

1 Introduction

Traditional mass spectrometers require frequent cleaning of ion lenses and surfaces. Dirt on ion lenses will alter the electrical field and thus render the lens less effective. This leads usually in a drop in sensitivity, recognized by the user as «drift». Common countermeasures are e.g. increasing of the lens voltage to compensate the electrical field strength and or cleaning of the lens. This results in loss of productivity since the vacuum needs usually to be breached for maintenance. Furthermore, dirty surfaces can lead normally to increase in background due to random desorption and thus worsen the instrument performance. Such effects are of major concern for productivity laboratories such as clinical screening or high-volume contract laboratories.

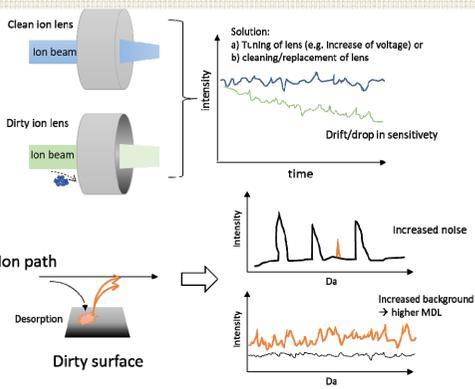


Figure 1: Sources of background, drift in mass spectrometry caused by changes of the electrical field of ion lenses and sputtering of dirty surfaces.

2 Solution

The Qsight™ MS/MS instrument from PerkinElmer uses a novel and innovative interface that greatly reduces the extent of contaminated surfaces and thus reduces significantly the need for tuning and user-based maintenance. With the StayClean™ hot-surface induced desolvation (HSID™) technology, ions and solvated charged species are confined in a hot laminar flow of sampling gas. With this they are transported through the vacuum region. The transport furthermore is governed by fluid dynamics and not by electrical or magnetic fields. The hot gas flow shields ions and solvated species from striking the HSID walls, acting as a constant cleaning agent. The flow-based transport furthermore greatly reduces mass bias effects. A good analogy here is the transport of debris in a river, small and large debris are transported at the same speed with the flowing water current.

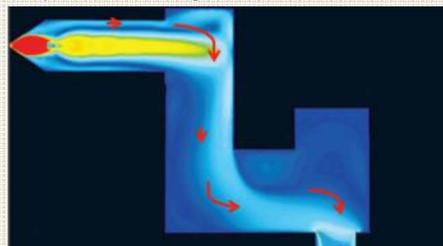


Figure 2: HSID schematic illustrates the path that ions are transferred by laminar flow (arrow). The entire HSID block is heated to help prevent contaminants from depositing on the inner surface. Laminar gas flow carries all the charged species from entrance to exit.

- The Qsight MS/MS series therefore has several distinct advantages for the user:
- 1) The Qsight MS/MS systems are the LC-MS/MS systems with the least amount of user maintenance and least amount of cleaning induced downtime.
 - 2) The Qsight MS/MS systems provide exceptionally low background intensities.
 - 3) The Qsight MS/MS systems need, due to the absence of ion lenses, a minimum amount of daily tuning and provide exceptional ease of method transfer between instruments.
 - 4) The Qsight MS/MS systems have a unique uniform response across the entire mass range.

3 Examples

No loss in sensitivity during a week of direct wine analysis. Minimal change of peak area, chromatography fails before MS/MS.

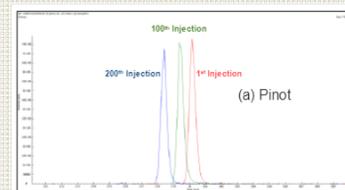
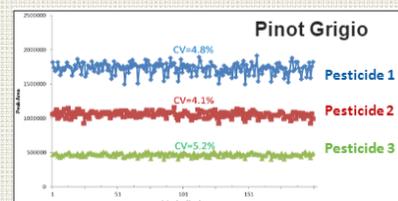


Figure 3: Top section shows peak area of three pesticides vs injection number for spiked Pinot Grigio samples. Bottom section depicts a chromatogram of the three pesticides in the Pinot Grigio samples.

Another example of no loss in sensitivity with 1200 injections of hormones in human serum. Excellent reproducibility and stable peak areas

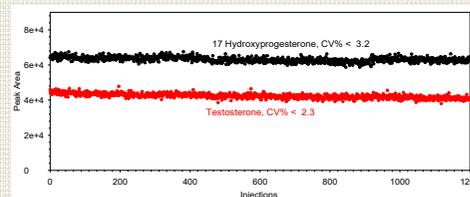


Figure 4: Shows peak area of two hormones vs injection number for spiked human plasma samples. In black is 17-hydroxyprogesterone with a CV % of 3.2 % and in red is testosterone with a CV % of 2.3 %.

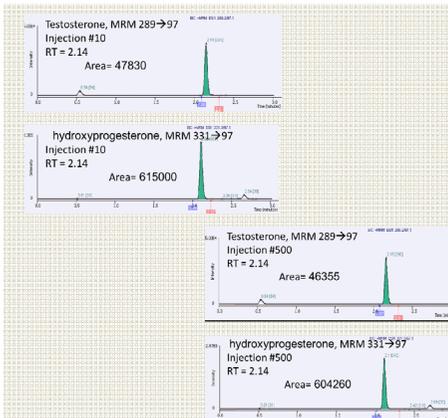


Figure 5: Example chromatograms testosterone and 17-hydroxyprogesterone showing injection numbers 10 (top) and 500 (bottom) and how the peak areas remain stable.

4 Conclusions

It is demonstrated by analyzing of challenging biological fluids that the unique StayClean™ and HSID™ technology of the Qsight® series provides the user with unparalleled robustness and uniform mass response. These systems are therefore very well suited for all high throughput applications where downtime and low maintenance requirements are desired characteristics. The Qsight® systems can also be combined with liquid handling and/or kits to further streamline production.

