compared mass spectrometric approaches for PAH determination in food

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Following the recommendation of the European Commission (2005/108/EC and 2005/208/CE) concerning the monitoring of polycyclic aromatic hydrocarbons (PAH) in food, analytical methods dedicated to 15 molecules have to be developed for assessment of food contamination.

The strategy used in the laboratory will focus on 15 compounds completed by 5 of the 16 US EPA compounds not because of their low toxicity but because of their high concentration in food. Strategy in term of extraction, purification and mainly mass spectrometric characterisation will be presented. The justification of the developed method will be given in term of recovery yield, selectivity, and sensitivity; it will include chronologically freeze drying, grinding, liquid/solid extraction of the dried sample versus pressurize liquid extraction (PLE) with or without florisil/alumina trapping, purification on co-polymeric phase (styrene-divinylbenzene). Regarding quantification aspects, the use of ^{13}C labelled internal PAH has been systematically decided, when available. The logical consequence was the choice of mass spectrometry as analytical and identification technique; this decision was justified by the need of sensitivity especially for the heaviest PAH such as indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene, benzo(g,h,i) perylene, dibenzo(a,l)pyrene, dibenzo(a,e)pyrene, dibenzo(a,i)pyrene and dibenzo(a,h)pyrene. Comparison of various GC-MS techniques including single quadrupole (Low Resolution selected Ion Monitoring), triple quadrupole (Selected Reaction Monitoring) and sector instruments (High-Resolution Selected Ion Monitoring) is discussed. Illustrations will be given on extracts resulting from various samples of different food origin. Ion chromatograms will be compared regarding limits of detection, capacity to produce several signals of diagnostic interest, and ability to deliver accurate and repeatable quantitative signals.

The application of this method will give a better appreciation of PAH concentrations in food and should permit to assess the risk of the consumer regarding these molecules. This work might be used on industrial process revisions, aiming to decrease the concentration of these compounds during production of some specific food, in the possible case of high concentration observed. At the same time more information concerning benzo(a)pyrene as a specific and representative marker for presence of PAH in food will be given.