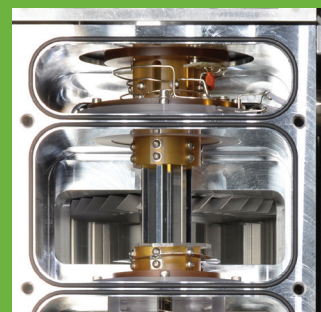


QSight Laminar Flow Ion Guide

Liquid Chromatography/ Mass Spectrometry



Unique Ion Flux Transportation Technology Under Laminar Flow and RF Electric Fields

Most traditional mass spectrometers apply axial voltages to transfer the ion flux from an atmospheric ion source through an intermediate pressure region of several torr and then on to the low pressure mass filter region of 10^{-5} torr. The QSight™ LC/MS/MS instrument performs the initial step from atmosphere to intermediate pressure using the Hot Surface Ion Desolvation (HSID™) interface region. A diffuse directed laminar ion/gas flux, at roughly the speed of sound, emits from the HSID through a series of three consecutively lower pressure multipolar regions - referred to as the QSight Laminar Flow Ion Guide™ - before entering the low pressure of the first mass filter. Figure 1 shows the geometric relationship of HSID with the QSight Laminar Flow Ion Guide, as well as an illustration of the gas flow velocity profile in each region. The multipolar regions provide the radial ion containment while the diminishing gas flux provides the axial velocity into and through each successive multipolar section.

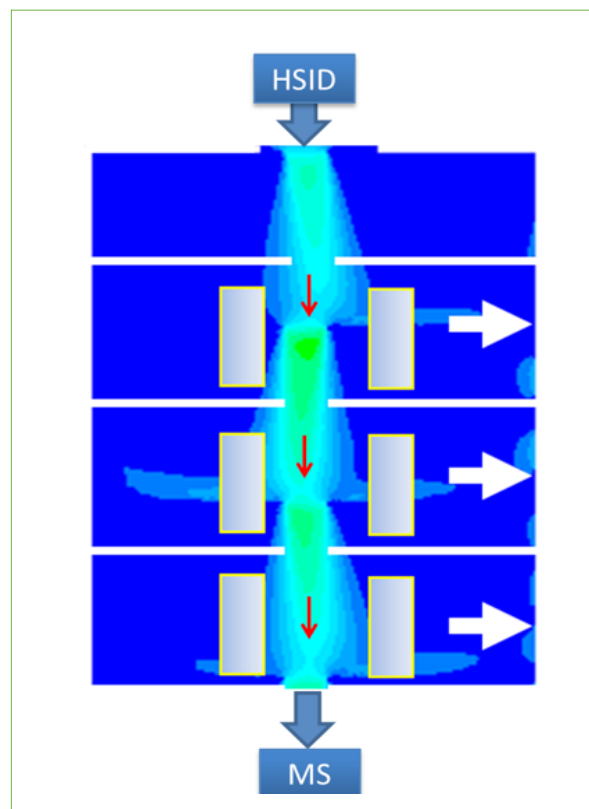


Figure 1. Laminar flow transports ions from HSID through ion guide to mass analyzer. No axial electric field is applied. RF electric field centralizes ion beam in ion guide, while laminar flow prevents ions from being pumped away.

Key Features

Increased Transport Efficiency

The QSight Laminar Ion Guide was developed in conjunction with advances in turbo pump technology to provide 'gently' successively lower pressure regions, which extract the gas in the ion/gas flux while preserving the ion flux.

Operational Simplicity

The gas entrainment velocity is completely sufficient to drive the ion flux through the QSight Laminar Flow Ion Guide, no axial fields are required, and no operator adjustment is necessary. Ion transport by gas flow also means no mass discrimination.

Enhanced Robustness

The axial fields that most traditional mass spectrometers use to drive the ion flux from atmosphere to the low pressure are easily distorted by minor surface charging of their entrance ion optics, causing sensitivity loss - usually mass dependent - ultimately requiring daily/weekly cleaning of the ion optics, thereby affecting operational up-time. The QSight Laminar Flow Ion Guide is highly resistant to minor surface charging, principally due to ion-entraining gas flux, thereby reducing ion optics maintenance to the standard six month schedule for roughing pump oil replacement.

True Thermal Distribution

The QSight Laminar Flow Ion Guide allows ions to fully thermalize to sampling gas temperature, resulting in a very narrow ion energy distribution while propagating downstream in parallel layers to the mass analyzer. Ions scattering and ion beam drifting is minimized, which greatly improves signal stability and reproducibility in the first quadrupole analyzer.

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