FMS
Fluid Management Systems

Fast, Reliable Pesticides in Food Extractions

PLE®

Pressurized Liquid Extraction

Agenda

- PLE® Overview
  - Pressurized Liquid Extraction
- Extraction and Cleanup for Pesticide Testing
- Questions

Testing in Food

- Food Safety
  - Pesticides cause Harm to Humans/Pets
  - Identify potential risks to your Supply Chain and Product line
- Analytical
  - Pesticide Analysis
  - Fast
  - Reproducible Results

Pressurized Liquid Extraction

- An Extraction technique used in the Food Market
- The Technique Incorporates:
  - Solvent
  - Pressure
  - Heat
  - Time

Why is the PLE so effective?

- Performed near the solvent's supercritical region
- Under Programmable Pressure
- Creates a high degree of analyte solubility releasing them from the solid matrix

Extraction

- A solid or semi-solid sample is placed in the Pressurized Extraction Cell 5ml to 200ml

- The Extraction cell is capped and placed into the extraction device which can be pressurized to up 2500psi

Extraction

- The Extraction cell is placed under pressure at ambient temperature (nominally 25 ^{o}C)
  - For Pesticides
- No Heat
- The Extract is flushed with solvent then Nitrogen

The PLE®

Pressurized Liquid Extraction

PLE – Pressurized Liquid Extraction

- High Speed
- Modular and expandable from 1 to 8
- Process 1 to 8 samples in 10 to 15 min
- Extraction cell size 5 to 200 ml
- Real time plot of temperature and pressure
- Reduced Solvent Consumption
- Lower Energy Consumption
- In Cell Sample Cleanup

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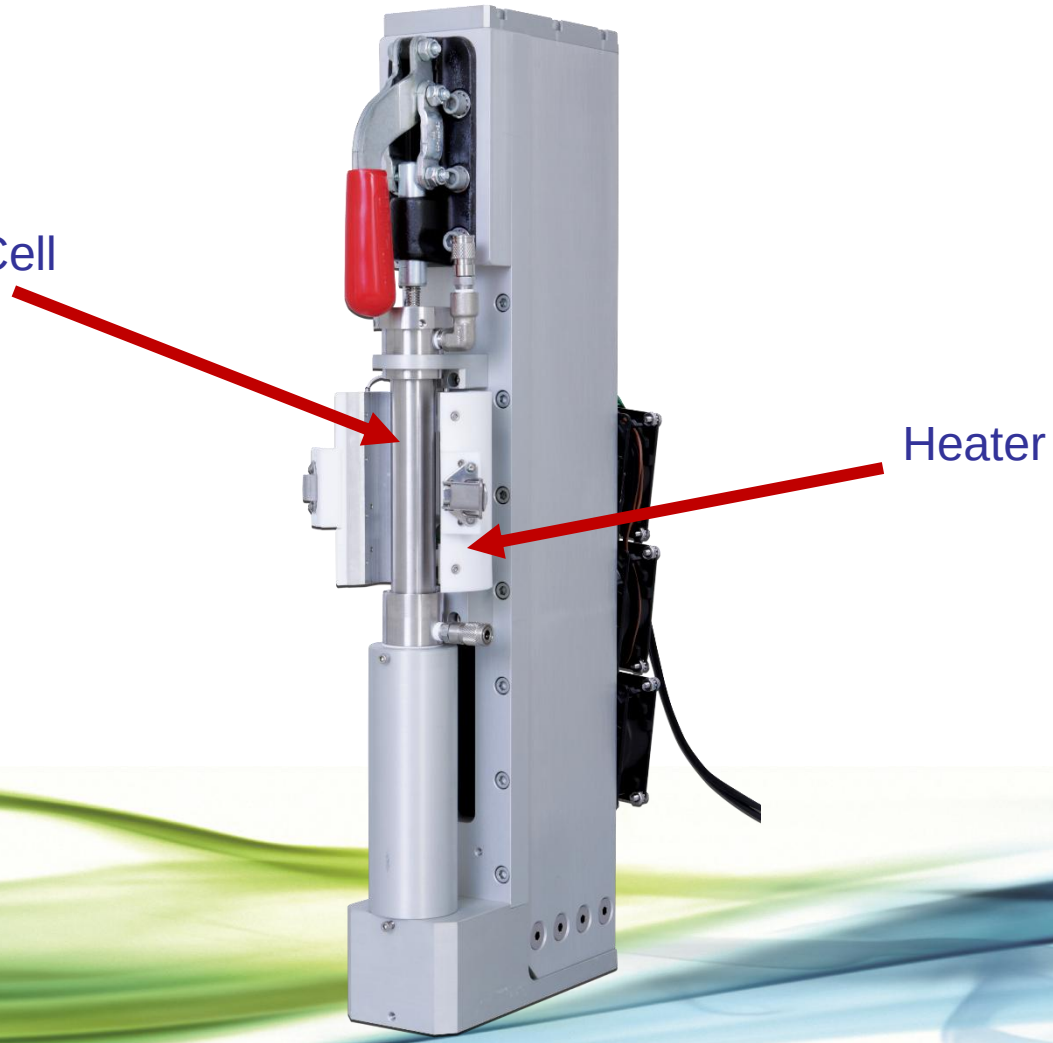

