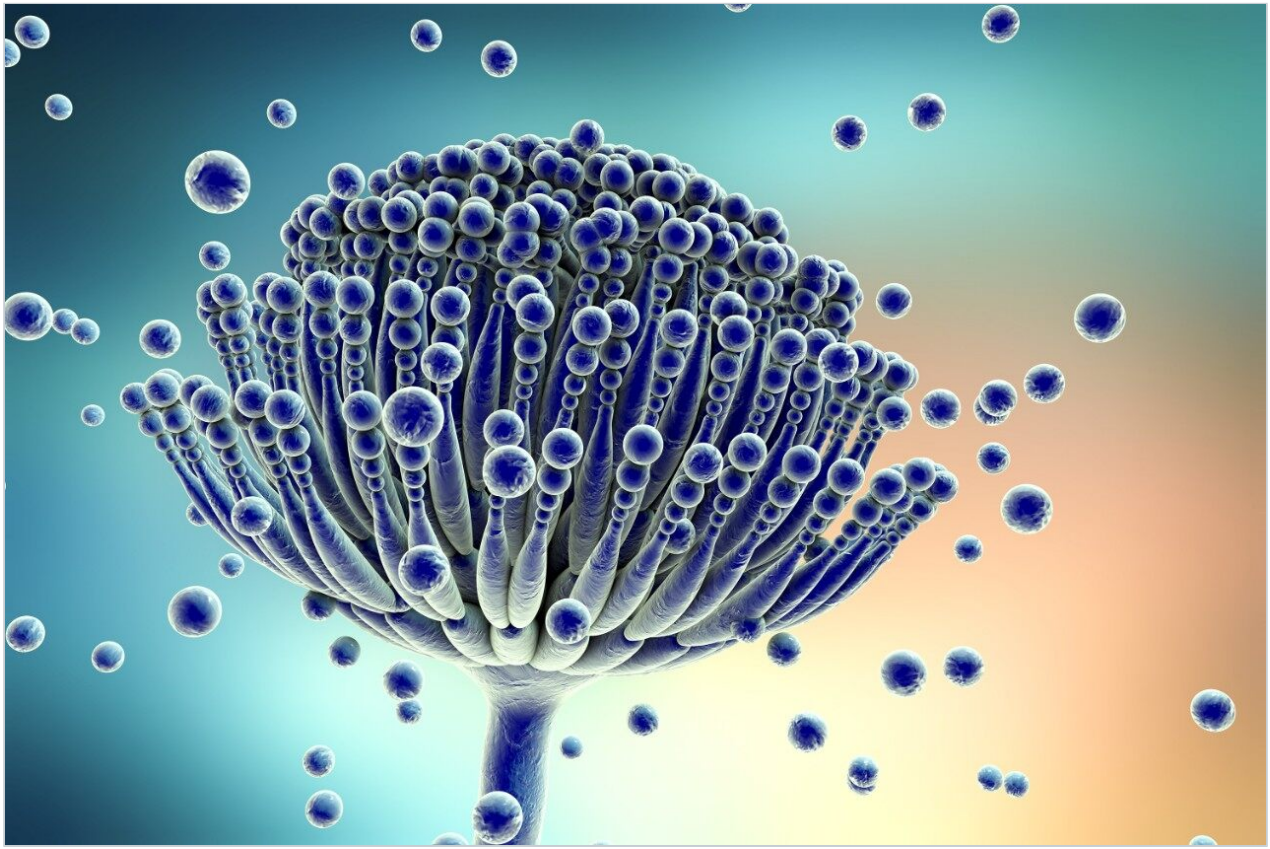
Waters™

アプリケーションノート

Illustrating Benefits Other Than Increased Sensitivity for Mycotoxin Analysis Using Xevo TQ-S

日本ウォーターズ株式会社



This is an Application Brief and does not contain a detailed Experimental section.

Abstract

This application brief shows that Waters Xevo TQ-S reduces ion suppression and makes peak integration easier at sub-legislation concentrations for mycotoxin analysis.

Benefits

Ion suppression is lowered with smaller injection volumes, but this can only be achieved with the sensitivity increases obtained with Xevo TQ-S.

Introduction

Mycotoxins are a class of chemical compounds produced by fungi growing on food. These chemicals are subject to legislation around the world as they are a concern to human health. They are known to cause problems associated with the digestive system and liver.

Using the most sensitive mass spectrometers, such as Xevo TQ-S for analysis of these compounds makes compliance with legislative limits easier, but there are other benefits to be attained as well.

Results and Discussion

The increased sensitivity achieved by Xevo TQ-S improves peak shapes at sub-legislation concentration, levels already achieved by Xevo TQ MS. The relative intensities of any imperfections in peak shape created by poor chromatography are reduced because the peak is larger. The start and finish of the peaks are more clearly defined, so processing software such as TargetLynx can achieve baseline to baseline integration more routinely. This is shown in Figure 1; the injection is spiked barley matrix at a pre-extraction concentration of 0.1 µg/kg. This concentration is 20 times below EU legislation levels for aflatoxin B1. The Xevo TQ chromatography has been manually changed but the Xevo TQ-S chromatography was automatically integrated. The increased sensitivity at low levels helps to reduce the number of manual integrations in a sample batch. This in turn reduces operator variability and the results from processed data sets become more consistent.

