**Effect-directed analysis with TLC in combination with non-target screening using HPLC-HRMS – A promising concept in environmental analysis to prioritize and identify contaminants**

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Through frequent use, a wide variety of organic compounds, such as pharmaceuticals, pesticides, industrial or household chemicals, find their way into the environment via waste water, agriculture, contaminated sites, or street run-off. Through transformation processes in the environment and during waste water treatment, the number of compounds is increased further. These anthropogenic substances represent a potential risk to the aquatic environment and thus to drinking water resources as well.

To record the wide variety of substances, in addition to the analysis of the individual substances, non-target screening by means of high-performance liquid chromatography coupled with high-resolution mass spectrometry (HPLC-HRMS) is used. The non-target screening also makes it possible to detect substances which were not expected.

Even when a toxicological test is done parallel to non-target screening, matching a detected compound to an effect is possible only with difficulty. In addition, the prerequisite is that the analytical system used also be able to detect the effective compound. A solution that utilizes the combined approach of physical-chemical analysis and *in vitro* bioassay is effect-directed analysis (EDA). In EDA, the sample, which usually has a complex composition, is first fractionated in a separation process and then examined further in a biological testing system. By matching effect and fraction, identification of the substance(s) triggering the effect is substantially more probable.

As an example, the combination of high-performance thin-layer chromatography (HPTLC) and the luminescence-inhibition test *with Aliivibrio fischeri* has been used to isolate and identify single environmental contaminants. High-performance thin-layer chromatography (HPTLC) is an open separation system. The fractionation is done continuously through the position of the substances on the HPTLC plate. The separation is detected after chromatography based on the position of the substances on the stationary phase. There are also other bioassays used in HPTLC-EDA for example *Bacillus subtilis* (antibacterial effect), yeast oestrogen screen (estrogenic effect) or acetylcholinesterase inhibition (neurotoxicity).

The combination of effect-directed analysis and non-target screening, respectively, represents an effective tool in raw water monitoring.