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Economical Extraction Cells

Easy to Use End Caps

Modular and Expandable

Expandable from 1 to 8 Modules

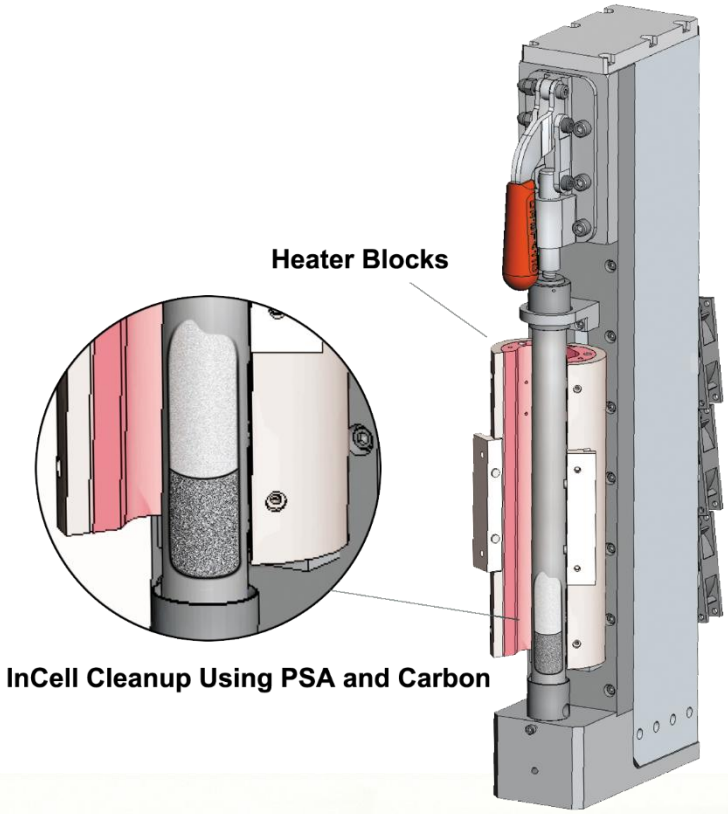
Parallel Extraction

In Cell Cleanup for Pesticides

Eliminates Manual cleanup

Uses In Cell Cleanup

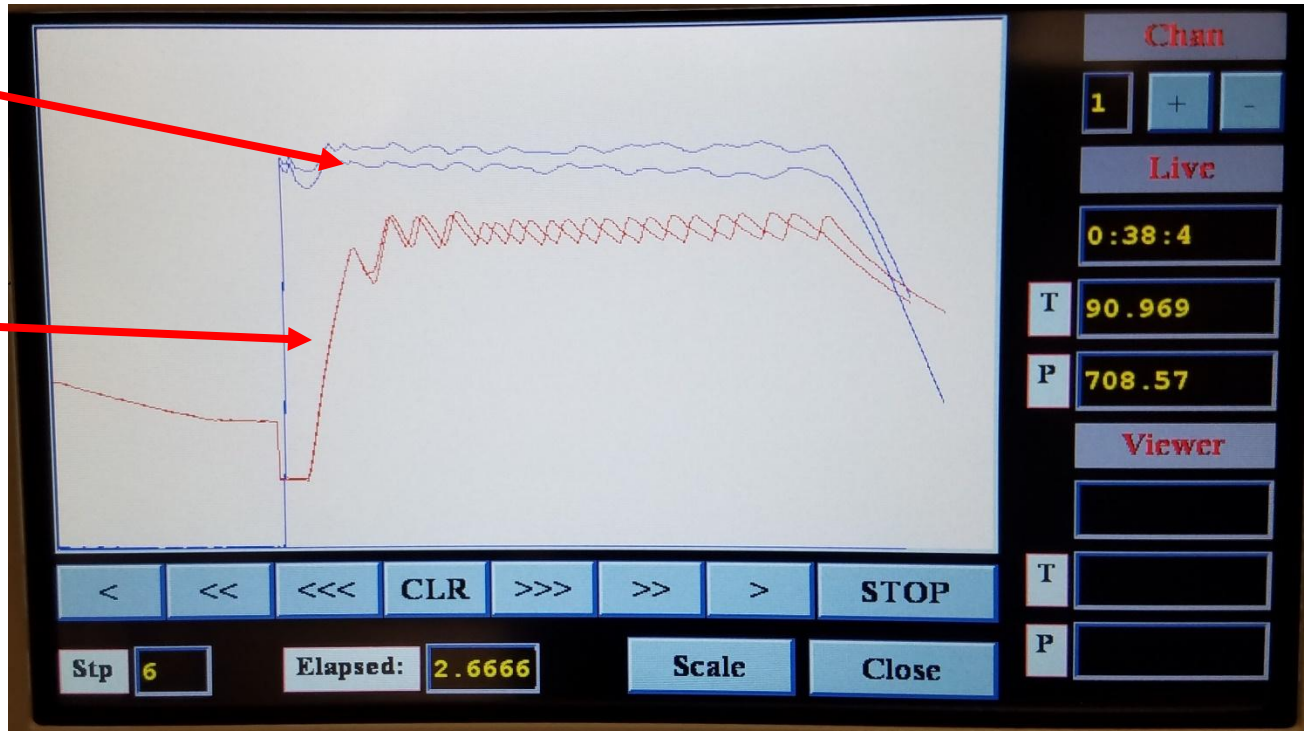
- Florisil
- PSA
- Carbon
- Silica



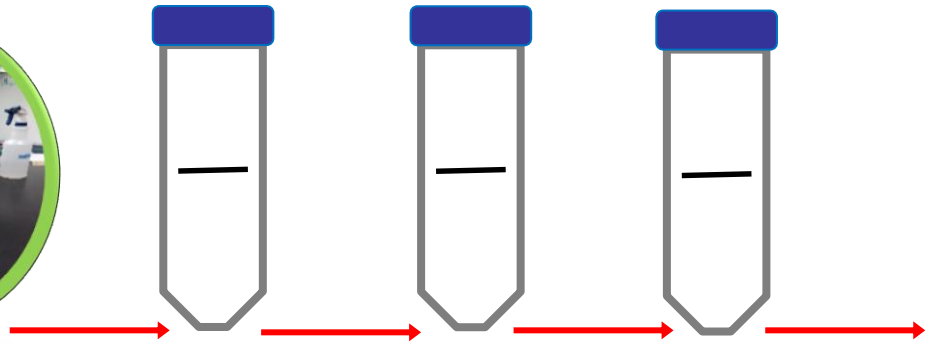
Method Documentation

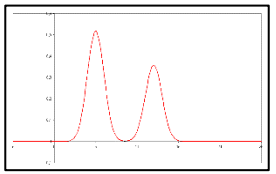
Pressure

Temperature



Standard Quechers Pesticide Workflow





2 minutes

Weigh the Sample

5 minutes

Load the Sample into the Vessel add H_2O and Acidified ACN

30 minutes

Shake Vessel

10 minutes

Add Quechers salt, shake and centrifuge

10 minutes

Extract Filtration

