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Filtering out carcinogenic polycyclic aromatic hydrocarbons from wood smoke used in food processing (fish/meat)

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Abstract

During the development of Project SmokLean a polyurethane foam containing activated charcoal has been developed. The foam has been produced with MDI diisocyanate and sustainable polyols (either natural or synthesized from natural products) designed to create an hydrofobic environment capable of capturing no less than 95% of the Polycyclic Aromatic Hydrocarbons (PAH) contained in smoke, generated by wood incomplete combustion, before it reaches the food smoking chamber. In particular, we are interested in reducing carcinogenic PAH in the smoke by using these inexpensive disposable foam filters, with minimum alterations in the food smoking instalation, minimum loss of pressure across the filter and minimal sensorial alteration of the product.

HPLC-DAD-Fluorescence was used to further develop official methods to quantify PAH by incorporating a new mobile phase program and a new internal standard synthesyzed in-house. Flow reduction during the better part of the runs generates significant savings in solvent cost.

Foam filters used in preliminary runs, at 60°C, for 30 minutes, were treated with a rotating abrasive surface and the generated powder was aspirated into a reservoir. The height of the filter was devided into four layers and the powder generated from each layer was extracted (82°C) in a Soxhlet apparatus for 6 hours, using acetonitrile. The extract was diluted to a fixed volume, analysed by HPLC and the chromatogram was used to plan the dilutions/concentrations needed for the quantitation above LOQ with the internal standard stock solution.

In-depth quantitative profiles of PAH retained in filters will be discussed.

Biography

Humberto Eduardo de Carvalho Santos Ferreira received his PhD in Pharmaceutical Chemistry from the University of Lisbon, majoring in HPLC/GC and Mass Spectrometry (40 years' experience). He is now a Senior Consultant for several industrial projects in Food Smoking, while lecturing in Organic Chemistry and Physical-Chemistry. His main contributions are in Steroid Chemistry, Biostatistics, and Optimization methods. At present his lab develops surfaces capable of selectively capturing cyclic hydrocarbons by Molecular Inprinting, including optical isomers of pharmaceutical interest (from turpentine) and bile acids. These surfaces could work as sensors for rapid detection and quantitation.

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