

POLYCYCLIC AROMATIC NITRO-HYDROCARBONS (PANH): THEIR OCCURRENCE IN SMOKED, DRIED, ROASTED FISH, MEAT

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Background:

The PANH are, like the PAH (polycyclic aromatic hydrocarbons), in many cases highly carcinogenic, even more than the well-known benzo[α]pyrene. They have been contaminants since mankind began using open firing with wood and roast products of hunting and fishing; however, only the last 20 years have seen systematical studies in order to detect and elucidate these compounds. Modern methods of cooking have lowered the risk of contamination distinctly. Roasting, grilling, and smoking of food, especially with possible contact with flames, may still represent considerable concern, regarding the carcinogenic potential of some of the PANH.

Objectives:

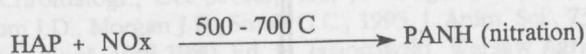
- To establish an improved and simplified HPLC (high performance liquid chromatography)-method which gives a limit of detection of below 0.1 $\mu\text{g/kg}$ and allows routine analysis of a large number of commercial foods.
- To get a comprehensive survey of the contamination of fish, seafood, and meat products.

Method:

- extraction of the PANH with acetonitrile (soxhlet)
- the clean up takes place on a Kieselgel-cartouche with a mixture of hexane/dichloromethane as eluent
- reduction of the PANH in alcoholic solution with Zn at pH 3.0 during 10 minutes
- chromatographic conditions: LiChrospher 60 RP-select B column, 250 mm x 3 mm; gradient elution with a mixture of methanol/water; detection with fluorescence detector equipped with variable wavelength
- limit of detection: 0.05 $\mu\text{g/kg}$ matrix
- recovery: $\geq 80\%$

Results and discussion:

The use of the proposed method showed that smoking is one of the principal sources of PANH in fish and meat products. Another possible source of contamination is the environment (exhaust and waste gas).



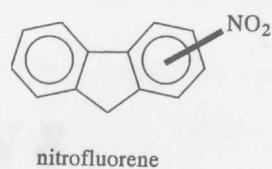
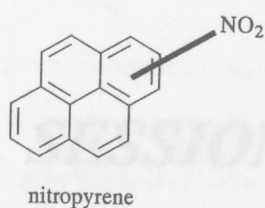
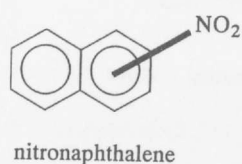
The most dangerous PANH for health (carcinogens) are fortunately found only very rarely and generally at a concentration far below 10 $\mu\text{g/kg}$.

Conclusions:

A HPLC-method is presented to quantitatively determine polycyclic aromatic nitro-hydrocarbons (PANH) in some 70 samples of fish and meat products. The limit of detection is as low as 0.05 $\mu\text{g/kg}$.

Data:

In the following table the highest concentrations ($\mu\text{g/kg}$) found in different matrices of 1- and 2-nitronaphthalene, 2-nitrofluorene, and 1-nitropyrene are given.



matrix (number of samples)	1- + 2-nitronaphthalene $\mu\text{g/kg}$	2-nitrofluorene $\mu\text{g/kg}$	1-nitropyrene $\mu\text{g/kg}$
smoked salmon (25)	0.237	0.198	< 0.05
other smoked fish from sea (21)	0.06	1.380	< 0.05
smoked trout (6)	1.471	0.705	< 0.05
smoked or roasted duck (10)	0.870	1.910	< 0.05
smoked or roasted turkey (4)	< 0.05	0.111	< 0.05
ham (2)	0.068	< 0.05	< 0.05

NOTES