

Advion



Food & Ingredients Analysis

Integrated Solutions for Food Authenticity, Characterization and Safety with the **expression** Compact Mass Spectrometer, AVANT (U)HPLC and SOLATION ICP-MS



Advion.com/FoodScience · info@advion.com

Your integrated laboratory solution for comprehensive testing of food, ingredients and natural products

Analytical instrumentation for characterization, screening and purity determination. Measurement and quantitation of pesticides, toxic metals and other contaminants.

Your Complete Lab Solution:

expression® CMS - The **expression** Compact Mass Spectrometer (CMS) offers the industry's widest range of sample introduction systems, providing rapid answers with little or no sample prep in < 30 seconds.

SOLATION™ ICP-MS - Provides fast, simple, multi-element analysis of toxic metals, and essential elements and minerals in a wide array of samples, including water, soil, plant material, food and raw ingredients

AVANT™ HPLC & UHPLC - Advion's range of modular high performance, liquid chromatography systems can be used standalone with UV and UV/Vis detector options, or with the **expression** CMS to provide seamlessly integrated LC/CMS under the full control of Advion's simple, intuitive software suite.

PLATE EXPRESS™ TLC PLATE READER - Plate Express provides a simple, automated means of obtaining mass spectra directly from TLC plates, combined with Advion's **expression** CMS creating a technique known as TLC/CMS. See results in < 30 seconds at the push of a button.

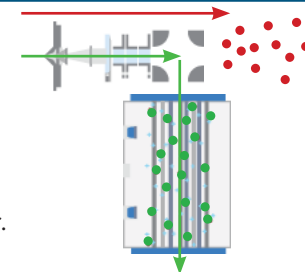
A new ICP-MS has arrived

An ideal companion for food and ingredients analysis, the SOLATION ICP-MS brings a user-friendly instrument to life

For quantitative, multi-elemental analysis, the SOLATION ICP-MS is the ideal system for high-throughput laboratories seeking the perfect mix of performance and ease of use.

KEY FEATURES

90 degree quad deflector so that the analyzer and detector are not in line with the plasma beam. This ensures neutrals and particles do not enter the analyzer, improving S/N and preventing contamination of the analyzer and detector.



- Triple cone ion extraction available in nickel and platinum
- Octupole collision cell and kinetic energy discriminator to remove interferences
- Extended dynamic range with combined analog and pulse counting detector: measure high- and low-level elements in a single analysis
- User-friendly ICP-MS Express® software simplifies routine, high-throughput analysis and provides all the power and versatility you need for cutting-edge research
- Optional autosampler with capacity for up to 240 15 mL vials
- Optional ASXpress rapid sample introduction system that halves sampling time for high-throughput analyses

THE SOLATION ICP-MS system provides fast, simple multi-element analysis in a wide array of samples including:

- Heavy metals in raw ingredients and water. Measurement of Arsenic, Cadmium, Lead and Mercury and more in plant material, extracts and oils
- Track metals and minerals in your production process from starting materials to finished goods
- Environmental analysis of drinking water, waste water and soils

Push-Button TLC/CMS Analysis of Natural Products

The Plate Express™ TLC plate reader provides valuable information at the push of a button, combined with on-line polarity switching and in-source CID capability of the CMS

Generate required information for compound ID and structural information of analytes from natural products in seconds – simply align your developed TLC plate, push a button, and view your results in the integrated Mass Express software.

Acquire both positive and negative ion mode data as well as in-source CID data in

