

Mycotoxins are natural metabolism products of moulds which have a toxic effect on humans and animals. Just like micro-organisms which generate antibiotics, moulds which generate mycotoxins have spread all over the world. Aflatoxins are the most toxic form of mycotoxins. Some types of food show an increased risk of aflatoxin release due to fungal infestation: dried fruit, spices, nuts (peanuts, hazelnuts, pistachios) and grain (wheat, corn).

“Often entire ship loads of nuts or similar products cannot be released before the aflatoxin content is determined exactly. The method described here provides representative results in a very short time thus giving the supplier as well as the consumer optimum protection.”

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Detection of Mycotoxins in Nuts

Mycotoxins need certain conditions of temperature and humidity to form as well as sufficient nutrients. These conditions often occur with food when it is stored too long and in an unsuitable way. The result can be a complete family of chemical compounds instead of only one substance. As mycotoxins are temperature-resistant they are usually not destroyed when the food is processed.

PRELIMINARY AND FINE SIZE REDUCTION

For a sufficient extraction of the mycotoxins from the initial product, the sample must be reduced in size and homogenized. As the maximum permissible mycotoxin values range between 0.025 and 15 µg/kg and fungal infestation usually occurs in nests, a random sample taken from the bulk must be sufficiently large to allow for the detection of contaminants.

The first step is the preliminary size reduction of a representative amount of 1 - 2kg per ton of nuts with the Retsch Cutting Mill SM 100 to a particle size of 1 - 3mm. This mill is suitable for the rapid and gentle size reduction of dry materials down to a fineness of 0.25mm. The sample is then divided into representative sub-samples with the help of the rotary tube divider PT 100 which provides a very high division accuracy.

The subsequent fine size reduction is ideally carried out with Retsch's Ultra Centrifugal Mill ZM 200. This powerful rotor mill is easy and safe to operate and very versatile due to a wide selection of accessories.

For the processing of hazelnuts, the use of distance sieves is recommendable which have been specially developed for grinding temperature-sensitive brittle materials. As mycotoxins are lipophilic, the grinding process should be as gentle as possible to avoid the release of fat from the sample. A fineness of 300 µm is sufficient for the subsequent extraction of the mycotoxins from the sample.

EXTRACTION

For the extraction 25g of the homogenised sample are shaken in 200ml water/acetonitrile (16+84 v/v) for 60 minutes and are then filtrated. 100ml of the filtrate are extracted with 100ml petroleum ether. The petroleum ether phase can be disposed. An aliquot of the remaining phase is mixed with activated carbon / Al₂O₃ / Celite (7:5:3 - w/w/w) for 10 minutes and then centrifuged. The supernatant is evaporated and resolved in water.



Hazelnuts before grinding



SM 100

The solution is introduced to an immuno-affinity column, washed with water and eluted with methanol. The eluate can then be analysed by HPLC.

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

High Performance Liquid Chromatography (HPLC) is an analysis method which has various advantages such as high selectivity and reproducibility and very low detection levels.

For sample preparation, immuno-affinity columns are available for solid phase extraction (SPE). Retaining the

