

FractioMate™

FASTEST IDENTIFICATION OF WATER HAZARDS



Spark
H O L L A N D

VU  **VRIJE
UNIVERSITEIT
AMSTERDAM**



SECURING THE SOURCE OF LIFE

VU and Spark Holland proudly introduce FractioMate™

Of course you know that our planet contains more than 70% of water. It is the source of every form of life on earth. We can't live without it.

All kinds of emerging contaminants, including pharmaceuticals, endocrine disrupting compounds and perfluorinated compounds, are present in the aquatic environment, wastewater and drinking water sources. In addition, numerous bioassay surveys have demonstrated the presence of not yet identified compounds with toxic activities in the environment, which is evidently of high concern. For example, genotoxic and endocrine disrupting compounds may lead to DNA damage, to disruption of development and reproduction and/or to cancer.

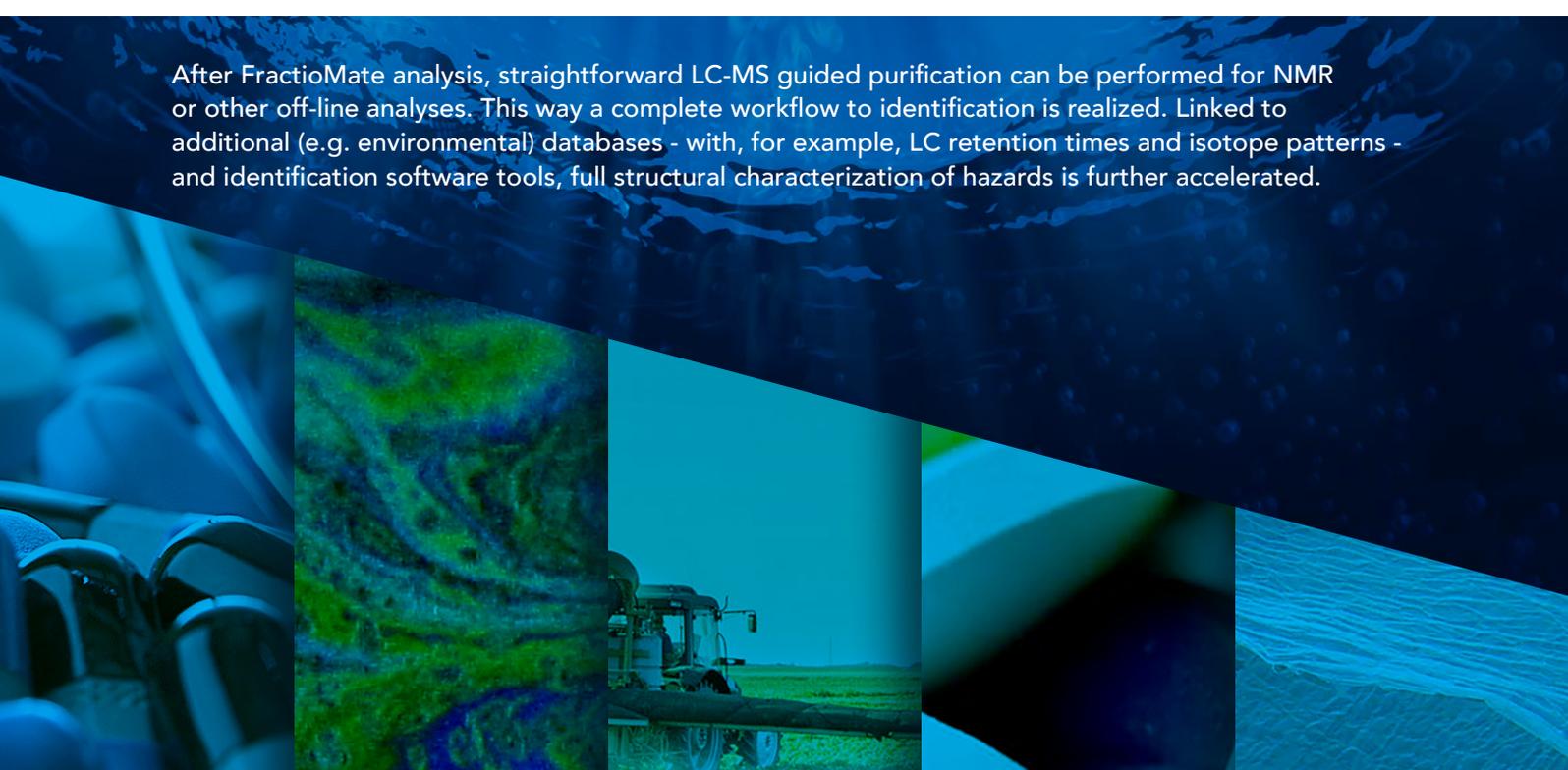
Therefore, the importance of paying attention to emissions and pollution is rising with each day. We have to ensure ourselves, for the sake of every living being, that the water we drink or use is 100% pure. Mistakes are inadmissible. To make sure of this, we introduce FractioMate™.