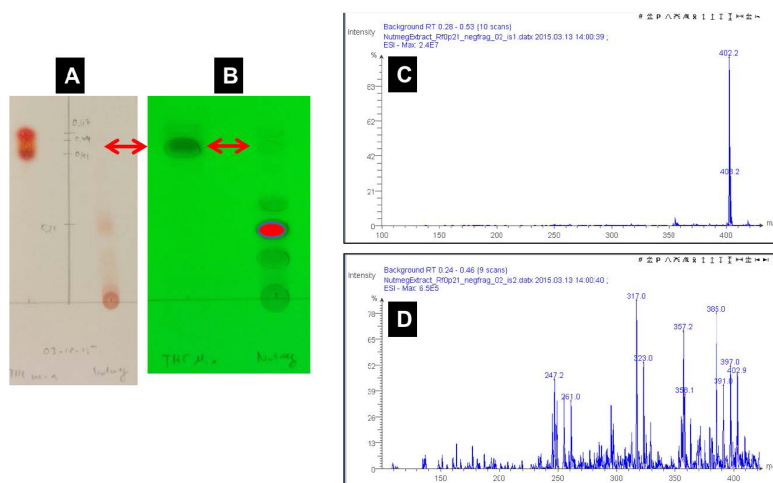


Figure: TLC and TLC/FIA/MS analysis of an alcoholic nutmeg extract. Comparison to three cannabinoid standards (cannabinol, cannabidiol, and tetrahydrocannabinol) at Rf 0.40 shows a slight positive response in the THC region under UV light (2b), however does not show the signature color reaction when derivatized with Fast Blue RR (2a). Derivatization suggests that an unknown compound at Rf 0.21 is the interference to the color reaction. MS analysis of the respective location (red oval in 2b) shows a prominent signal at m/z 402.2 in the negative ion mode MS scan (2c) and an information rich in-source CID MS (2d).

Measurement of carcinogenic materials in water by LC/CMS

LC/CMS provides detection limits at low ppb, ideal for testing polycyclic aromatic hydrocarbon (PAHs) in water

- The Advion **expression** CMS coupled to liquid chromatography is an effective tool for the determination of PAHs in water matrices.
- The detection limits of PAHs in water were demonstrated to be in the low ppb levels.
- The ease-of-use, affordability and capability of the Advion **expression** CMS makes it an excellent choice for analysis of PAHs.

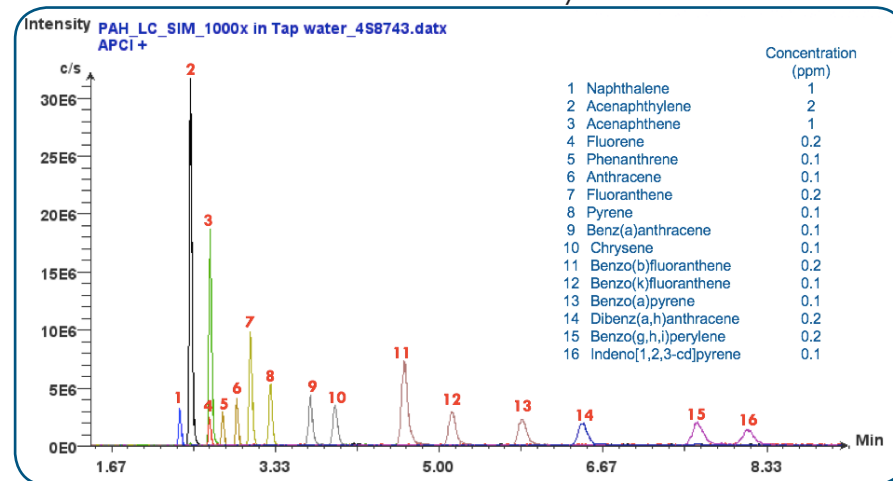


Figure: LC/SIM analysis of 16 PAHs spiked into tap water. All 16 PAHs were well separated and differentiated as shown. EPA 610 mix from Sigma was diluted by a factor of 1000 in tap water and used as a fortified sample for the analysis. The LC/SIM chromatograms of the fortified PAH sample are shown in Figure 2, with the concentration listed for each compound from low ppb to high ppt level.



Application Note: LC/CMS is a rugged and simple to use analytical method to screen for the presence of nitrogenous economic adulterants in milk derived ingredients has been developed for routine frontline use.



Analyze VOCs in headspace to determine contamination and spoilage

Utilize the **expression** CMS with the volatile APCI (vAPCI) sampling technique for fast, easy analysis of volatile organic compounds (VOCs), including cadaverine and putrescine

Using vAPCI to analyze the atmosphere surrounding a piece of meat, we can easily and reliably track formation of key compounds indicating the spoilage of meat including cadaverine and putrescine.

This technique allows us to measure the compounds directly from the gas phase, without any need for extra sample preparation. This application shows the capabilities of vAPCI with the Advion **expression** CMS and its versatility and ease of use in analyzing vapor phase compounds.

