

# Sample Preparation

## 2011 Restek Overview



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**ECHnology** Pty Ltd

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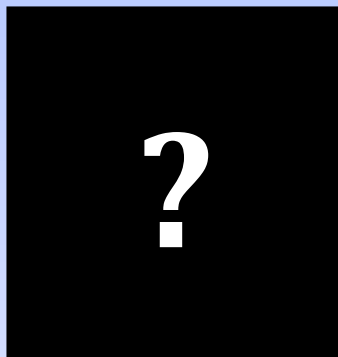
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# Outline

- What is Sample Preparation?
- Key Markets Overview
  - Product Offering
  - New Products
  - Products and applications in development
- Current Sample Prep Objectives
- Promotions

# What is Sample Preparation?



Sample Collection

Sample Analysis

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# The Sample Prep Market



- Worldwide extraction market is project to be 370 million dollars in 2012.
- Two thirds of this (\$247 million) is aftermarket
- 22% (\$81 million) is Asian with a growth rate more than double ROW (about 6%)
- No single manufacturer has more than 11% of the market



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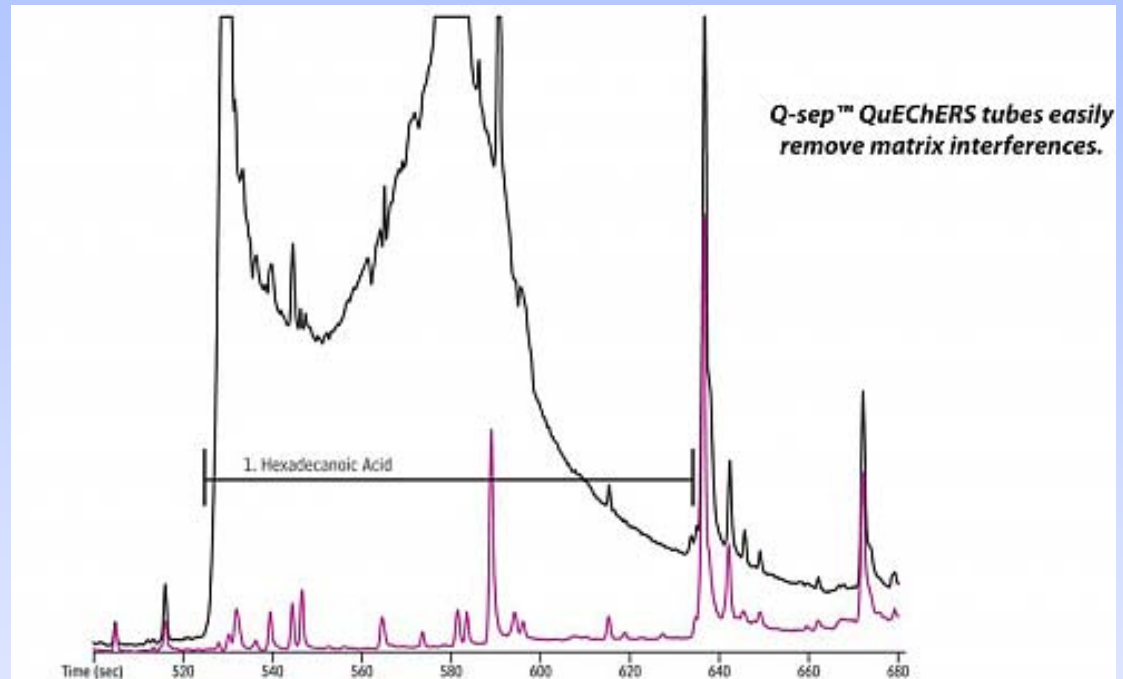
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# We want a sample that is:

