INRAM

The use of integrated passive samplers as a source of contaminant mixtures in ecotoxicological laboratory experiments

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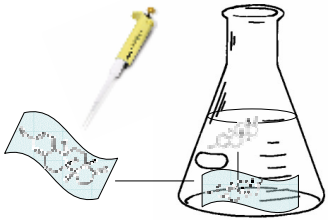
Introduction

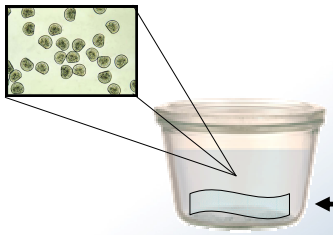
In conventional laboratory ecotoxicity studies, test organisms are exposed to various (high) concentrations of a single test compound. This clearly does not reflect *in situ* conditions: i.e. exposure to low levels of a complex mixture of micropollutants. In order to expose organisms to environmentally realistic contaminant mixtures, this study explores a novel use of integrative passive samplers. When used in contaminated seawater, these devices absorb the pollutants by diffusion; when subsequently transferred to uncontaminated water, the pollutants are released. Experiments were conducted to examine the use of passive samplers as a source of pollutant mixtures in laboratory ecotoxicity assays. As these passive samplers also allow to determine the aqueous concentrations of otherwise (nearly) undetectable trace compounds, they promise to be a powerful new tool in environmental risk/impact assessment.

Methodology

Laboratory studies

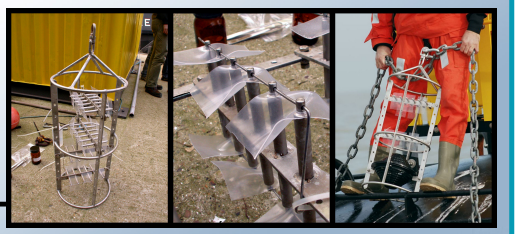


Experiments with spiked passive samplers to study the equilibrium dynamics



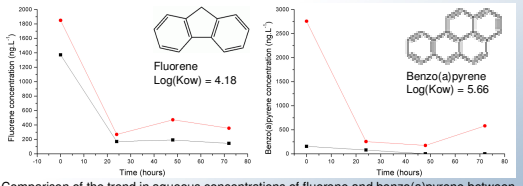
Larval development tests with oyster larvae exposed to mixtures desorbed from passive samplers.

Field work



Deployment of passive samplers in the harbours of Oostende, Nieuwpoort and Zeebrugge, and in the North Sea.

Results



Comparison of the trend in aqueous concentrations of fluorene and benzo(a)pyrene between conventionally prepared solutions and solutions prepared with passive samplers.

: conventionally spiked solutions, : solutions prepared with passive samplers

- **Steady concentrations achieved after initial decrease**
  - **higher than with conventional spiking**
  - **below expected concentrations**
- **Benzo(a)pyrene concentrations stay above detection limits only in the medium with passive samplers**
- **Promising results, but more research on equilibrium dynamics needed to improve contaminant release during toxicity tests**

- **Severe effects of contaminant mixtures collected in all coastal harbours (at environmentally realistic levels)**
- **Clear differences in normal larval development were observed between and within harbours**
- **First results from the chemical analysis show toxicity might be related to PAH pollution. No clear relation with organotin concentrations was found.**

Organotin concentrations in the watercolumn of the three harbours (NP: Nieuwpoort, OO: Oostende, ZB: Zeebrugge).

PAH concentrations (sum of 22 PAHs) in the watercolumn of the three harbours (NP: Nieuwpoort, OO: Oostende, ZB: Zeebrugge).

Partners

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