

Chromatography helps in times of crisis

... Comprehensive two-dimensional gas chromatography a gestalt in separation science

Chiara Cordero

Dipartimento di Scienza e Tecnologia del Farmaco, Università degli Studi di Torino, Via Pietro Giuria 9, I-10125 Torino, Italy

Email: chiara.cordero@unito.it

Comprehensive two-dimensional gas chromatography (GC×GC) is a powerful analytical platform for effective investigations in food-omics domain. It combines the information capacity of profiling with the flexibility of fingerprinting strategies. Compared to mono-dimensional (1D)-GC, the comprehensive combination of two separation dimensions results in analytical platforms with remarkable separation power and enhanced sensitivity. In addition, the retention logic for structurally correlated components, generates 2D patterns that are distinctive sample fingerprints. As a gestalt “...a configuration or pattern of elements so unified as a whole that it cannot be described merely as a sum of its parts...”, GC×GC offers a perspective on samples’s compositional complexity that is particularly useful in challenging situations.

The contribution discusses, through applications developed in the author’s laboratory, the gestalt attitudes of GC×GC in food research. Within the complex volatilome of high-quality hazelnuts it will be presented fingerprinting strategies to detect spoilage patterns and to define robust markers of storage quality. By the characteristic volatile profiles of fermented and processed cocoa beans, it will be shown identification capabilities of 2D patterns generated by GC×GC- TOF MS. As a straightforward example, the potentials of Artificial Intelligence smelling based on sensomic principles, will be discussed for high quality extra virgin olive oils.