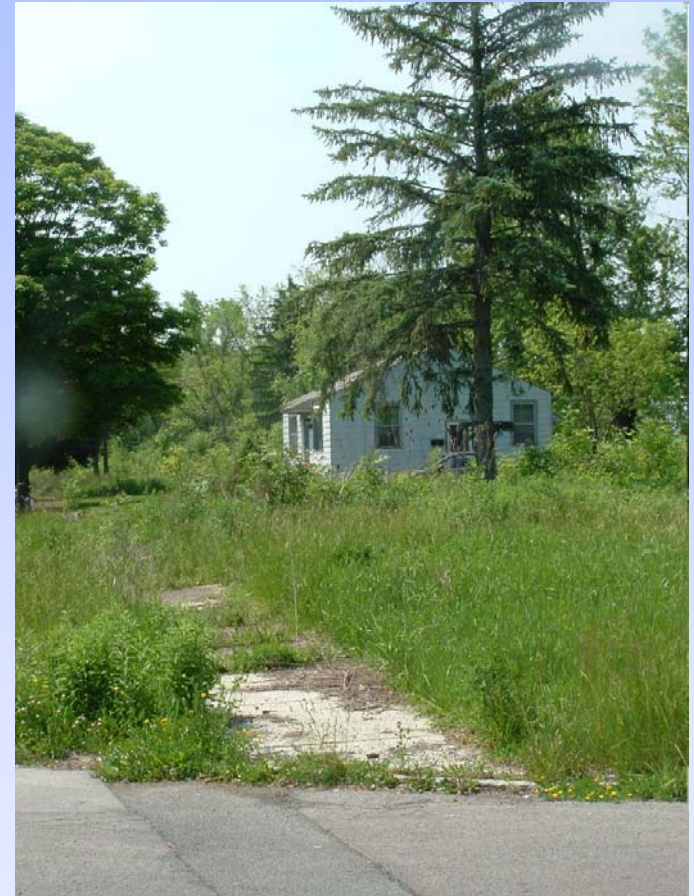
- Clean
- Concentrated
- And Detectable





# Environmental Market

- Historically a strong market for Restek
- Original sample prep product offering was built to fit the environmental analysis market



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# Solid Phase Extraction (SPE) Concepts

- Liquid/solid chromatography
- “LPLC”
- Disposable extraction column filled with a variety of chromatographic grade sorbents
- Alternative to traditional liquid-liquid extraction

# Why SPE?

- Reduce solvent costs due to smaller amounts of solvents used
  - Buying
  - And disposing!
- Lab supply cost savings
  - Most SPE components are relatively inexpensive
  - Extend life of analytical hardware and consumables due to cleaner samples



# SPE Tubes

- Normal phase – silica, Florisil
- CarboPrep®
- Method Specific
  - EPH Fractionation
  - Coconut charcoal
  - Resins
- Reverse phase – C18, C8
- Ion Exchange – WAX, SCX



# SPE Disks

- Higher reproducibility
- Faster throughput
- Higher recoveries
- Primarily used for large volume water samples
- C18 or C8 embedded in glass fiber disks



# More SPE Products



Bulk Sorbents



Manifolds and replacement parts

# Pressurized Fluid Extraction (PFE)



- Commonly known as ASE<sup>®</sup> (Accelerated Solvent Extraction)
- EPA 3545A
- High temperature, high pressure automated extraction
- Used to remove organics from various solid matrices
- Faster and less solvent usage than Soxhlet



# ASE® Products



- Full line of cells, caps, and replacement parts for ASE 100, 200, and 300 systems
- Bulk package quantities for high-use items like PEEK washers, glass and cellulose filters, replacement frits
- Currently investigating ASE® 150 and 350 for replacement parts