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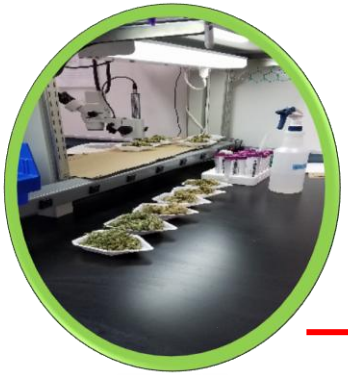
52 minutes

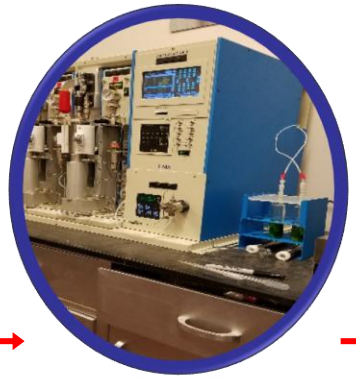
Sample Prep Total Time Ready for Injection

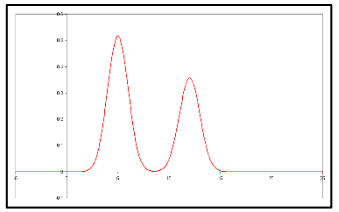
Standard Quechers Pesticide Workflow

- Lots of Manual Steps and Human Interaction
  - More Error Prone due to interaction
- Labor and Solvent Intensive
  - Costs money
- Time Consuming Process
- Users Complain of Inconsistent Results

PLE Extraction and Cleanup for Pesticides Workflow







2 minutes

Weigh the Sample

2 minutes

Load the XtractClean™ and Sample into the Extraction Cell

8 minutes

Pesticide Extraction and In Cell Cleanup

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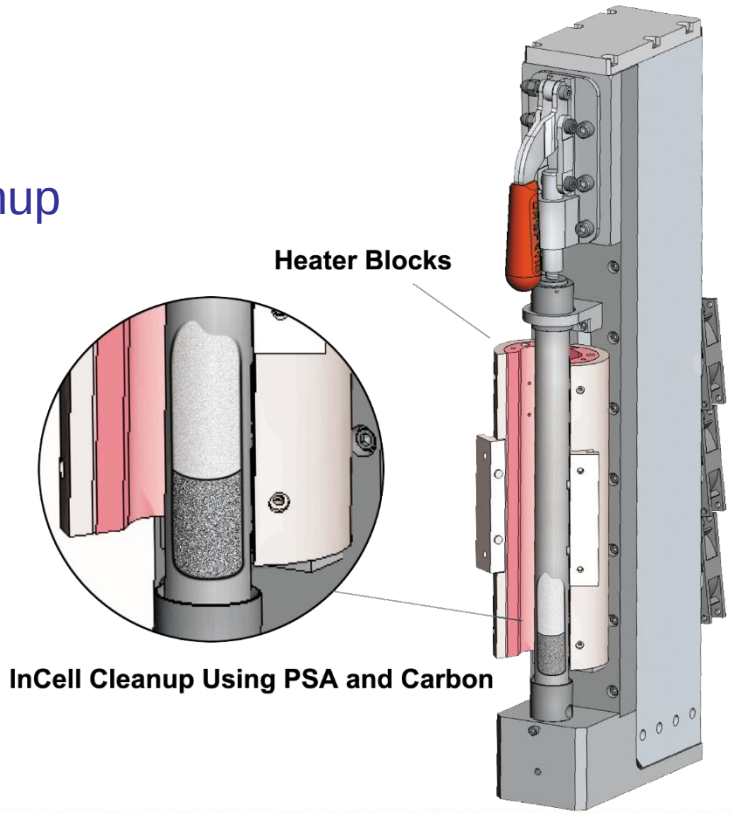
12 minutes

