Agilent 500 Ion Trap LC/MS Atmospheric Pressure Ionization Interface

Technical Overview

Introduction

Routine analysis of large numbers of samples in a dirty matrix presents a severe challenge for an LC interface. The ionization chamber and atmospheric pressure ionization (API) interface shown in Figure 1 is designed to meet just such a challenge. Ions formed at atmospheric pressure in the electrospray (ES) assembly are directed from atmospheric pressure into the low pressure region of the MS vacuum system via the interface capillary and are subsequently transported by the hexapole ion guide into the mass analyzer.

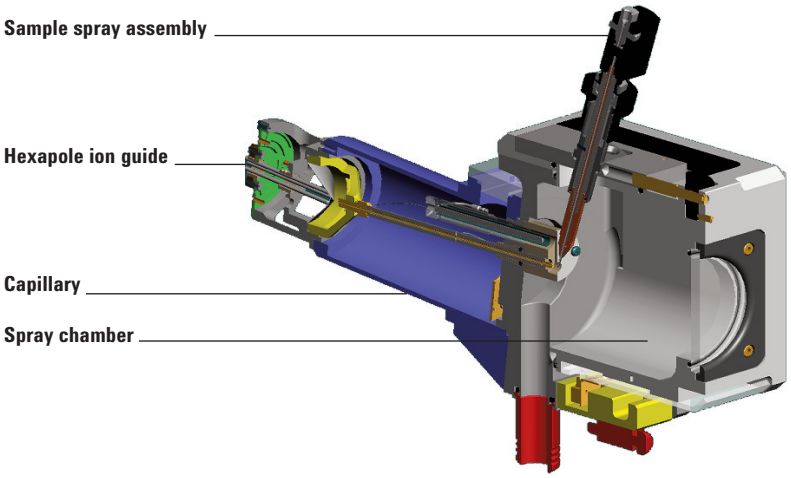

Figure 1. The Agilent API Interface.

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Product Description

The electrospray assembly (Figure 2) allows adjustment of the spray tip in two dimensions to optimally position the spray relative to the interface capillary. Adjustment of the extension of the liquid capillary from the nebulizing sheath allows the optimal formation of electrospray droplets depending on the liquid flow rate and solvent composition.

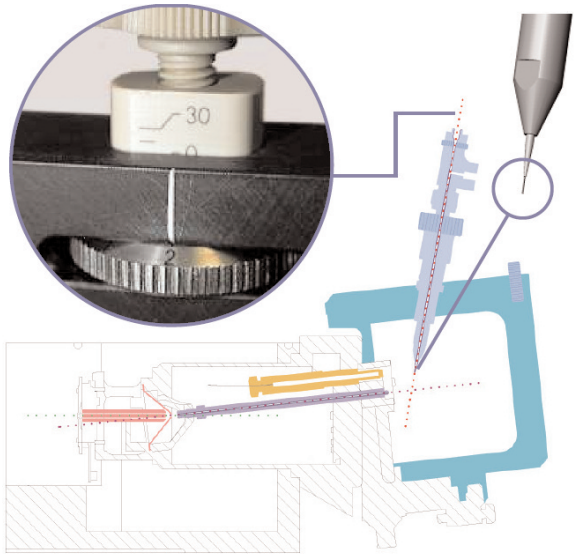

Figure 2. Adjustment of the inner liquid capillary needle to maximize nebulization effeciency.

The tilted chamber (Figure 3) ensures that the excess liquid from the spray will be directed into the drain port at the bottom of the chamber, and away from the interface capillary, to reduce contamination. The tilted ion guide has no line of sight between the axis of the capillary and the ion guide, thus preventing droplets from the spray assembly from entering the mass analyzer and causing noise. The heated counter-flow drying gas facilitates evaporation of droplets to form sample ions, while also displacing uncharged contamination from the sample matrix from entering the vacuum chamber and ion optics.

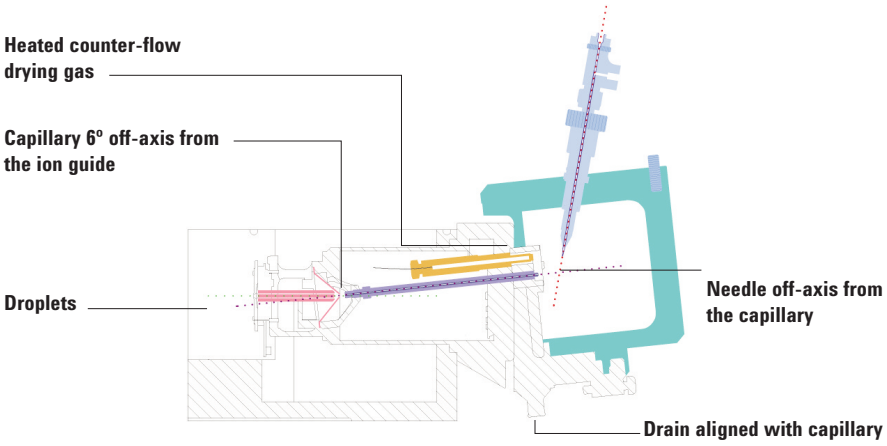

Figure 3. Tilted chamber design reduces contamination.

Experimental Conditions and Results

The hexapole ion guide robustness, when coupled with an ion trap detector, is demonstrated with the results in Figure 4. Test samples of 1 ppm 4-hydroxy-tolbutamin in 10% urine in 50/50 methanol/water were injected multiple times into the 500 Ion Trap system. No sample preparation was conducted and direct injections were performed. One thousand consecutive injections were made with the results shown in Figure 4. After 1000 injections the response factor remained constant with no indication of contamination of the API interface or long term changes in system sensitivity.

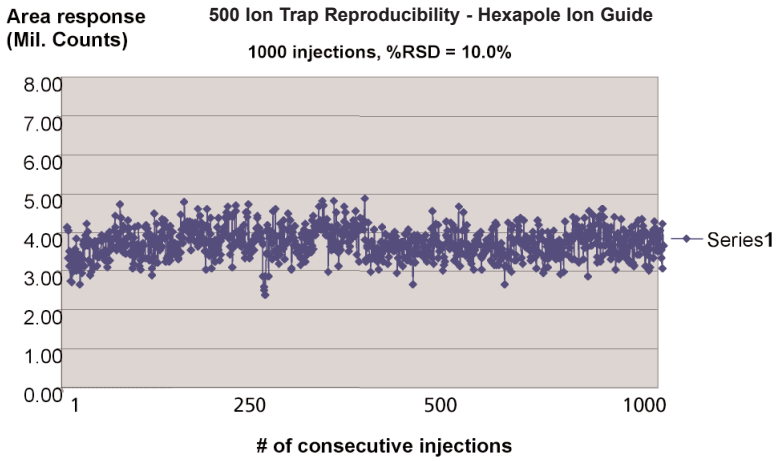

Figure 4. Reproducibility of 1000 injections shows no contamination of the API.

Benefits

The unique design on the Agilent 500 Ion Trap LC/MS Atmospheric Pressure Ionization Interface reduces interface contamination and delivers robust, consistent system sensitivity.

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