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Q-TOF PREMIER: DYNAMIC RANGE PERFORMANCE

Alan Millar and Jose Castro-Perez
Waters Corporation, Manchester, UK

DYNAMIC RANGE DEFINED

The linear dynamic range of a mass spectrometer describes the concentration range, in orders of magnitude, over which the instrument can provide a response which is proportional to the concentration of a given compound. For example, the Waters® Micromass® Q-Tof Premier™ Mass Spectrometer has been shown to provide a linear response for the small molecule verapamil over the range of 0.1 to 1000 ng loaded on column. This illustrates that the Q-Tof Premier has a linear dynamic range of up to 4 orders of magnitude. The calibration curve for verapamil acquired on the Q-Tof Premier, demonstrating four orders of linear dynamic range is shown in Figure 1.

EXACT MASS MEASUREMENT IS ACHIEVABLE OVER FOUR ORDERS OF LINEAR DYNAMIC RANGE

The dynamic range performance of the Q-Tof Premier provides another noticeable advantage with its ability to acquire exact mass measurements over a wider range of sample concentrations (as compared to other oa-TOF instruments). The enabling technology behind this extended dynamic range performance delays the onset of detector saturation at high ion signals. In doing so, it expands the sample concentration window over which the high quality, exact mass measured data synonymous with Q-Tof instruments can be acquired. Under ideal conditions, exact mass measurements of less than 3 ppm RMS can be achieved.

SIGNIFICANT IMPROVEMENTS IN EASE OF USE WHEN ANALYZING UNKNOWN OR COMPLEX SAMPLES

The increased dynamic range performance of the Q-Tof Premier provides the user with significant ease of use benefits as compared to previous oa-TOF instruments. The ability of the instrument to provide a linear response and acquire exact mass measured data over a wider range of concentrations means that the user need be less concerned with the quantity of sample being analyzed. In practice, this can minimize the need to select data on either side of the apex of a chromatographic elution profile to avoid selection of 'saturated' data which can result in increased mass measurement errors. Rather, data can be combined across the entire chromatographic peak to determine the elemental composition of an unknown metabolite, for example. This can be particularly useful when analyzing unknown or complex samples, where the constituent components may be present over a wide range of concentrations.

Waters Micromass Q-Tof Premier Mass Spectrometer

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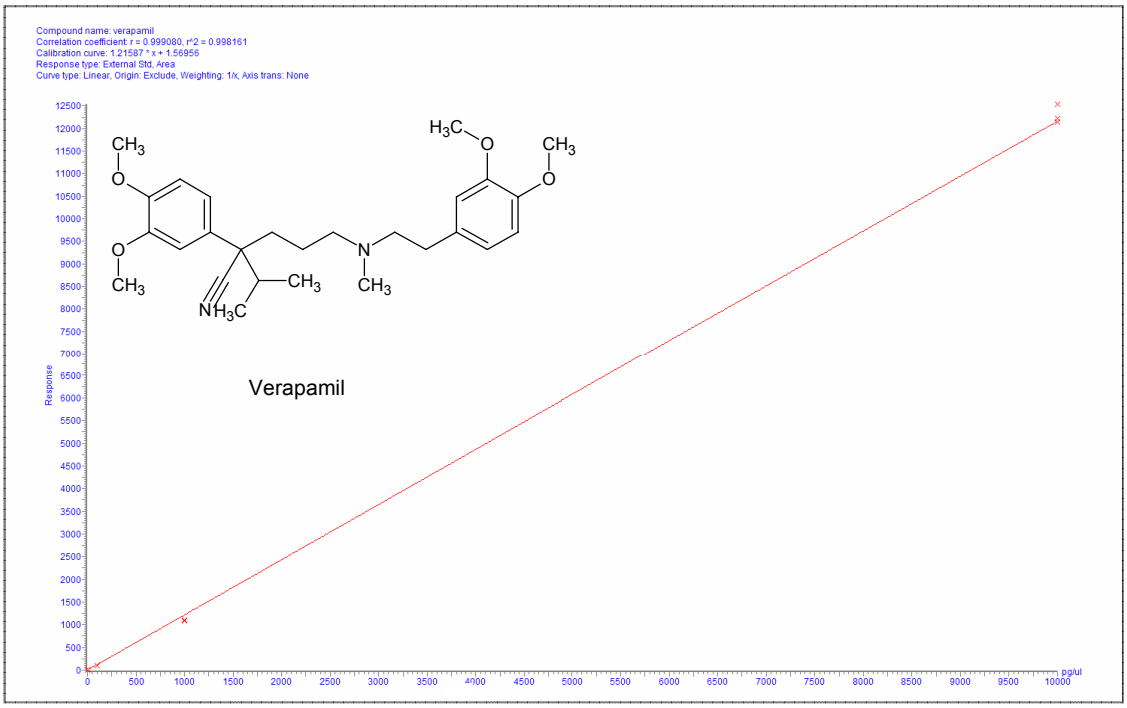

Figure 1. Calibration curve illustrating four orders of linear dynamic range for the small molecule verapamil. Concentration range of verapamil is 0.1 to 1000 pg/µL. Data was acquired on a Q-Tof Premier MS.

CONCLUSION

The full mass range spectra produced by the Q-Tof Premier Mass Spectrometer enables a wide range of components at varying concentrations, both known and unknown, to be detected from mixtures with high sensitivity. The Q-Tof Premier delivers up to 4 orders of linear dynamic range for exact mass measurement and quantitative analysis of complex samples – for the utmost confidence in your most demanding proteomics and small molecule applications.

WATERS CORPORATION
34 Maple St.
Milford, MA 01757 U.S.A.
T: 508 478 2000
F: 508 872 1990
www.waters.com

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