



HAL
open science

Development of a GCxGC-TOF/MS-based method to investigate the fate of 206 dioxin-related micro-pollutants during food cooking

Erwan Engel, Christelle Planche, Frederic Mercier, Laurent Debrauwer,
Jérémy Ratel

► To cite this version:

Erwan Engel, Christelle Planche, Frederic Mercier, Laurent Debrauwer, Jérémy Ratel. Development of a GCxGC-TOF/MS-based method to investigate the fate of 206 dioxin-related micro-pollutants during food cooking. 38. International Symposium on Capillary Chromatography / 11. GC X GC Symposium, May 2014, Riva del Garda, Italy. 1 p. hal-02740607

HAL Id: hal-02740607

<https://hal.inrae.fr/hal-02740607>

Submitted on 2 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Development of a GCxGC-TOF/MS-based method to investigate the fate of 206 dioxin-related micro-pollutants during food cooking

Erwan ENGEL¹, Christelle PLANCHE^{1,2}, Frédéric MERCIER¹, Laurent DEBRAUWER², Jérémy RATEL¹

¹ INRA, UR370 QuaPA, MASS group, 63122 Saint-Genès-Champanelle, France

² INRA, UMR1331 TOXALIM, AXIOM Platform, BP93173, 31027 Toulouse Cedex3, France

Food-producing animals are exposed to various dioxin-related compounds like polychlorodibenzo-p-dioxins (PCDDs), polychlorodibenzofurans (PCDFs) and Polychlorobiphenyls (PCBs). Due to their lipophilic nature, these micro-pollutants are rapidly transferred from the environment to animal edible tissues where they are bio-accumulated, thus representing a public health risk. Only a fraction of these micro-pollutants is bioaccessible to the consumer due to technological and physiological processes applied to the food matrix before and after ingestion. Therefore, worldwide food safety agencies encourage residue chemists to investigate their fate during processes like cooking or digestion in order to upgrade their risk assessment procedures. The aim of the present paper was to develop a multiresidue method based on GCxGC-TOF/MS in order to investigate changes induced by cooking in the composition of a complex food matrix spiked with 226 dioxin-related micro-pollutants. In a first step, a GCxGC-TOF/MS method was developed to achieve a satisfactory separation of the 209 PCBs and the 17 toxic PCDD/Fs in hexane. The best GCxGC-TOF/MS conditions were determined according to peak shape (width and symmetry), peak count and resolution and enabled to separate 206 dioxin-related micro-pollutants including the 17 PCDD/Fs. Starting with meat as a model matrix, the second step enabled to set up procedures for both micro-pollutant spiking and sample preparation. The later included Accelerated Solvent Extraction (ASE), Centrifugal Evaporation and Gel Permeation Chromatography (GPC). The performance of the ASE-GPC-GCxGC-TOF/MS method was assessed in terms of recoveries, reproducibility, linearity and LODs. In the third and final step, the multiresidue method was implemented to assess the modulating influence of cooking on meat content in the 206 dioxin-related micro-pollutants. The results are discussed in light of the current knowledge about mass and heat transfer occurring in meat during cooking and about physico-chemical properties of these compounds.

This study was supported by the French National Research Agency, project SOMEAT, Contract No. ANR-12-ALID-0004. Safety of Organic Meat. Available at <http://www.so-meat.fr>