

Studies on ultra-high resolution multidimensional and comprehensive 2D GC with MS for essential oil & aroma analysis.

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We have been engaged in the science of comprehensive two-dimensional gas chromatography (GC×GC) for some time now. There are a few truths that can be stated about GC×GC. 1. GC×GC offers an amazing potential to separate components in complex samples. 2. Essential oils, aromas and plant volatiles can be very challenging to separate, and identify. 3. The use of two complementary columns in GC×GC can make optimisation – and achieving best results – difficult. 4. Well resolved peaks in 2D should make quality of MS data much better, by removing underlying chemical interferences. 5. The opportunity to separate many more compounds SHOULD make the job of discovery much easier! 6. Sure, we can separate many compounds, but what about identifying them to an adequate degree of certainty?

We have learned much about the operation of GC×GC; the different separations that can be achieved for various sample types with different coupled column phases; it seems that every study should reveal new knowledge about samples.

Some of our studies address aroma profiling in sample-types relevant to flower attractants. We have also recently used a portable GC-MS system for fast profiling of essential oils in a native Australian botanic garden.

This presentation will highlight our MDGC and GC×GC approach; aroma/olfactory profiling methods for a variety of samples, including wine; use of MDGC for authenticity analysis of oils (e.g. saffron, and tea tree oil), including chiral analysis; and selected studies on unusual chromatographic behaviour of some compounds in GC that lead to either interconversion of compounds (e.g. oximes, such as those in Darwin's orchid, and *Nicotiana*) or degradations, that leads to poor quantification of these compounds. GC×GC is unique in its ability to reveal this effect.

Philip J Marriott is a Professor in the School of Chemistry, Faculty of Science, Monash University. His PhD was from LaTrobe University. He undertook postdoctoral research at the University of Bristol, UK. His first academic appointment (5 years) was at the School of Chemistry, National University of Singapore. He moved to his present position at Monash University in 2010. He received an Australian Research Council Discovery Outstanding Researcher Award in 2013, and has held Distinguished Professorships in Portugal, Korea and Brazil. His primary research is in GC and MS, specifically in comprehensive 2D GC and multidimensional GC, covering fundamental method development and a broad applications base. He has published 345 research papers and book chapters.

