencing the ecosystem health. However, the understanding of pharmaceuticals fate in marine environment is poor and as long their spatial distribution, main sources, transport mechanisms and biological effects is not recognized it is difficult to suggest targeted measures to improve the situation and gain the ecological objectives. One of the main targets in this issue is identification of their concentration levels in environmental samples. Marine coastal sediments can be seen as the final sink of the most persistent antibiotics, thus the objectives of the presented work were to optimize method of sulfonamides determination in marine sediments and to measure sulfonamide concentration in the coastal sediments of the southern Baltic Sea (Polish economic zone).

## Methods:

An analytical method to determine the most commonly used veterinary drugs (10 sulfonamides) in marine sediments was tested. Different variables affecting the extraction process and sample preparation, such as solvents used for extraction, conditioning and elution of analytes and properties of sediments like organic matter content and granulometry have been studied. The final analyses were performed LC-MS/MS method developed by Białk-Bieliska et al. [1].

The optimized method was applied for the analysis of sulfonamides residues in sediment samples collected from the Polish coastal zone during r/v "Oceania" cruises in 2008 and 2009.

**Results:** The developed SPE procedure, applying Strata-X cartridges proved to be effective (absolute recovery >65 %) for almost all sulfonamides and types of sediments. Presented method was optimized and validated for its performance parameters and was characterized by very good selectivity, linearity ( $R^2 > 0,99$ ), precision (<10 %), repeatability (<10 %), accuracy and low limits of quantification (LOQ) in the range of  $\text{pg g}^{-1}$  of sample. The concentrations of analysed compounds in the collected samples were in the range of  $\text{ng g}^{-1}$  d.w. Generally, the highest values were observed for sulfadimethoxine.

**Discussion:** There are considerable deficiencies in the marine waters monitoring of the residues of so called new emerging pollutants like antibiotics and personal care products which are nowadays recognized as one of the most important toxicants. For these reasons methods of measuring such new organic pollutants. The concentrations of 10 sulfonamides have been determined in sediments from the southern Baltic Sea for the first time. These findings revealed that the residues of these bioactive compounds were present in this coastal ecosystem and may pose negative biological effects. Particular emphasis should be placed on investigating the influence of sulfonamides to microorganisms.

**Acknowledgements:** The investigations were carried out in the frame of project funded by Polish Ministry of Science and Higher Education (N N306 300536).

**References:** [1] Białk-Bieliska et al. (2009) *Talanta*, 80, 947-953.