A further advantage of Xevo TQ-S is that the response for the secondary (confirmation) ion is large in size.

This is also shown in Figure 1. The consistency of integration, even at low concentrations, helps to stabilize any fluctuations in the ion ratio produced by the two MRM transitions. This increased peak area gives a more accurate ion ratio at lower concentrations, and thus increases user confidence by clarifying the identity of the compound analyzed.

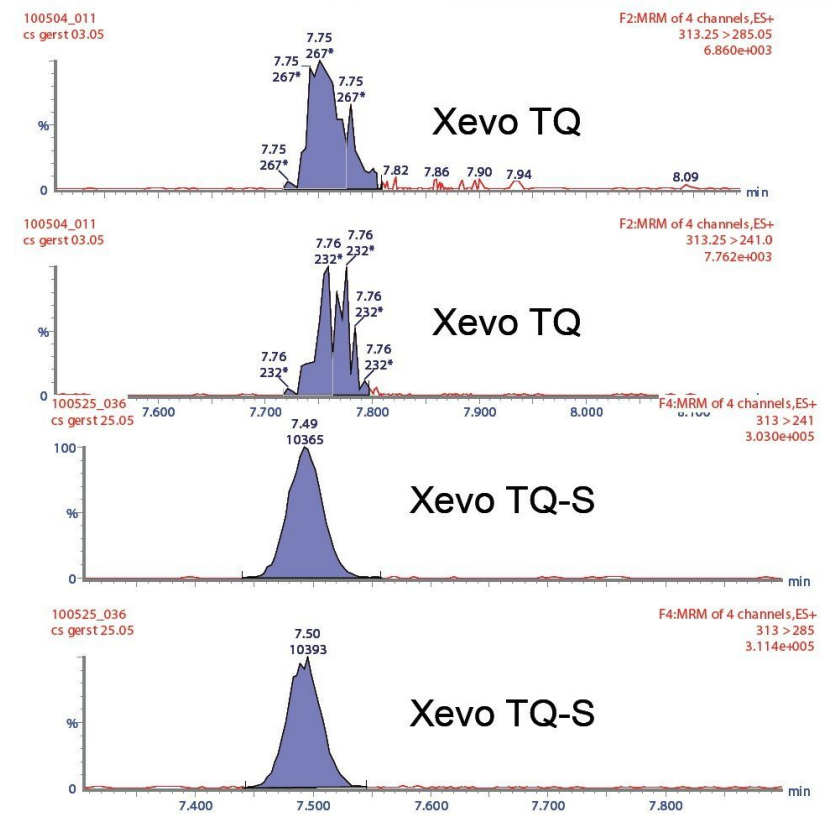


Figure 1. The same barley sample analyzed with Xevo TQ and Xevo TQ-S at a concentration of 0.1µg/kg, 20 times lower than EU legislation levels. The mycotoxin shown is Aflatoxin B1.

Extracted animal feed samples were also injected; animal feed is considered to be a complex matrix that can cause significant problems with regards to ion suppression. The results of 10 µL, 5 µL, and 2.5 µL injections are shown in Table 1. The ion suppression was calculated in the normal way of comparing the response of a solvent standard to that of an equivalent concentration in matrix.

The ability to inject a smaller amount on column can help reduce the effects of ion suppression because a smaller amount of matrix is also injected onto the column. The increased sensitivity of Xevo TQ-S makes detection at lower injection volumes possible. The reduction in ion suppression is clear at a 2.5 µL injection volume, with the majority of results between 70% and 120% (shown in light blue).

	10 µL injection	5 µL injection	2.5 µL injection
Nivalenol	88%	89%	86%
DON	81%	83%	88%
3-ac-DON	75%	78%	84%
Aflatoxin G2	64%	71%	112%
Aflatoxin G1	60%	68%	103%
Aflatoxin B2	52%	57%	89%
Aflatoxin B1	47%	50%	77%
Fumonisin B1	92%	93%	89%
HT2 toxin	44%	41%	62%
Beta zea	67%	71%	80%
Alpha zea	76%	81%	93%
T2 toxin	44%	49%	66%
T2-C13	76%	86%	104%
Zearealone	20%	24%	37%
Ochratoxin A	76%	80%	82%
Cytochalasin E	108%	102%	90%

Key	70% to 120%	50% to 69%	0% to 49%

Table 1. Ion suppression data using different injection volumes.

Conclusion

Improved peak shapes have been achieved due to the increase in sensitivity provided by Xevo TQ-S.

Data processing becomes quicker as baseline to baseline integrations are more common, reducing the time

that analysts require when reviewing and editing processed data.

Ion suppression is lowered with smaller injection volumes, but this can only be achieved with the sensitivity increases obtained by Xevo TQ-S.

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