TechnicalNOTE

Waters

QUATTRO PREMIER™: RAPID POLARITY SWITCHING

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Introduction

All tandem quadrupole instruments are capable of monitoring both positively and negatively charged ions formed by analytes entering the ionization source. Occasionally a single assay will entail a mixture of compounds some of which produce positive charged ions and some of which produce negatively charged ions. However, the time taken to switch between these two modes of operation will generally prohibit the use of a single LC/MS/MS analytical run to monitor this mixture.

Tandem quadrupole mass spectrometers typically require a voltage settling period of 200 to 300 ms when switching from positive to negative ion modes (some tandem Quadrupole MS instruments require >700 ms). When performing an assay in multiple reaction monitoring (MRM) mode it is important to keep the MRM cycle time low enough to maintain a sufficient number of data points per chromatographic peak (typically 15-20 points per peak per MRM channel monitored). If this is not done the quality of the resulting quantification data will decrease due to poor peak area definition. On most instruments polarity-switching time is too long to allow positive ion and negative ion monitoring to be used together effectively in a single analytical run while maintaining a low MRM cycle time.

The Waters Micromass Quattro Premier™ benchtop mass spectrometer has an unmatched capability to switch from monitoring positively charged ions to monitoring negatively charged ions in less than 20 ms without any degradation in data quality. Optimized high voltage supplies used in the Quattro Premier mean that positive to negative ion switching in full scan or MRM mode can now be achieved in 20 ms with no loss in performance. Mixed mode, short cycle time MRM analysis can now be performed without loss in signal intensity and without compromising the integrity of quantification data.

Example Data

The data presented below was obtained using the Quattro Premier benchtop mass spectrometer. Direct loop injections of a solution containing sulfadimethoxine were monitored in the MRM acquisition mode. Separate acquisitions were performed in positive ion mode only (Figure 1) and negative ion mode only (Figure 2). A third acquisition was performed using a single method combining both positive and negative acquisition methods using a polarity switching time of 20 ms (Figure 3). By comparison it can be seen that neither peak areas nor signal-to-noise ratios are affected by rapid polarity switching.

With the Waters Quattro Premier mass spectrometer you can confidently perform mixed ionization mode MRM analysis without compromising either sensitivity or MRM cycle time.

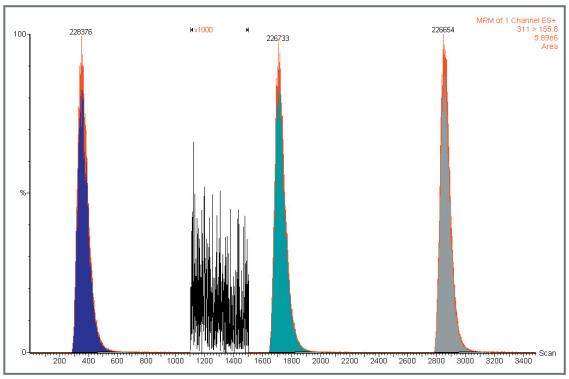

Figure 1. Replicate injections of sulfadimethoxine, monitored in positive ion mode only.

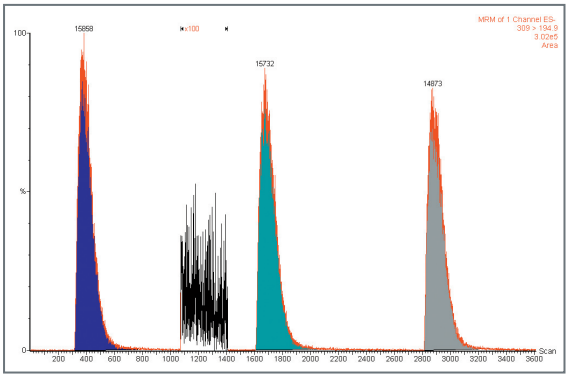

Figure 2. Replicate injections of sulfadimethoxine, monitored in negative ion mode only.

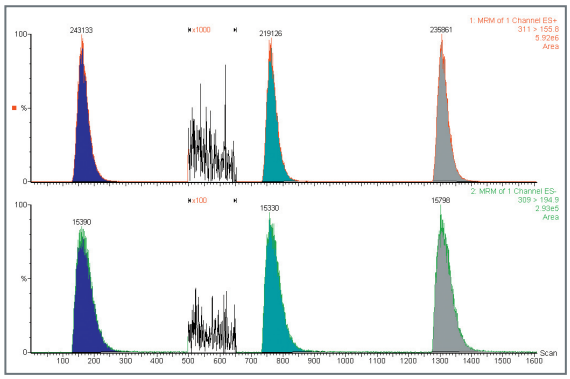

Figure 3. Replicate injections of sulfadimethoxine, monitored simultaneously in positive and negative ion modes.

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