

How New Technology is Challenging an Old Environmental Lab Tradition

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For decades—as long as **environmental laboratories**—there has been the tradition of the daily “Shaking Party” in the organic sample preparation lab. For those not familiar with this practice, it refers to the use of Liquid-Liquid Extraction (LLE) for **sample preparation** via separatory funnel. In this process, the aqueous sample being analyzed, and an organic extracting solvent (such as methylene chloride), are placed into a separatory funnel and shaken. Shaking continues for a period of time until all the target organic analytes are transferred from the aqueous sample into the organic solvent. At that point the organic layer is transferred from the funnel, dried, and evaporated down for analysis by **GC or GC-MS**.

So far, this all sounds like a regular analytical laboratory procedure. So, where does the “Shaking Party” come in? Well, as it turns out, the LLE extraction procedure is very tedious and time consuming, particularly when dozens of samples (or more) need to be processed. In order to manage the boredom and help pass the time, a social shindig spontaneously developed in the extraction laboratory, and there was born—the “Shaking Party”. This exclusive event has a couple individuals, or sometimes a half dozen or more, setting up their personal separatory funnels and

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standing in a circle shaking them. At the same time the group would chat about current laboratory challenges, listen to classical music, or just discuss life's endless mysteries—like why Taylor Swift's newest song was just not up to par with the lab's go-to, "*Shake it Off*". Sometimes these shaking parties would last only tens of minutes, but some could last an hour (or longer) if there were a lot of samples to process. Now, that's a lot of shaking! However, the "Shaking Party" served the exceptionally useful purpose of making a very tedious task much more enjoyable.

However, as I visit environmental and food testing labs around the country lately, I have noted that many laboratories seem to have lost the "Shaking Party" tradition. Why is that you may ask? Has the EPA suddenly banned the practice? Aren't there any "fun" people in laboratories anymore? Is there perhaps a shortage of separatory funnels?

Actually, the reason for this decrease is pretty straight forward—sample preparation technology has evolved, and more effective and efficient sample preparation techniques are available. In addition, newer environmental methods based upon LC-MS/MS and GC-MS/MS require more targeted, efficient, and cleaner techniques which allow for faster, easier, and more accurate sample preparation. This also enables the reduction of extraction solvent use. Although the "Shaking Party" is still an acceptable technique for many types of samples, it

Whatever Happened to the Shaking Party? New Technology Challenging Old Lab Traditions

appears that more and more labs are gravitating toward the newer, more effective preparation techniques to better support their need in a faster and more productive manner, all with less solvent usage.

Some examples of these improved sample preparation techniques include **QuEChERS**, off-line SPE, and on-line SPE. Although perhaps not as much fun as the “Shaking Party”, these new techniques are much more appropriate for modern environmental methods, such as the determination of pharmaceuticals and personal care products in water and waste water, and also the analysis of PFAS, PFOA, and PFCs in drinking water and even in food. Recently, PFAS/PFOA/PFCs have received a great deal of regulatory scrutiny because of their strongly bio-accumulative nature and their widespread environmental abundance resulting from their extensive use in fire retardant chemicals and nonstick coatings. These factors have led to an EPA Health Advisory at the concentration level of 70 ppt in drinking water. This need for high sensitivity has led some laboratories to apply alternative techniques, such as QuEChERS, for the analysis of PFCs in sediments. It has also led to the use of off-line SPE and even on-line SPE (using a variety of sorbents) to extract, concentrate, or clean PFAS/PFC samples for subsequent LC-MS/MS analysis. (Details on all these applications can be found on the Phenomenex Web site, or the new Environmental Sample Prep Guide **Download Now**).

However, new analytical methods such as for PFAS/PFC are not the only ones to benefit from advanced sample preparation techniques. Even the ancient (by laboratory standards) EPA Method 625 method for the analysis of Base/Acid/Neutral organics in waste water has benefited. EPA recently approved the use of SPE as an alternative for LLE in Method 625, thus allowing for faster, more effective, and more efficient sample preparation. Owing to its widespread use, Method 625 was one of the primary drivers of “Shaking Parties”. EPA’s

Whatever Happened to the Shaking Party? New Technology Challenging Old Lab Traditions

allowance of SPE has led some labs to ditch their “Shaking Parties” and replace their racks of separatory funnels with SPE tube manifolds and vacuums.

The availability of new, more targeted sample preparation techniques like QuEChERS, off-line SPE, and on-line SPE has certainly reduced the practice of LLE in environmental laboratories. Although “Shaking Parties” may have significantly decreased, I don’t believe that this decade long tradition will entirely disappear, because LLE is still an effective means of sample preparation for small sample batches. However, the higher productivity and throughput to be gained from new preparation techniques will continue to drive a shrinking role for LLE in the environmental laboratory. While it is great to maintain traditions like the “Shaking Party”, unfortunately, modern times demand higher productivity which has led us to “break with tradition”.

Now, we would like to hear from you!

We are conducting a survey to determine how often shaking parties are now occurring. Has your lab decreased the number of shaking parties? What do you talk about during your shaking parties? What are your favorite shaking tunes? What is your favorite (or your worst) shaking party memory? Don’t have shaking parties anymore? What have you done with all the extra time you’ve saved from moving on from them?

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Summary

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Description

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