FASTEST IDENTIFICATION OF WATER HAZARDS

FractioMate™ converts complex, costly and lengthy EDA studies into robust, rapid and sensitive analyses which also significantly increase toxic compound identification.

- **Direct integration of biological and chemical lab.**
- **Lengthy EDA studies reduced to a few days.**
- **Capacity increase by orders of magnitude; resulting in 5 to 10 samples per week.**
- **Integration results in much faster correlation of bioactivity / toxicity to accurate mass.**

After FractioMate analysis, straightforward LC-MS guided purification can be performed for NMR or other off-line analyses. This way a complete workflow to identification is realized. Linked to additional (e.g. environmental) databases - with, for example, LC retention times and isotope patterns - and identification software tools, full structural characterization of hazards is further accelerated.



THE SOLUTION TO REPEATED SEPARATION AND FRACTIONATION CYCLES

Fraction collection of liquid chromatographic (LC) separations can be utilized for analyte purification, but also for applications in which a detection technique cannot be coupled online to LC due to compatibility issues. Fractionation is commonly applied in environmental toxicant screening, drug discovery research and food chemistry when chemical analysis is combined with bioassay testing for the identification of bioactive substances. In these types of studies fractionation is required to reduce the sample complexity until preferably only one single compound is present in a fraction. Subsequently, each fraction is tested for biological activity and the detected bioactives are potentially identified.

Alternatively, this approach is used to purify enough material for typical off-line analyses such as NMR. This traditional process usually requires many orthogonal separations to obtain the pure compounds for chemical structure elucidation and furthermore many repeated fractionation cycles are required for analyte isolation. This altogether makes this process very costly,

time consuming and prone to analyte losses. In environmental chemistry, this huge bottleneck has recently been solved by establishing High-Throughput Effect-Directed-Analysis (HT-EDA) which shifted traditional EDA towards high resolution small-volume fractionation. The crucial technology advancement in this platform, integrating both biological and chemical analysis directly after separation into one system, is the FractioMate™.

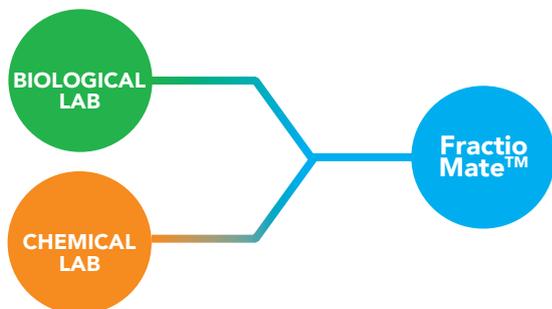
The FractioMate™ is a contact-free high-frequency droplet ejection spotter device for HT-EDA. It is the bridging unit integrating biological toxicity responses with chemical data, such as mass spectrometry. The unit is placed directly post-column after chromatographic separation thereby allowing high resolution fractionation of an environmental extract, while at the same time via a split chemical data such as mass spectrometric data is acquired.

VU and Spark Holland have joined forces in developing an accurate solution for water screening, complying to the highest standards. Combining the full power of state of the art hardware and validated applications, results in an unprecedented potential in water analysis. Quick and robust.

Healthy living, quality of life and sustainability are at the center of the Vrije Universiteit's research and education ambitions. In the BioMolecular Analysis group and the department of Environment & Health of the Faculty of Science, excellent research and training to better understand the impact of environmental contaminants on human health and the environment is carried out. For HT-EDA research the FractioMate™ was developed in close collaboration with the VU Engineering Groups on Electronics and Precision Mechanics. Under the name Tec4Science this development is made available for other research groups outside the VU.

Spark Holland's area of expertise is liquid handling and sample preparation in analytical systems. Based on our own engineering, we translate that into concrete high-tech products. Such as autosamplers, pumps, dried matrix spot, sample preparation systems, or other automated liquid handling modules. We have a reputation to uphold when it comes to the seamless integration of our knowledge into 'larger' analytical measurement systems.

This new technology allows to integrate and directly connect biological analysis labs with chemical analysis labs. These two types of laboratories are nowadays in most cases still two separately operating labs in environmental analysis institutes and laboratories.