Sample Prep Total Time Ready for Injection

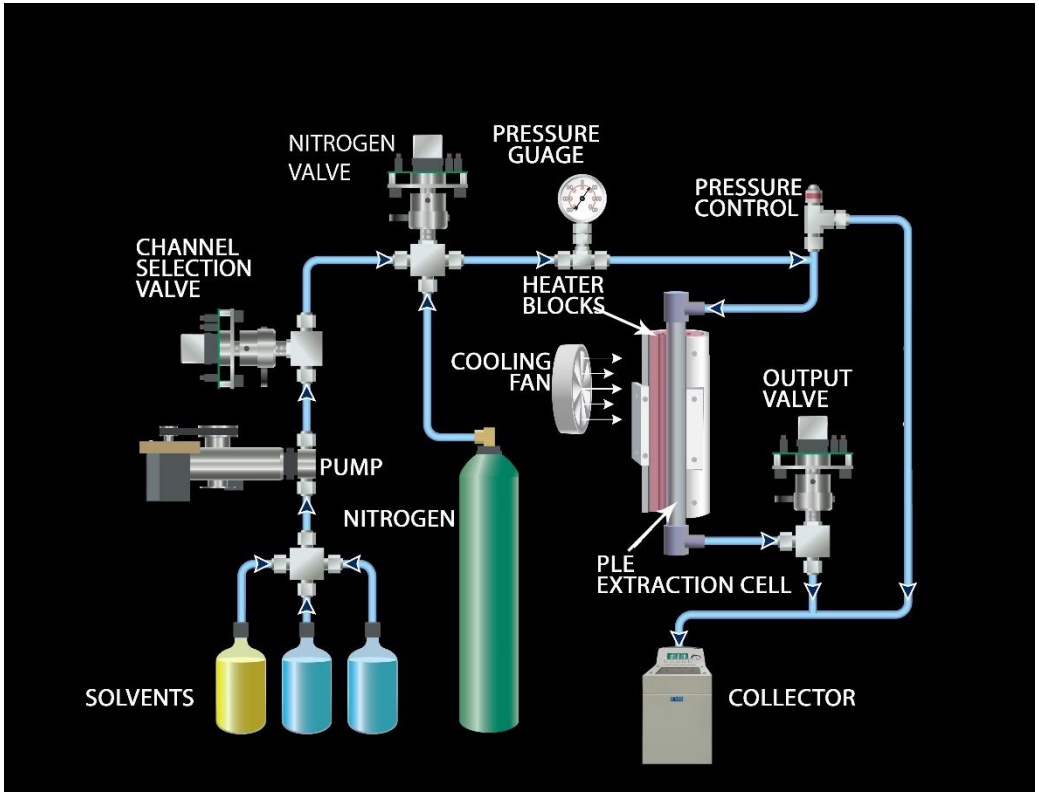
InCell Cleanup for Pesticides

Eliminates Manual cleanup

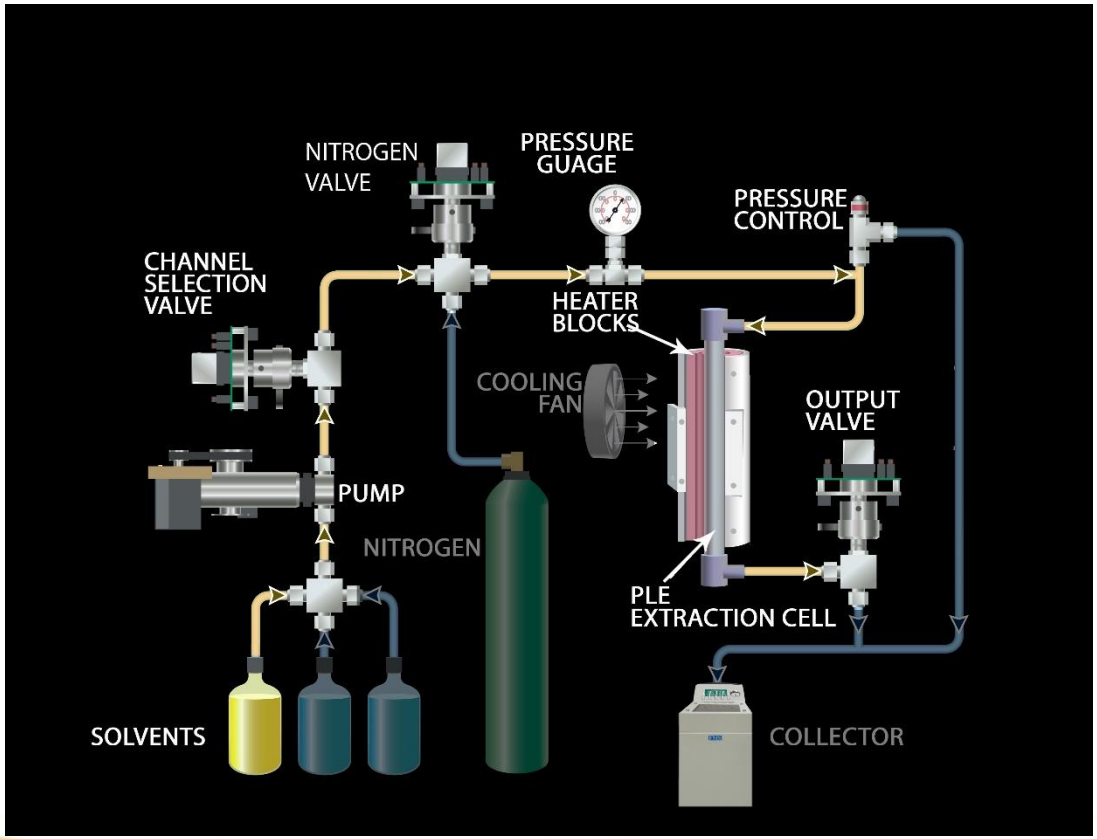