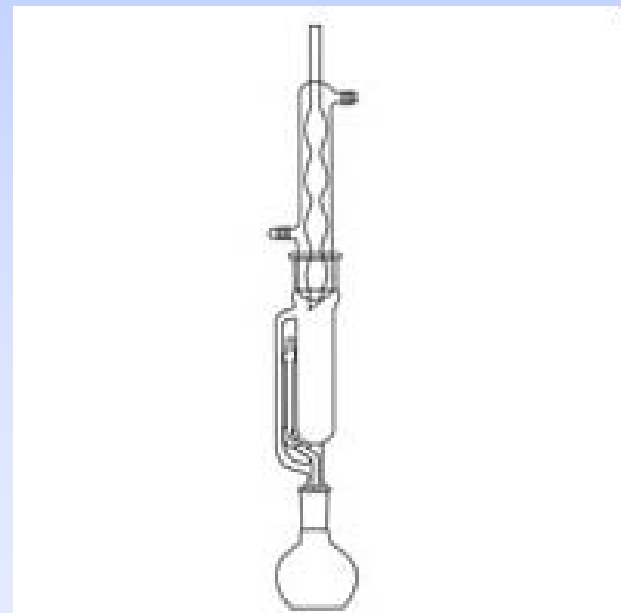




# Environmental Glassware



- New in 2011 is our line of technical glassware.
- For the environmental market:
  - Soxhlet Extraction Glassware
  - Kuderna-Danish Evaporators



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# Environmental Positioning

- Priced competitively with industry leaders like Agilent, JT Baker, Supelco
- Targets more common, larger volume sample preparation applications
- SPE tubes and ASE consumables part of Restek's core focus on high volume consumables
- Complements Restek's industry leading GC columns and reference standards



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# Environmental Developments

- New and updated applications for
  - Extractable petroleum hydrocarbons
  - CarboPrep for pesticide extract clean-up
  - Environmental sample prep application resource
- New products in development
  - Larger selection of bulk sorbents
  - Additional SPE materials and formats
  - New ASE parts
  - New glassware



# Food Safety Market

- Smaller market, but rapidly growing especially in Asia and South America
- Restek has a large selection of related products and technical resources
- More details in our **Food Safety Market** overview



# Restek's Total Solution for Food Safety

- GC Columns
- LC Columns
- Analytical Standards
- QuEChERS Sample Preparation
- Related Lab Equipment



The banner features a green background with a stylized 'Q-sep' logo. To the left is a glass vial with orange liquid. To the right are various lab items: a syringe, a vial, a tube, and a package labeled 'Q-sep'. Below the logo, the text reads 'QuEChERS Products' and 'Your Total Solution for QuEChERS Methods'. At the bottom, it lists 'Tubes • Standards • Columns • Accessories' and includes a 'Shop now' button.

**Q-sep™**  
QuEChERS Products  
Your Total Solution for QuEChERS Methods  
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# Food Safety Expertise

- Restek.com/QuEChERS
- ChromaBLOGraphy
- Jack, Jason, Julie, Michelle
- Worldwide tradeshow

Home > Restek Q-sep™ QuEChERS Products

## Restek Q-sep™ QuEChERS Products

### Related Links

[www.quenchers.com](http://www.quenchers.com)  
AOAC Official Method 2007.01  
CEN European Standards  
EN 15662 Method  
More Chromatograms

Tired of throwing away all those tubes?

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New Reusable Teflon  
QuEChERS Centrifuge Tubes

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Products

Resources

Chromatograms

### Q-sep™ QuEChERS Extraction Salts

Fast, Simple Sample Prep for Multi-Residue Pesticide Analysis

- Salt packets eliminate the need for a separate extraction step
- Go green by using packets with reusable tubes
- Convenient and easy to use.
- Ready-to-use tubes, no glassware required
- Preweighed, ultra-pure sorbents
- Support original unbuffered, AOAC (2005) Method 3040

[Click here for more information on our QuEChERS](#)

[Click here for an audio slideshow.](#)



Q-sep™ 3000 Centrifuge  
for QuEChERS

## ChromaBLOgraphy

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« Some answers on the Chromatography challenge posted before: Does a GC-capillary column produce different retention times when installed in the opposite direction? LC/MS/MS Analysis of Synthetic Cannabinoid Metabolites in Urine – The Saga Begins »

### First QuEChERS Extraction of Marijuana with GCxGC-TOFMS Analysis, dudes...

April 20th, 2011 by Jack Cochran

My Restek colleagues Julie Kowalski, Michelle Misselwitz, and Amanda Rigdon, along with Professor Frank Dorman from The Pennsylvania State University (PSU), report here what we believe is the first QuEChERS extraction of marijuana, with subsequent analysis using GCxGC-TOFMS. We task by Randy Hoffman, a Police Officer Specialist/Evidence Technician at PSU, who very kindly donated the samples confiscated from him. Probably should have had their minds on class, not grass.

