

Ingénieur de recherche / MSc

12-month contract starting February 2023

Development of two-dimensional liquid chromatography and supercritical fluid chromatography for small organic positional isomers

Keywords: liquid chromatography, SFC, two-dimensional liquid chromatography, high-resolution mass spectrometry

The objective of the collaborative project between ARKEMA and the Institute of Analytical Sciences (ISA) is to assess the potential of two-dimensional chromatography for the characterization of complex products and in particular the contribution to distinguish molecules appearing during an organic chemistry reaction. The Institute of Analytical Sciences has been developing for many years multidimensional chromatographic techniques coupled with mass spectrometry for the analysis of mixtures of very high molecular complexity (analogs and positional isomers). The difficulty in developing methods in multidimensional chromatography lies in the selection of very different interaction mechanisms (orthogonal methods), in order to increase the occupation of the separation space and thus to access the maximum peak capacity for the separation of neutral compounds. The company ARKEMA is eager to characterize the small organic molecules appearing during its industrial process. However, the high complexity including the number of molecules and the numerous positional isomers make one-dimensional liquid chromatography unefficient. In this project, different LC retention mechanisms will be screened and an online LCxLC- MS separation will be optimized. Furthermore, SFC mechanism will be evaluated. The method development will be carried out using single-quad MS, and the optimized 2D method will be hyphenated to HRMS. Potentially, MS/MS or IM-MS could be investigated. Comparison of samples using the selected 2D method combined with high-resolution mass spectrometry will allow the annotation of reaction markers. The most relevant molecules may be isolated using preparative chromatography and analyzed using high-field NMR (600MHZ). The determination of structures will eventually be done using multidimensional NMR experiments (1H,1H and 1H/13C correlation).

The candidate would be in charge of the literature review, the conduct of one- and two-dimensional chromatographic experiments, including liquid chromatography and SFC, as well as data handling and results reporting to both academic and industrial partners. He/She will join a team of 6, including postdocs and PhD students, working on state-of-the-art analytical equipments (Including UHPLC, SFC, online LCxLC, IM-QToF). English and French are daily spoken.

Minimum Qualifications:

MSc or “diplôme d’ingénieur” in analytical chemistry (or a related field)

Prior experience with liquid chromatography or supercritical fluid chromatography is mandatory

Preferred Qualifications (are a plus, but not compulsory):

Prior experience with mass spectrometry

Advanced training in chromatography theory

Experience developing chromatographic methods

Experience with two-dimensional liquid chromatography

Programming experience (e.g., Matlab) and/or experience with advanced data analysis

Experience writing publications

Documents must be sent to Karine Faure (karine.faure@isa-lyon.fr), including

- Letter of application that addresses the position qualifications
- Curriculum vitae (including list of publications if applicable)
- The names and contact information for professional references. Please do not ask references to submit letters of recommendation; the committee will conduct reference checks by phone.

Review of applications will begin immediately and continue until the position is filled. At this time, please only send the required documents listed above. Incomplete applications will not be considered by the search committee.

Location: Institut des Sciences Analytiques, 5 rue de la Doua, 69100 Villeurbanne (Lyon area, France)

Start of contract : February 2023