XtractClean™



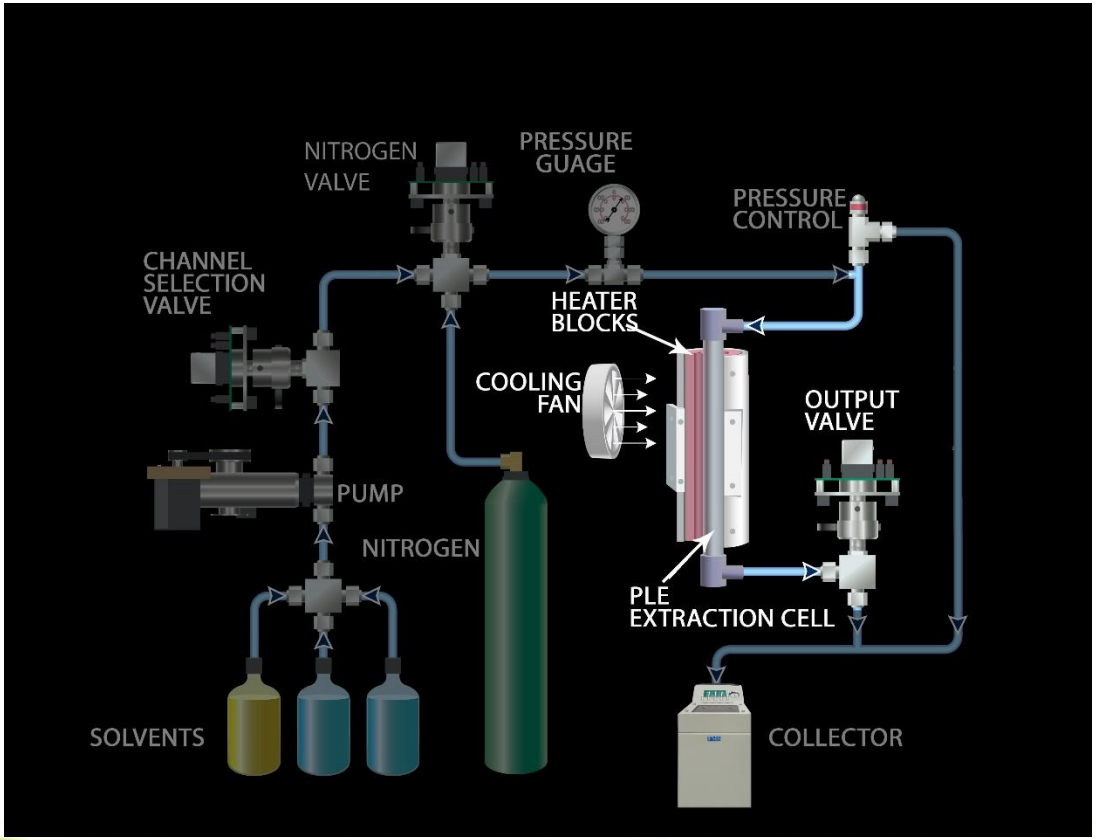
Filling the Cell with Acetonitrile



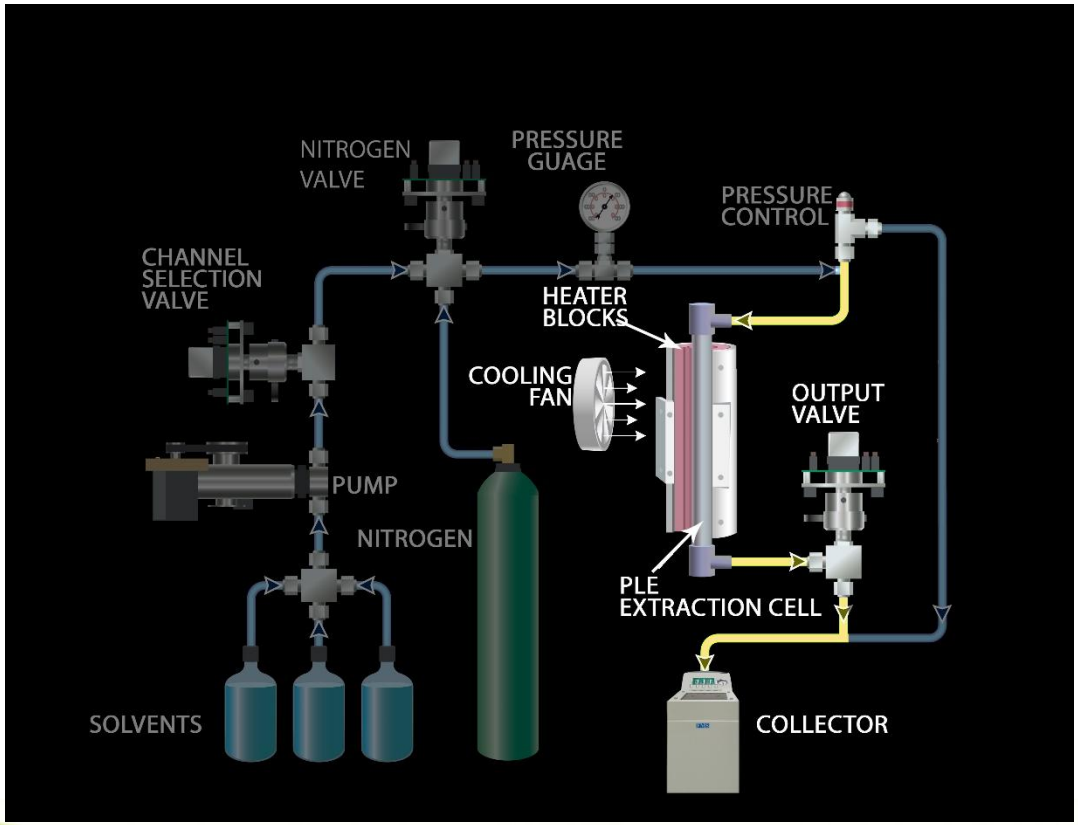
Pressurize the Cell



