Toxicity of coastal waters: use of a quick algal bioassay


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Optimization of the SPE step in the analysis of β-blockers and β-antidromes in natural water samples by SPE- GC technique

MF Cabau, A Michalak, M Cizekwa, M Nigowska, M Kwiatkowski, P Stepnowski, J Kumiska

Environmental sampling techniques, especially sewage and marine water samples are complex and often contain interfering elements that can mask or interfere with the analysed pharmacueticals. Universities of Gdansk, GDANSK, Poland

Enzymatic pre-treatment of sewage and marine water samples is complex and often interferes with the extraction of pharmacueticals. This work describes an alternative strategy for these samples, using a combination of SPE and GC-MS. The optimization of the SPE step was done using different SPE sorbents and evaluated using spiked standards.

TU 084 Construction of a water toxicity sensor based on luminescent bacteria

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A new prototype of a portable water monitoring device has been developed at KWR. The bacteria are fixed on an optic fiber or a glass slide and placed in a continuous water flow. The light generated by the bacteria is then measured by photomultiplier tubes. The current prototype is highly adjustable and allows control of pH, temperature, flow, and pressure. Additionally, it is possible to add nutrients as well as to add compounds to the water. This sensor prototype is being tested in both the laboratory and monitoring sites along dutch rivers. The ultimate aim is to develop a sensor that measures several types of toxicity and can be applied continuously in the field, both at surface water inlets and in the distribution network.

TU 085 Toxicity of coastal waters: use of a quick algal bioassay

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A new quick algal bioassay for the determination of toxicity in coastal waters was developed. The assay utilizes the bacterial bioluminescent GLoBios and is based on the detection of bacteria when exposed to toxicants. This method is fast, sensitive, and inexpensive and can be used to detect toxicants in coastal waters.

TU 083 Towards a common mass spectra database for the identification of unknowns in environmental samples

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5Microcystis, highly toxic cyclic peptides, are a group of hepatotoxins produced by a number of aquatic species of cyanobacteria, such as Microcystis, Anabaena and Plankothrix. Worldwide, concentration in water has grown in recent years as a result of eutrophication and climate change. The database is used to identify unknown compounds in aquatic samples.

The identified unknown active chemical is still time and cost consuming due to the complexity of each active fraction (e.g. mixture effect). Hence, further fractionation steps are often needed. This approach is used to develop and test the use of a first pre-fractionation step on SPE that will be followed by a RP-HPLC fractionation. First the separation of 12 EDCs have been evaluated with several elution conditions. Silica columns with 4 step elution (heptane, heptane/dichloromethane (50/50, v/v), ethyl-acetate and methanol/water (50/50, v/v)) were chosen for the isolation of these compounds. However, the identified unknown has not yet been chosen for these investigations.

For these investigations, recoveries were assessed for the mixture alone and for a blank sediment extract spiked with this mixture. Finally, a natural sediment known to exert estrogenic, PXR X- and CAR-mediated activities in an in vitro assay. Good mixture recoveries (74-110 %) were obtained. The fractionation F1 contained only the PCBs and the PHEs, whereas 4-tert-octylphenol, triphenyl phosphate and fenobibrate were detected only in F2. Finally, steroids, bisphenol A and clortalazone were found in F3 while F4 contained more polar chemicals.

Fractionation on natural sediment allows isolation of TCDD-like activity in F1 and F2 while PHE-like activity was detected in F1, F2 and F3. Then estrogenic compounds were only detected in F2 and F3. Interestingly, the sum of the estrogenic activity found in these 2 fractions is higher than that of the crude extract, which indicates the occurrence of anti-estrogenic chemicals. Finally, PXR-like activity was mainly detected in F3.

TU 081 Priming the global LIM database: data addition, curation and dissemination

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The global LIM database is a website that was developed to provide data on the presence of toxicants in the environment. The database is used to develop and test the use of a first pre-fractionation step on SPE that will be followed by a RP-HPLC fractionation. First the separation of 12 EDCs have been evaluated with several elution conditions. Silica columns with 4 step elution (heptane, heptane/dichloromethane (50/50, v/v), ethyl-acetate and methanol/water (50/50, v/v)) were chosen for the isolation of these compounds. However, the identified unknown has not yet been chosen for these investigations.

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This work describes the application of selected SPE sorbents: C18 bonded silica gel (Strata C18), copolymers (Osiris HLB, Strata X, and Lichrolut EN), functionalized copolymers (Isolute ENV+), mixed-mode sorbents (monolithic silica), as well as a safe drinking water sorbent (SPE Strata C18). This selection was made by a commercial service (Strata Select C18 for extraction of six β-blockers [acetobutanol, atenolol, metoprolol, nadolol, propranalol, pindolol], and two β-antidromes [terbutaline, salbutamol]) from natural water samples. Parameters such as pH of the loading samples, the amount and kind of solvents used in conditioning, washing and eluting steps, were selected and optimized. The obtained extracts were evaporated to dryness, subjected to silylation using BSTFA, and finally analysed by GC-FID technique. The recovery of the analytes form natural water samples in the mentioned above SPE conditions will be discussed.

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TU 082 Mustard fractionation based on normal phase SPE and reverse phase HPLC (RP-HPLC) for isolation of endocrine disrupting chemicals in environmental extracts

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Effected Directed Analysis (EDA) approach aims to identify adverse pollutants by reducing the complexity of environmental matrices. Single hyperfractionation combined to biosays is sufficient to link direct chemicals and to direct knowledge to the so-called "classical" pollutants. However, although the emergence of promising chemical tools (e.g. Octbitrap), identification of unknown active chemicals is still time and cost consuming due to the complexity of each active fraction (e.g. mixture effect). Hence, further fractionation steps are often needed. The aim of this study was to develop and to test the use of a first pre-fractionation step on SPE that will be followed by a RP-HPLC fractionation. First the separation of 12 EDCs have been evaluated with several elution conditions. Silica columns with 4 step elution (heptane, heptane/dichloromethane (50/50, v/v), ethyl-acetate and methanol/water (50/50, v/v)) were chosen for the isolation of these compounds. However, the identified unknown has not yet been chosen for these investigations.

For these investigations, recoveries were assessed for the mixture alone and for a blank sediment extract spiked with this mixture. Finally, a natural sediment known to exert estrogenic, PXR X- and CAR-mediated activities in an in vitro assay. Good mixture recoveries (74-110 %) were obtained. The fractionation F1 contained only the PCBs and the PHEs, whereas 4-tert-octylphenol, triphenyl phosphate and fenobibrate were detected only in F2. Finally, steroids, bisphenol A and clortalazone were found in F3 while F4 contained more polar chemicals.

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