Our interest in this topic is mainly about medicine, since at least 15 states (Pennsylvania is not one of them) and Washington DC have medical marijuana. When you fill your prescription, how do you know your remedy is active (potency, or cannabinoid content), pesticide bacteria or mold or fungus? Well, you probably don't, but eventually FDA might get involved and we'll need good, robust analytical methods for pesticide analysis. We think that you might be able to do one extraction for both potency and pesticide determinations and we're high on it.

First, the potency work, or cannabinoids determination. Although you don't need GCxGC for the BIG THREE (cannabinoid, Δ9-THC, and CBN), Restek has a reference material containing these compounds... we used it to illustrate one of the benefits of that technique, the structure of the first figure below, the GCxGC contour plot (or chromatogram), you can see that compound classes position themselves in certain areas of the plot, and makes discovery of new compounds within classes a bit easier (e.g. perhaps there are undiscovered cannabinoids out there). Zooming in, we can see the terpenoid classes, which are thought to have therapeutic effects. Finally, you can see the cannabinoid, one of much interest given that "it has been shown to relieve convulsion, inflammation, anxiety, and nausea, as well as induce sleep" (<http://en.wikipedia.org/wiki/Cannabidiol>).

We quantified cannabidiol (CBD), Δ9-THC (THC), and cannabinol (CBN) for 4 marijuana samples using QuEChERS and GCxGC-TOFMS and the results are presented in the table below. Since the samples had been stored in an evidence locker for over a year in some cases, the CBN content is relatively high versus fresh marijuana. CBN increases as THC degrades. The THC content is in line with what is typically reported for higher grade illicit marijuana.

Stay tuned for a report on pesticide analysis of marijuana using QuEChERS and GCxGC-TOFMS. As you might imagine, the extracts are extremely complex, similar to what we saw in our dietary supplements work.



cannabinoid



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# Universal Products

- Syringe filters
- Filter vials
- Technical Glassware



# Filtration

- Membrane choices
  - Chemical stability
- Pore size
- Surface area
  - Larger sizes can accommodate larger flow rates
  - Larger sizes have more dead volume



# Syringe Filters

- Current Promotion –  
**10% increased discount**  
on top of **quantity break**  
discounts for all of 2011



- Current line includes
  - Cellulose, PVDF, Teflon, and Nylon membranes
  - 13 and 25mm diameter
  - 0.22 and 0.45  $\mu\text{m}$  porosity
- Just released
  - PES membranes
  - 4 and 30mm diameters for all membranes



**NEW!**

# Thomson Filter Vials

- Polypropylene vials with PTFE, Nylon, PVDF, or PES filters
- Simplifies sample filtration – put vial straight in the autosampler.



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# Technical Glassware



- In 2011, we have introduced a line of technical glassware including:
  - Erlenmeyer Flasks
  - Volumetric Flasks
  - Soxhlet Extraction Glassware
  - Kuderna-Danish Evaporators
  - Separatory Funnels
  - And more!



# Technical Glassware

- In 2010, Restek acquired Glastron, a manufacturer of scientific glassware
- Glastron has been making technical glassware for over forty years
- Our current offering is just a limited selection of the most common items
- Market competitive pricing

# QuEChERS Objectives

- QuEChERS products for the Food Safety market
- Focus on the environmental market
- Low price, large volume universal products like syringe filters and glassware

# Food Safety

- Leverage our deep technical knowledge with applications
- Continue to expand our “Total Solution”
- Focus on environmentally friendly “Green” solutions

# Environmental

- Provide the products and applications to support the environmental market
- Focus on key sample preparation products to support our columns and standards
- Increase our application footprint in the market



# Universal Products

- Support the universal consumable products found in analytical labs
- Our acquisition of Glastron strongly positions us to serve the technical glass market
- Offer high-quality, high-volume consumables like syringe filters at competitive pricing

# 2011/12 Promotions

Tired of throwing away all those tubes?

**GO GREEN!**

New Reusable Teflon  
QuEChERS Centrifuge Tubes

Shop now



- Purchase one package of reusable Teflon centrifuge tubes and get one box of QuEChERS Extraction Salts