

TrapPulse Technology

Increase Your Sensitivity with Innovative TrapPulse Technology



Introduction

The AxION® 2 TOF Mass Spectrometer provides analysts with complete confidence in their results. It combines speed and specificity to enable unambiguous identification and quantification of both known and unknown compounds for full characterization of a sample.

Increasing Sensitivity

PerkinElmer's unique patented TrapPulse™ technology affords on average a 10-fold increase in sensitivity and a reduction in baseline noise. As with all TOF Mass Spectrometers, ions are pulsed into the flight tube towards the detector. The innovative technology of TrapPulse maximizes sensitivity by collecting dense packets of ions before accelerating them into the flight tube. The TOF pulse is perfectly synchronized with the arrival of the selected ion packets, ensuring maximum ion transport to the state-of-the-art detector.

The benefits of this improved sensitivity, as a result of maximum ion transmission, are best observed by comparing spectra in standard Pulse and TrapPulse modes. The TrapPulse methodology can be selectively applied to a single ion within a mixture to increase sensitivity of any given compound, as illustrated below, Figure 1.

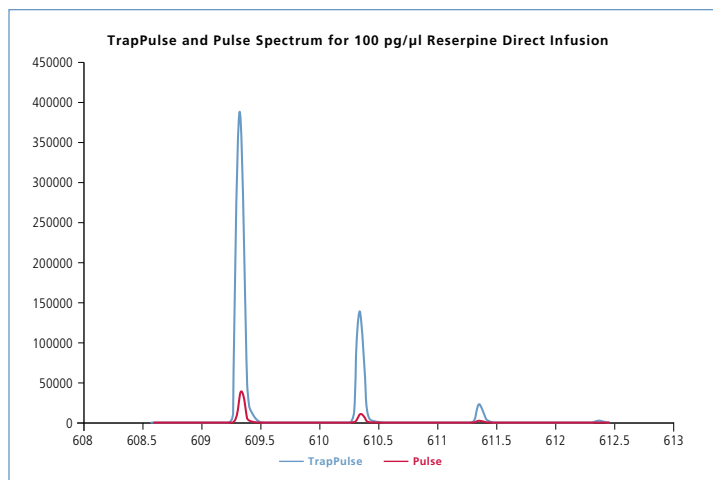


Figure 1: By using the breakthrough TrapPulse technology on the AxION 2 TOF MS, you can typically experience a 10x increase in sensitivity (shown in blue) for clearer, more definitive results.

Using a more “real life” sample, a melatonin tablet (available over the counter) was crushed and dissolved in 10 mL of water. With a 100 ug/mL injection, the sample was analyzed by LC/TOF using the AxION 2 TOF in both Pulse and TrapPulse mode, Figure 2.

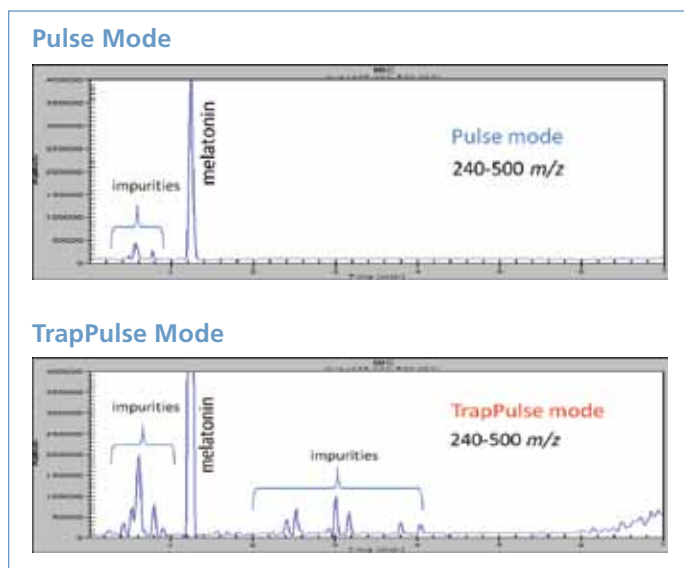


Figure 2: Analysis of melatonin in Pulse and TrapPulse mode; 240-500 m/z.

Using the TrapPulse mode, more impurities are discovered and the sensitivity of these impurities detected increased by over 10 fold. This is a significant benefit as the previously unseen impurities can now be detected and determined, helping to ensure ongoing product safety.

Eliminating Spectral Wrap Around

The proprietary technology of TrapPulse also eliminates spectral artifacts such as “spectral wrap around”. Clear and reproducible spectra are generated regardless of the mass range used.

In Pulse mode, the calibrant mix spectra, Figure 3, indicates the presence of an extraneous ion at 172 m/z.

The sample has higher masses than 1000 and this extraneous peak could be a result of spectral wrap around. Closer inspection of 172 m/z showed it to have a much lower resolution than the other ions present and this ion is no longer present when run in TrapPulse mode—confirmation that it was an interfering ion.

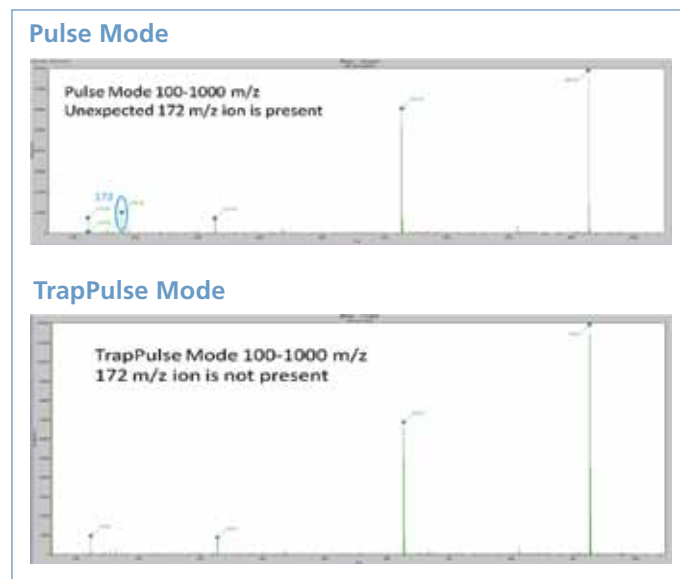


Figure 3: Calibrant test mix run in Pulse and TrapPulse mode, 100-1000 m/z.

Summary

PerkinElmer TrapPulse technology provides analysts with the scope to further increase sensitivity (on average, 10x) and it opens up the possibility to drive down Limits of Detection (LOD) and analyze samples that were previously not possible.

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