

UHPLC with heated ESI coupled to ion trap MS (LC-ESI-IT-MSn)

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Brand

Thermo Scientific

Type

Vanquish UHPLC with Velos Pro MS



Contact

Organisation

Agrotechnology & Food Sciences Group

Department

Food Chemistry

Description

Intro to Velos Pro electrospray ionisation ion trap mass spectrometer (ESI-IT-MSn)

The Velos Pro mass spectrometer is a dual-cell linear ion trap with high-pressure and low-pressure cells that enables tandem mass spectrometric (MSn) analyses. Despite its limited mass resolution and accuracy, this ESI-IT-MSn is a powerful tool for mass spectrometric analysis of food(-related) molecules, mainly due to its high flexibility and MSn capabilities. At the Laboratory of Food Chemistry, it is used extensively for profiling, quantification, and structure elucidation of molecules in complex food(-related) samples.

The Velos Pro is capable of combining various types of scans in one analysis, this includes: full scan (MS1), fragmentation (MS2 or MSn), single ion monitoring (SIM), and selected reaction monitoring (SRM). All types of scans can be performed in negative and positive ionisation mode, and both modes can even be switched within the same method. The Velos Pro is equipped with a heated electrospray ionisation source (HESI-II probe). The HESI-II atmospheric pressure ionisation source enables handling of flow rates of 1 mL/min and higher through gas-assisted thermal desolvation.

Analyses on the Velos Pro can be performed via direct infusion of the sample using a built-in syringe pump.

Alternatively, the MS can be operated in-line with a Thermo Scientific Vanquish ultra-high performance liquid chromatography (UHPLC) system, which is equipped with a photodiode array (PDA) and a fluorescence detector (FLR) to assist with identification and quantification.

Principles

Dual-cell linear ion trap MS for tandem mass spectrometry (MSn)

In the HESI source, a combination of heat and nitrogen flow is used to evaporate the solvent, and a high voltage is applied to ionise the analytes. The resulting ions enter the MS where they are transferred to a quadrupole and subsequently they enter the high pressure cell. Inside this cell, ions can either be isolated as such, for determination of the mass-to-charge (m/z) of the non-fragmented parent ions (i.e. full scan analysis), or ions with a specific m/z can be selected and subjected to fragmentation (MS2 or MSn analysis). Fragmentation takes place via collision induced dissociation (CID) in helium gas. From the high pressure cell, ions are transferred to the low pressure cell where they are separated based on their m/z , ejected, and detected.

Technical Details

Supplier: Thermo Scientific

Specifications: Velos Pro dual-cell linear ion trap

- MSRange: m/z 50 – 2000
- Mass accuracy: up to 0.1 Da
- Scan rate: up to 66,667 Da/s
- Full scan analysis for sensitive detection and rapid screening of unknown compounds
- MSn capabilities to investigate the structure of analyte ions
- Selected ion monitoring (SIM) and selected reaction monitoring (SRM) options for targeted quantification of compounds of interest
- Automatic gain control (AGC) for up to 10 Hz MS/MS acquisition rate

Applications

- Profiling, identification, and quantification of diverse food(-related) molecules:
 - Phytochemicals (e.g. from crude plant extracts)
 - Lipid mixtures from fats or oils
 - Charged and neutral oligosaccharides
 - Protein hydrolysates or peptide mixtures
- Structure elucidation of natural products
- Monitoring (micro)biological, enzymatic, or chemical conversions and analysis of the resulting product profiles