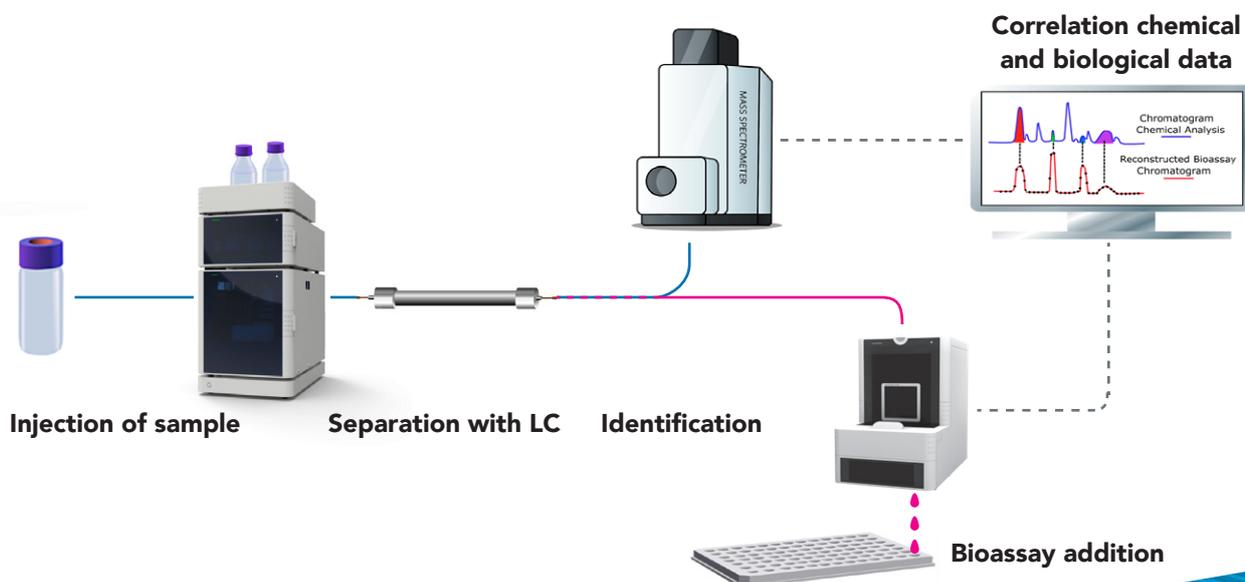


As the technique has proven to reduce the typical analysis time of one traditional EDA study from several months up to a year for one environmental extract, to maximum a few days for both measurement and data analysis time of multiple environmental samples, this is a huge step in identification of merging contaminants of concern. Complete EDA studies have this way been changed to robust analyses to be run on weekly basis in environmental labs. The new FractioMate™ therefore should be of interest for labs focusing at screening of environmental samples for unknown toxicants. **The FractioMate™ will integrate biological and chemical analysis labs.**

Of course, the technology can also be implemented in food safety analysis, natural product drug discovery pipelines, for studying the chemical and biological properties of drug-like metabolic mixtures simultaneously in pharmacological settings, and for profiling biopharmaceutical preparations. The design of the FractioMate™ allowing long-term robust and accurate low volume droplet deposition on flat surfaces in high resolution can additionally be of interest for matrix assisted laser desorption ionization (MALDI) purposes.

High Throughput Effect Directed Analysis - FractioMate based on the SPARK Integrity as linking technology for chemical and biological analysis

Compounds in a sample are separated with liquid chromatography (LC). Subsequently, the eluent is split where one part is transferred by means of the innovative FractioMate spotting technology to a high-resolution bioassay (e.g. 96 or 384 well mammalian or yeast-based cellular format) to test the biological activity of eluting compounds. The other part is directed to a mass spectrometer. Peak shapes from 'reconstructed bioassay chromatograms' using the individually collected and bioassayed fractions are efficiently correlated to compound accurate masses from the parallel obtained chemical data (in most cases MS data).





**FractioMate™ is a VU product,
using the Spark Holland Integrity™ platform.**

SPECIFICATIONS

FractioMate™

Optimized for UHPLC
Low dead volume spotting / dispensing
Standard configuration for two well plates
Suited for most liquid chromatography post-column fractionation applications

- Adjustable 1s > well fractionation time
- Dispense precision $\leq 4.4\%$ CV
- Standard 96 and 384 well plate spotting for nanofractionation
- Flow rate 10 μ l/min – 1ml/min
- Spot volume 0.1 μ l- 1.7 μ l
- Spotting frequency 1-50Hz

Options

- Optional MALDI plate spotting
- Optional 1536 well plate spotting for nanofractionation
- Optional true 4 °C sample cooling of collection plates
- Optional up to 4 well plates or 216 standard sample vials

ORDERING INFORMATION

FractioMate™

For quote or product information please refer to:
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All products are for Research Use Only (RUO), unless specifically labelled otherwise.





Specifications are subject to change

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