

# **Is the divinylbenzene passive sampler a useful tool for measuring hydrophilic endocrine disrupting compounds in the marine environment?**

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## **Abstract**

Even at low levels endocrine disrupting compounds (EDCs) are known to exert harmful effects on marine organisms and the aquatic ecosystem. However, current analytical methods, using low volume grab samples, are not able to detect and quantify EDCs at such low concentrations. To reduce the detection and quantification limits of EDCs, passive samplers may offer the solution. Besides that, passive sampling devices mimic the pollutant uptake by aquatic organisms, leading to better toxicological assessments. To date, passive samplers have rarely been used in the marine environment for screening and measuring of EDCs. In this study a novel hydrophilic divinylbenzene passive sampler was deployed in the Belgian Part of the North Sea (BPNS). Passive samplers were deployed at 3 m depth in the BPNS at 3 locations: the harbours of Ostend and Zeebrugge, and open sea (in front of Zeebrugge; 51°N 21.609', 3°E 8.0806'). To evaluate the performance of the passive samplers, high volume grab samples were taken at the same coordinates and depth below the water surface. Both the passive samplers and grab samples were extracted and analysed using in-house validated multi-residue methods targeting 55 EDCs with a broad polarity, i.e. ranging from log  $K_{ow}$  1.4 to 7.9. The multi-residue method was developed on an ultra high performance liquid chromatograph coupled to a hybrid high-resolution mass spectrometer (Q-Exactive™). Results on the divinylbenzene passive sampler its potential to capture a broad polarity range of EDCs in the North Sea will be presented. Besides, a comparison between the EDC concentrations derived from the hydrophilic divinylbenzene passive samplers and the concentrations obtained from the corresponded grab samplers will be made. Finally, the potential of the novel divinylbenzene passive sampler coupled to the multi-residue method to identify unknown EDCs at ultra-trace contamination levels in the North Sea will be discussed. The use of hydrophilic divinylbenzene passive samplers in combination with the in-house multi-residue method is an important first step towards not only measuring hydrophilic EDCs, but also future European legislations and monitoring programs.

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