Jean-Hugues RENAULT,
Professeur des Universités in Pharmacognosy since 2009 and assistant professor from 1997. He is in charge of a research team in Institute of Molecular Chemistry of Reims (UMR CNRS 7312): "Methodological development in support-free liquid-liquid techniques" consisting of 1 Associate professor, 1 assistant engineer and 2 post-docs and 3 PhD students.
He has authored around 95 publications and patents in the field of phytochemistry and separative sciences with both academic and industrial partners. His current research interests focus on new applications of novel liquid-liquid separation technology and on new development in complex mixture chemical profiling and de-replication.

More precisely the "Natural Product Chemistry" research group has specialized for 30 years in the molecular chemistry of natural products. ICMR has developed technology which covers subject areas ranging from natural resources to identified and characterized molecules. These research areas concern the development of new processes - mainly based on Centrifugal Partition Chromatography, the structural elucidation of complex natural products, the development of original NMR methods, mainly in the field of data analysis and computer assisted structure elucidation (CASE).

- CASE tools developed in our Insitute were designed for the analysis of pure compounds. Purification is a mandatory step for organic chemists, as far as it is nearly impossible to publish the structure of a new compound without its isolation at the highest possible purity level. The thorough purification of the compounds of an extract requires an important investment in equipment and human time. Therefore, the early identification of known compounds, a task also known as dereplication, when carried out in mixtures, is a way to save time and to concentrate on the structure elucidation of new compounds. Recent developments in this field led to the setting up of the workflow named CARAMEL (after CARActérisation de MÉLanges, in French, meaning mixture characterization), that combines separation, spectroscopic, data classification, and databasing tools.
- Centrifugal Partition Chromatography is a support-free liquid liquid separation technique based on the partitioning of solutes between two immiscible liquid phases. A CPC column consists of a series of partition cells linked by ducts in cascade and arranged in a centrifuge. One liquid phase, the stationary one, is maintained inside the column by the centrifugal acceleration field generated by the column rotation, while the other liquid phase, the mobile one, is pumped through it. There is thus no solid chromatographic support. As a consequence, CPC can generally support larger mass overload than silica-based chromatography, which normally should make it especially suitable for preparative or production applications. It was highlighted that high productivities can be reached with CPC, especially when used in the displacement mode. A CPC model interfacial mass transfer in continuously stirred tank reactors in series was developed in collaboration with the University of Nantes (Dr. Luc Marchal) to predict separations on CPC column at the optimized operating conditions and to guide the CPC user in its scale-up strategy.

Since 1997, he has been the scientific responsible of more than 20 research projects, funded or co-funded by industry, ANR, CPER, European Union for a total grant amount of about 2.5 million euros.
He has been the advisor or co-advisor for 12 PhD and 9 postdoc students.

He was the research coordinator of the Health sector for University of Reims Champagne-Ardenne and in charge of valorisation and technological transfer aspects from 2012 until 2016. Since junuary 2018, he is director of the Institute of Molecular Chemistry of Reims (UMR CNRS 7312).
Insitute Identity : Molecular Chemistry

The research work done at the Institute of Molecular Chemistry encompasses various basic aspects of molecular chemistry: synthetic methodology, reactivity and molecular engineering, green chemistry, advanced analytical methods, with many projects interfacing with

- fine chemistry, biomass valorization
- life sciences (biomolecules, pharmaceutical chemistry, cosmetics)
- environnemental sciences (diagnosis, prevention, remediation),
- materials science (elaboration, structural and functional properties)

Organization

The Institute is organized into 5 Research Groups

- Methodology for organic synthesis
- Biomolecules: synthesis and action mechanisms
- Coordination chemistry
- Isolation and structure of natural products
- Functional polymer and networks

Academics, Staff and Students

About 110 people are currently working in the Institute

- 42 academics
- 12 CNRS staff (5 senior researchers, 2 junior res., 5 engineers)
- 18 engineers, technical and administrative staffs
- 35 graduate students and post-doctorants

Fields of Expertise

Organic synthesis – Catalysis – Coordination chemistry – Therapeutical chemistry – Natural substances – Separation methods – Organic structural analysis – Macromolecular chemistry – Encapsulation – Chemical valorization of biomass – Molecular modelling – Pharmaceutical Technology – Polymer materials - Environmental chemistry – Enzyme inhibition

Main Scientific Equipments :

- NMR spectrometers at 250, 300, 500 and 600 MHz (Solution, HR-MAS, solid state, imaging)
- ESR spectrometer
- Mass spectrometers : MALDI-ToF, GCT, ESI-Q-TOF
- X-Ray Diffraction
- Atomic emission and absorption spectrophotometers (ICP-AES)
- Spectrofluorimeters
- Potentiometry, voltamperometry, polarography
- UV-visible, FTIR (MIR, NIR, ATR), Polarimeters
- Chromatographic methods CPC, HPLC, GC, FPLC, LC-MS, GC-MS, CES
- Pilot Extraction Plat-form (grinder, centrifugators, L/L, ASE, EPC,
- extractors, …)
- Microanalysis (C, H, N, S)
- Malvern nanosizer (DLS, SLS)
- Peptide synthetizer, oligonucleotide synthetizer
- Radiation sources and processors (UV, electron beam)
- Mini-extruder, tensile testing machine
- Thermophysical analysis (DSC, DMA)
- Plat-form for molecular modelling (Romeo URCA)