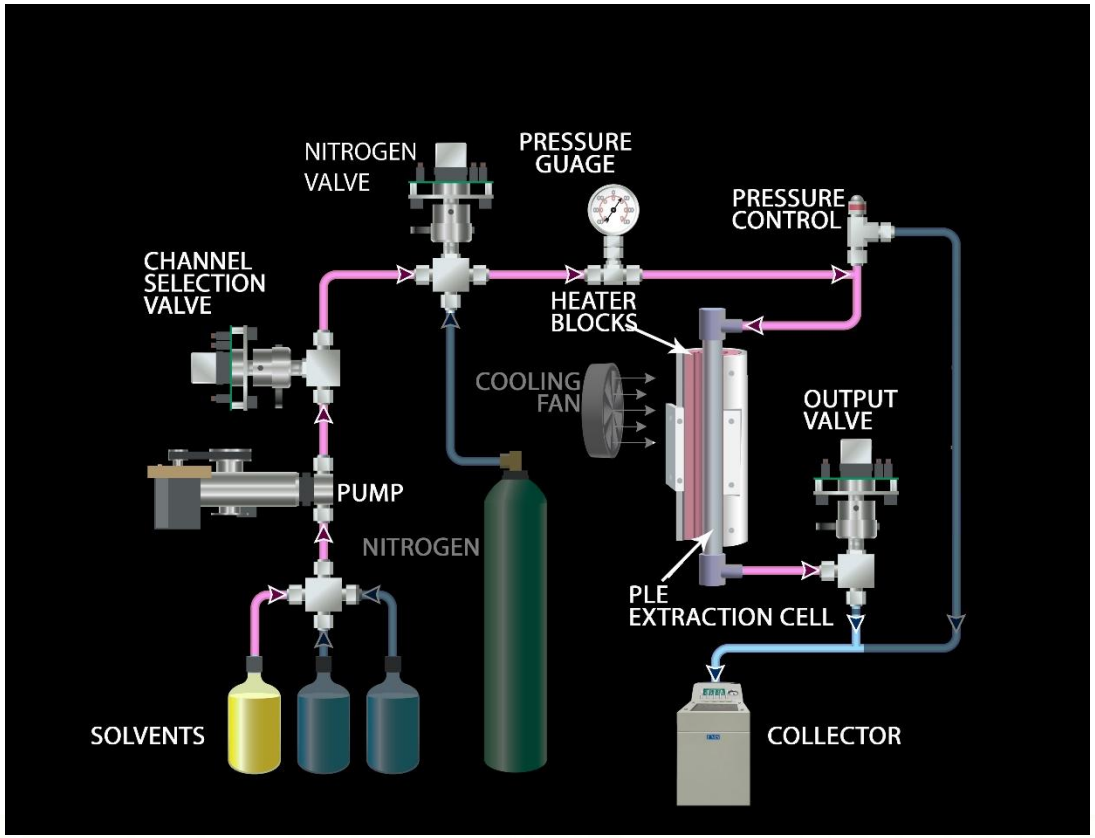
Maintain Pressure



Depressurize the Cell



Deliver the Extract to the Collection Vessel



Results

GC/MS-MS Conditions

