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[Shoot-and-Dilute GC – A Way to Keep GC Systems Up Longer to Help Lower Cost of Analyses](#)

Saturday, February 22nd, 2014 by [Jack Cochran](#)

Dilute-and-shoot LC-MS/MS is a selective and sensitive technique often used in determining pesticides in foods. Because of competitive ionization effects seen with electrospray (ESI) and atmospheric pressure chemical ionization (APCI) methods, quantitative accuracy suffers for trace compounds of interest when matrix coelutions occur. Dilution of extracts (or sometimes raw samples) is a good way of trying to mitigate this issue, although sample cleanup can help tremendously also. For an excellent discussion of dilute-and-shoot LC-MS/MS, check out Julie Kowalski's article in our latest Advantage newsletter, "[Mitigating Matrix Effects: Sample Prep and Calibration; Strategies for Multiresidue Pesticide LC-MS/MS Analysis of Foods](#)". Or visit her detailed poster, "[Feasibility of dilute-and-shoot LC-MS/MS, solvent-only calibration and multiple food types for multi-residue pesticide analysis: lazy chemists and old instruments](#)".

Shoot-and-Dilute GC (aka "split injection") is an analogous technique to dilute-and-shoot LC-MS/MS, used more because of matrix effects that can occur at the INLET and COLUMN, versus at the detector, although with ion trap mass spectrometers and the recently introduced, ultra-sensitive [APGC](#) systems, matrix effects at the detector end are still possible. Rather than write a(nother) book on problems associated with splitless injection of dirty samples, I'll simply mention that compound degradation and drastic response changes (especially for low volatility and active components) can quickly occur in a GC inlet liner that gets dirty. And I'll refer you to the extra reading below.

An easy way to mitigate the aforementioned problems is to use split injection GC any time you can. That is, if you can meet LOD and LOQ requirements by making split injections at ratios of 10:1, 50:1, or even higher, increased flow through the inlet is going to minimize compound degradation (e.g. Endrin and DDT) and poor response for involatile compounds (e.g. PAHs, PCBs, dioxins and furans). In addition to fg-detection ECDs, we have sensitive [GCxGC-TOFMS](#) and [GC-MS/MS](#) equipment in our lab, prime instrumental candidates for Shoot-and-Dilute GC.

I was going to say "it's easy" to demonstrate the positive effects of Shoot-and-Dilute GC, and maybe it is, but it takes a *LOOOOONG* time because split injection keeps the GC system up so long versus splitless injection. You can see that below in two chromatograms where I injected a [Used Motor Oil Composite Standard](#) hundreds of times, interspersed with a [PAH Standard](#) to monitor any response fall-off, and the system just won't go down! (I'm still running as I write this with no liner change!) There is a slight baseline rise at the end of the run occurring over time (not shown because chromatograms are baseline