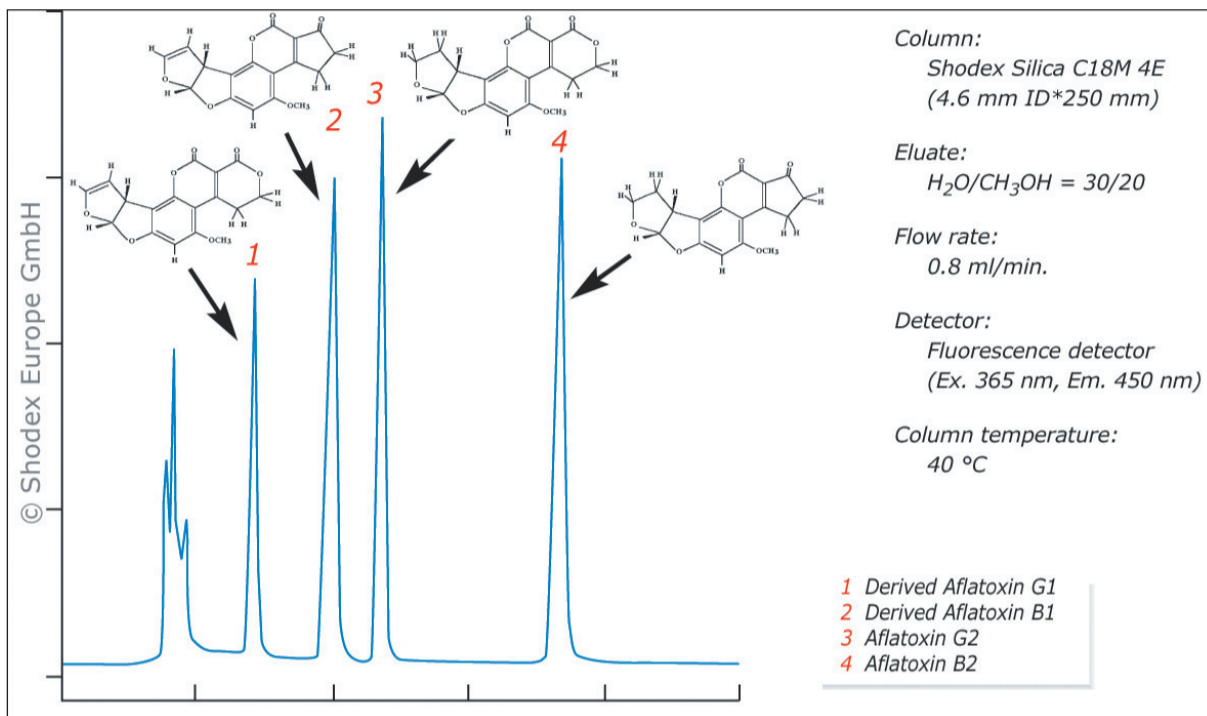


The result of preliminary size reduction

aflatoxins on selective binding antibodies they are separated from the matrix and afterwards released by elution with organic solvents. The resulting extracts can be analysed by RP18-HPLC detecting the mycotoxins by fluorescence after post-column derivatisation with bromine or iodine solutions. Often entire ship loads of nuts or similar products cannot be released before the aflatoxin content is determined exactly. The method described here provides representative results in a very short time thus giving the supplier as well as the consumer optimum protection.

CUTTING MILL SM 100

- Feed material: soft, medium-hard, elastic, fibrous
- Material feed size: < 60 x 80 mm
- Final fineness: 0.25 - 20 mm
- Defined final fineness by use of bottom sieves
- 3 different hoppers for different materials
- Samples subjected to low thermal stress



The graphic shows a typical chromatogram of a sample containing aflatoxin. It is possible to determine the type of mycotoxin as well as to make an exact statement about the quantitative contamination.

MOULDS WHICH GENERATE MYCOTOXINS



ALTERNARIA



the ultra centrifugal mill ZM 200

Amino Acid Analyser Applications for Food and Feedstuffs



The **Biochrom 30** is a dedicated amino acid analyser ideal for the busy industrial QC lab running 24/7. The Ninhydrin detection/ion exchange chromatography method is totally compliant with EU commission directive 98/64/EC and AOAC method for the determination of free and total amino acid content in food and feedstuffs.

Both the instrument and the method are robust, easy to use and economical to run. The column has a long life, is acid and base resistant and fully compatible with possible high concentrations of salts. It can be fully regenerated and re-optimised, enabling years of usage, controlling costs and minimising waste. A wide range of sample types can be run and thanks to the online post-column derivatisation of the amino acids with Ninhydrin, the precision on peak area is better than 1.5% RSD.

The peak separation is >95% on common amino acids profile (up to 45 amino acids in a single run with Lithium systems), including Taurine, Ornithine, oxidised amino acids such as Cysteic acid and Methionine Sulfone, and hydroxylated amino acids such as Hydroxyproline and Hydroxylysine. There is a choice of two buffer systems available, both

totally optimised for food and feedstuff analysis including an accelerated buffer system for high sample throughput labs.

Short methods are available for specific applications such as Lysine or Taurine content and there is a range of accessories to analyse Polyamines. Technical and Scientific Support is available worldwide from a dedicated amino acid analysis support team.

Circle no. 403

Supervised From Farm to Fork

According to estimates by the World Health Organisation (WHO), approximately 10% of the population in the industrialised nations become ill each year due to contaminated food. Scrupulous quality controls are not only an increasingly challenging task for health authorities, they also help to prevent scandals in the food industry, and are the best way to regain consumer confidence.

Particular emphasis is placed on the identification of pathogens in foods throughout all stages of food processing, from raw materials to consumers, also known by the slogan 'From farm to fork'.

In order to ensure quality throughout all stages of the production process, **Peka Kroef** has its own microbiological laboratory, where comprehensive testing is performed around the clock. An initial inspection is performed when the raw materials are delivered. Hygiene checks are performed regularly on all surfaces that come into contact with the products, the air-conditioning systems in production facilities are tested for the presence of airborne bacteria, and wastewater checks are also part of hygiene monitoring.

The microbiological tests at Peka Kroef are performed using leading technology equipment, such as incubators and heating chambers, supplied by the Binder. Here, the most important requirement for equipment is maximum temperature homogeneity in the test equipment interior. The Binder equipment with its patented technology guarantees homogenous air distribution and temperature stability even when the door is opened for the addition of new test samples. Any temperature fluctuations resulting from the intrinsic temperature of the samples and airflow from outside are balanced very rapidly.

In continuous operation, the incubators maintain a constant temperature of between 22°C and 55°C for specific applications. The incubators are used for a wide variety of applications such as warm storage of nutrient media, sample incubation, drying of food samples, or determining the presence of microorganisms with Durham test tubes. The various jobs are aligned in accordance with the programming of production processes. In this manner, any potential deviations, such as variations in raw material composition, can be detected and remedied with appropriate measures. As an additional safety measure, the Binder test chambers are regularly checked and recalibrated.

Circle no. 404