High Throughput Effect-Directed Analysis for the identification of Chemicals of Emerging Concern

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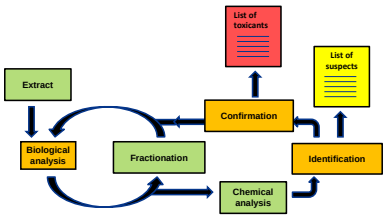

Fig. 1 Concept of Effect-Directed Analysis

Effect-Directed Analysis (EDA) is steadily maturing into a powerful approach for investigative monitoring of the environment including identification of Chemicals of Emerging Concern (CECs). The combination of in vitro toxicity testing and microfractionation of complex extracts using liquid chromatography (LC) has proven its suitability to prioritize mass spectral features from datasets obtained through suspect and nontarget screening using high resolution mass spectrometry (HRMS). This prioritization, based on the direct linkage between mass spectral features, chromatographic peaks and the observed toxicological effects in the microfractions, enables the successful identification of environmental toxicants[1]. By harmonizing the fraction collection format with that of the in vitro bioassay used to direct the analysis, e.g. into 96-384 well plate format, higher throughput is obtained while simultaneously achieving a higher identification success rate due to the less complex composition of the narrow time interval fractions, i.e. in the order of a few seconds. In addition, progress with regard to the compilation of a chemicals database to support the HRMS data evaluation work flow has added to the success of EDA. Using this high throughput EDA platform, environmental pollutants with estrogenic, (anti)androgenic and mutagenic activities have been identified. Currently, the platform is expanded with the inclusion of an assay for the assessment of thyroid hormone disruption based on a fluorescent readout (FITC-TTR assay[2]) that enables higher throughput in comparison with its radioligand analog.

[1] N. Zwart et al. *Env. Sci. Technol.* **2018**, *52*, 4367-4377.

[2] X. Ouyang et al. *Chemosphere*, **2017**, *171*, 722-728.