Supercritical Encounter in Strasbourg - Highlights of SFC 2018

By: J. David Pinkston, Board Member, The Green Chemistry Group

An enthusiastic crowd of scientists and vendors gathered recently in Strasbourg, France, for SFC 2018, the 12th International Conference on Packed Column Supercritical Fluid Chromatography. Sponsors of the meeting included Pfizer, Chiral Technologies Europe, Agilent Technologies, Waters, PIC Solution, Shimadzu, YMC as well as the following media sponsors: Chromatography Today, LCGC Europe and Select Science. The conference began with a well-attended short course on SFC and SFE (supercritical fluid extraction) on 17th October. Research presentations, discussions, social events, and vendor exhibits filled the following two days. Topics ranged far and wide in the worlds of SFC and SFE, but there were some general themes that emerged from the sessions:

1. **Robustness:** Once considered the Achilles' tendon of SFC, presentations illustrated a drive to robustness by SFC instrument manufacturers, along with a parallel drive by practitioners to demonstrate robustness and user friendliness. The conference began with an engaging presentation on this topic by Davy Guillarme (University of Geneva, Switzerland), who was followed by Claudio Brunelli (Pfizer, UK). Claudio focused on bringing the advantages of SFC into validated, quality-control methods used in manufacturing. This move is made possible by better instrument reliability, improved pumping and pressure-control designs, and better signal-to-noise ratios with UV-absorbance detection.

2. **A move to applications beyond pharma:** There has been a clear shift toward a broader range of applications of SFC. Caroline West (Univ. of Orleans, France) provided a broad summary of trends in the scientific literature, highlighting the move beyond pharmaceutical applications, and the growth of publications from China. Growing application areas include natural products, foods, flavour and fragrances, and bioanalysis. Cyrille Santerre (ISIPCA, France) illustrated this move with applications in the cosmetics and perfume areas. Many felt the growing adoption of SFC was due to improved efficiency per unit time compared to HPLC, rather than simply the 'green' nature of SFC. Some (such as A. Paige Wicker of the University of Texas at Arlington, USA) described on-line supercritical fluid extraction with SFC, demonstrating the 'tunability' of SFE to extract analytes and leave interferents, such as lipids, behind.

3. **Continued growth in prep scale:** There is continued growth in preparative scale SFC. This is the go-to prep method for all major pharmaceutical companies. Jeff Kiplinger (Averica Discovery, USA) focused on a practical workflow for tough purifications of molecules containing multiple chiral centres. Roberto Fronzoni (KD Pharma Bexbach, Germany) described production-scale purification of natural products. Vendors are responding to the growth in prep SFC with new and improved offerings.

4. **"Crossing the invisible barrier"** (coined by Caroline West): Takeshi Bamba (Kyushu University, Japan), Raffeal Bennett (Merck, USA), and others are using both SFC and HPLC in a single separation to obtain the best features of both, separating very nonpolar and polar analytes. This has become practical thanks to improvements in instrumentation.

5. **Fundamentals:** Eric Lesellier (University of Orleans, France), Terry Berger (SFC Solutions, USA), Abhijit Tarafder (Waters, USA) and others described a variety of fundamental studies of retention in SFC. These are critical to future growth in SFC. Oleg Pokrovsky (Russian Academy of Sciences, Russia) provided a study of the sometimes surprising behaviour of amine mobile-phase additives.

6. **And a shocking 'finale':** Perhaps the most shocking presentations of the conference described SFC of cationic and anionic inorganic ions and of polyvalent acids, and the simultaneous analysis of a pharmaceutical free base and of its salt (Marie Lecoeur, University of Lille, France). SFC of small, inorganic ions was never imagined as possible, and shows promise as an orthogonal method to today's 'ion chromatography'.

SFC 2018 demonstrated that the worlds of SFE and SFC are growing, vibrant fields of research and application. The Green Chemistry Group will feature further advances in SFC and SFE in two meetings planned for 2019, beginning with SFC Asia in April in Shanghai, China, followed by the next international meeting in Philadelphia, USA, on 29 September – 1 October 2019. See https://www.greenchemistrygroup.org/ for details.