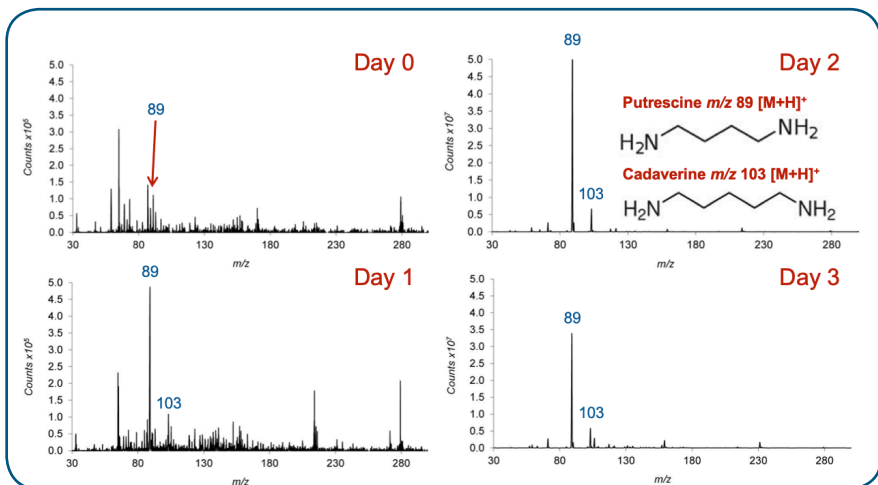


Figure: Daily analysis of the headspace above meat at ambient temperature. Putrescine (m/z 89 $[M+H]^+$) and cadaverine (m/z 103 $[M+H]^+$) are formed by breakdown of amino acids as meat decays. The meat sample sat at ambient temperature over several days.

Purity determination and adulterant detection with no sample preparation

The ASAP liquids and solids probe offers a one-touch APCI technique for fast analysis with results in seconds including vanilla extract purity and other authenticity testing:

ASAP/CMS is a rapid mass spectral analysis approach that can screen a variety of samples for purity and adulterants, ideal for the food, beverage and ingredients industry.

- Swiping a sample with the end of a glass capillary and inserting it directly in to the APCI source of the **expression** CMS provides spectral data in <30 seconds.
- For example, a series of vanilla extracts, including an artificial vanilla extract substitute, were tested back-to-back for authenticity. The pure extracts were as labeled, and the artificial product clearly shows the vanilla flavor, deprotonated ethyl vanillin, m/z 165, in the chromatogram.

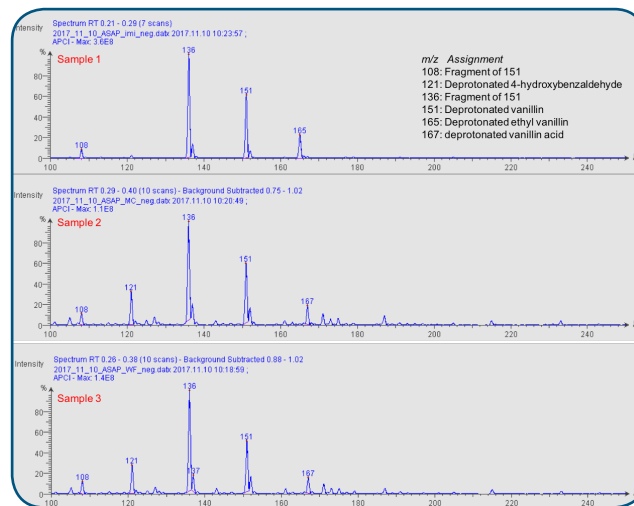


Figure: A. The negative ion ASAP/CMS spectrum of Sample 1 clearly shows a peak at m/z 165, or deprotonated ethyl vanillin - an indicator of artificial vanilla flavor. B. & C. Both Samples 2 and 3 contain 4-hydroxybenzaldehyde (m/z 121, deprotonated 4-hydroxybenzaldehyde), vanillin (m/z 151, deprotonated vanillin and fragments at m/z 136 and 108), and vanillin acid (m/z 167, deprotonated vanillin acid). The artificial vanilla flavor (deprotonated ethyl vanillin at m/z 165) is not detected.



Dedicated to Science • Dedicated to You

Advion's nearly three decade dedication to serving scientists yields customer-focused life science solutions. Our deep scientific, engineering and customer workflow knowledge spawns an unrivaled solution portfolio. We work directly with, train, and passionately advocate for our customers to ensure their success. *Dedicated to Science - Dedicated to You.*



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