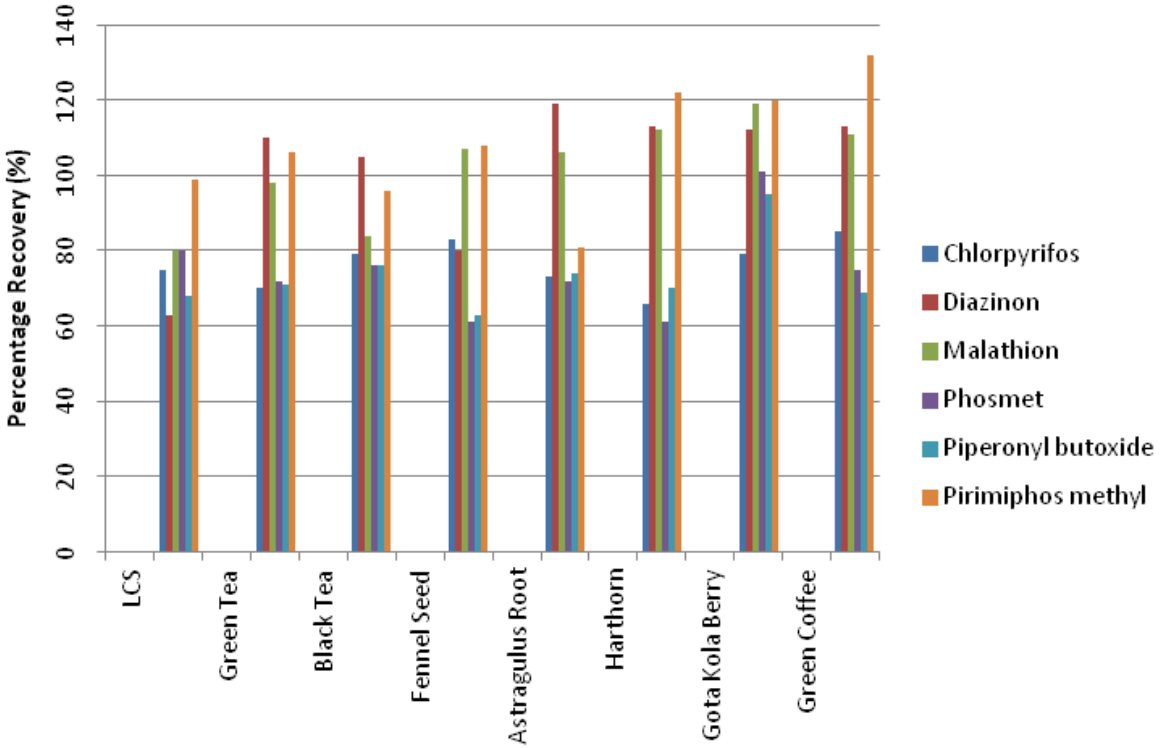
- Thermo Trace GC w/PTV
- TSQ Quantum Ultra
- 30 meter, .25mm, .25µm Column w/5 meter Guard column
- 203 Pesticides scanned (414 transitions)

