November 5, 2015 (13:30–14:30)

VENDOR SEMINAR:

Prolonging GC-MS/MS Performance: Shoot and Dilute Injection versus Analyte Protectants

Prolonging GC-MS/MS performance: shoot and dilute injection versus analyte protectants

Julie Kowalski, Jack Cochran, Restek Corporation
E-mail: julie.kowalski@restek.com

In gas chromatography–mass spectrometry (GC-MS), most problems occur on the front end, at the GC inlet, where compounds can degrade during hot splitless injection, active compounds can be irreversibly adsorbed to inlet liner surfaces, and nonvolatile material from dirty samples can compromise the transfer of less volatile compounds of interest from the inlet to the GC column. These issues are magnified due to the very slow inlet flow during splitless injection, which is typically less than 2 mL/min.

Two strategies to mitigate these issues will be demonstrated in this seminar. One approach is to use split injection, what we call, “Shoot and Dilute”. With newer, more sensitive GC-MS/MS systems LOD and LOQ requirements are often achievable using split injections at ratios of 10:1 or greater. Increased flow through the inlet during split injection minimizes residence time inside the inlet liner, which decreases compound degradation and adsorption, and maintains acceptable data quality longer. In addition, GC oven start temperature can be higher thus reducing overall run time as well as the time needed to re-equilibrate the GC oven prior to the next analysis. Another benefit of split injection is improved peak shape for early eluting pesticides when injecting acetonitrile-based QuEChERS extracts.

The second strategy to overcome GC inlet problems is to use “analyte protectants,” which are essentially volatile and chromatograph-able masking agents such as sugars, diols, etc., that are co-injected with each sample and standard to temporarily occupy active sites in the GC inlet liner and column. These analyte protectants have low m/z ions and the mass spectrometer can essentially overlook them in favor of target compounds.

Both strategies were tested with multi-class pesticides and compared against a typical splitless injection method without use of analyte protectants for QuEChERS samples. For Shoot and Dilute, viability of split injection based on detectability of a wide range of analytes was determined. Optimized split injection, inlet and initial GC oven temperatures were determined. Benefits of analyte protectants were evaluated by peak shapes and responses of both well-behaved and problem pesticides. The goal of both Shoot and Dilute and analyte protectants approaches is to improve initial and long-term chromatographic performance.