Results

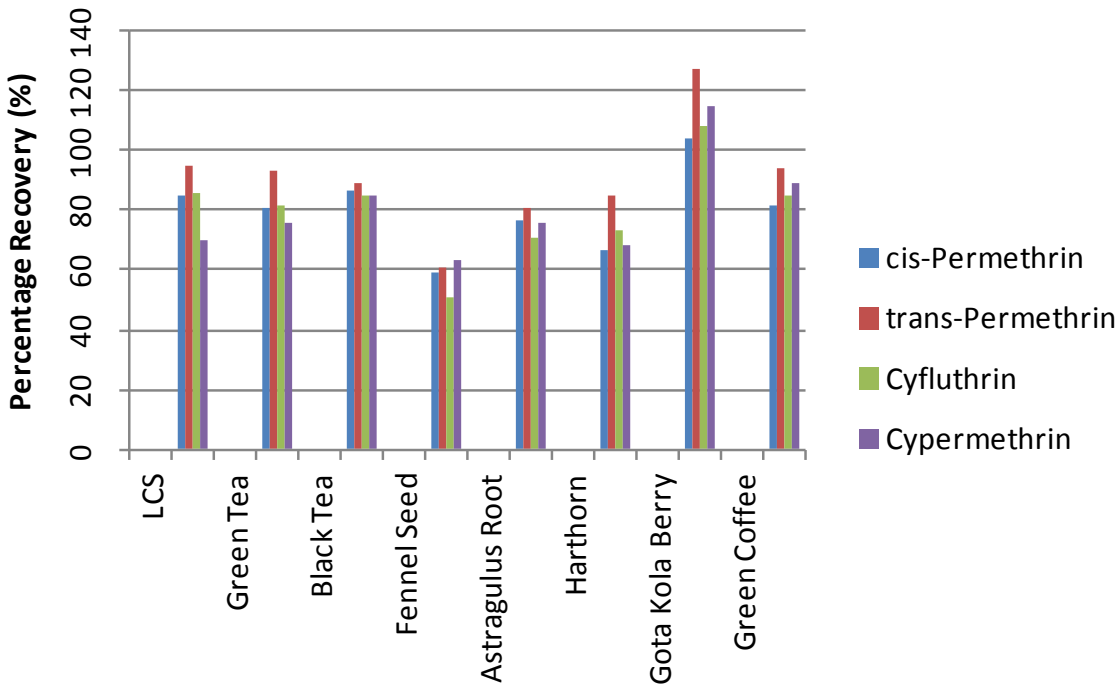
Sample Preparation for Extractions

- Samples weighed and prepared.
- Analyzed un-spiked and spiked to ensure no native pesticides of interest present
- Samples spiked at .1 ug/g
- Samples directly loaded onto GC with no evaporation.

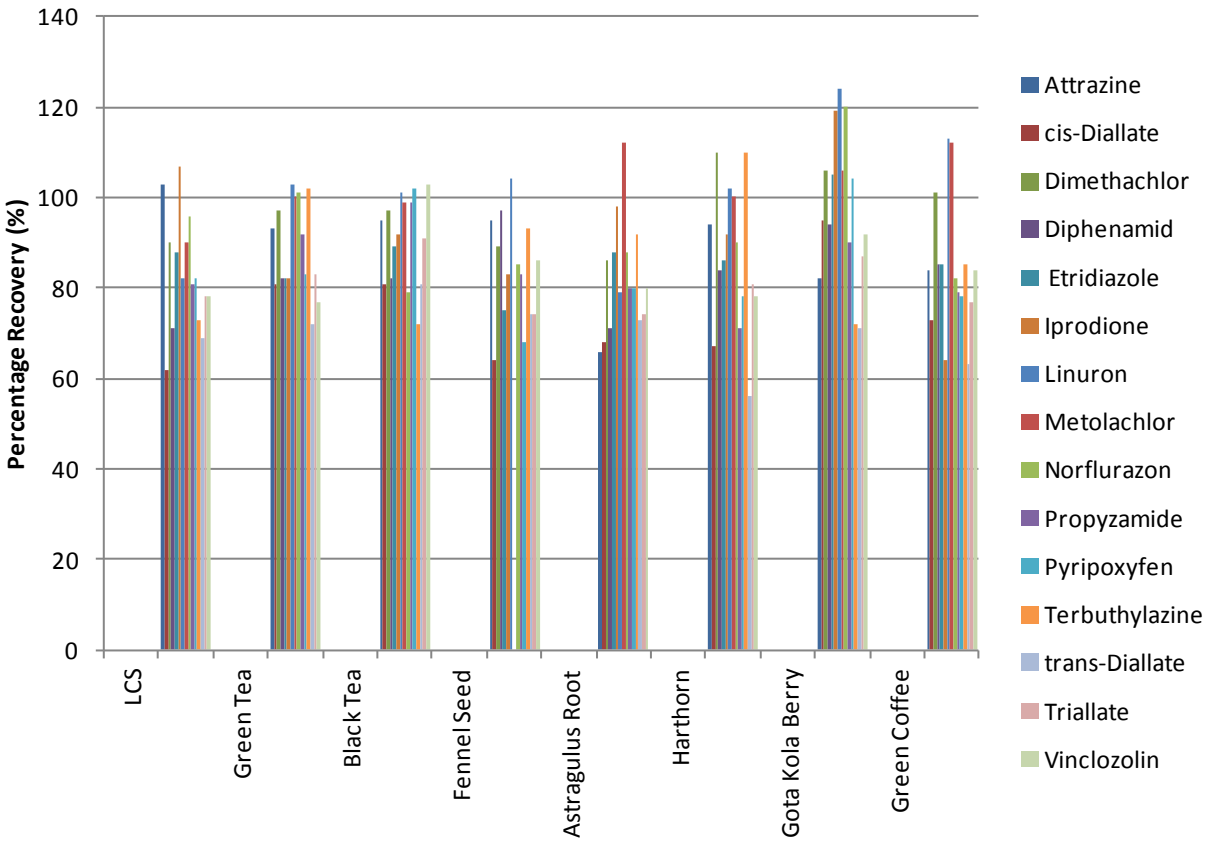
Results: Organophosphorus Pesticides



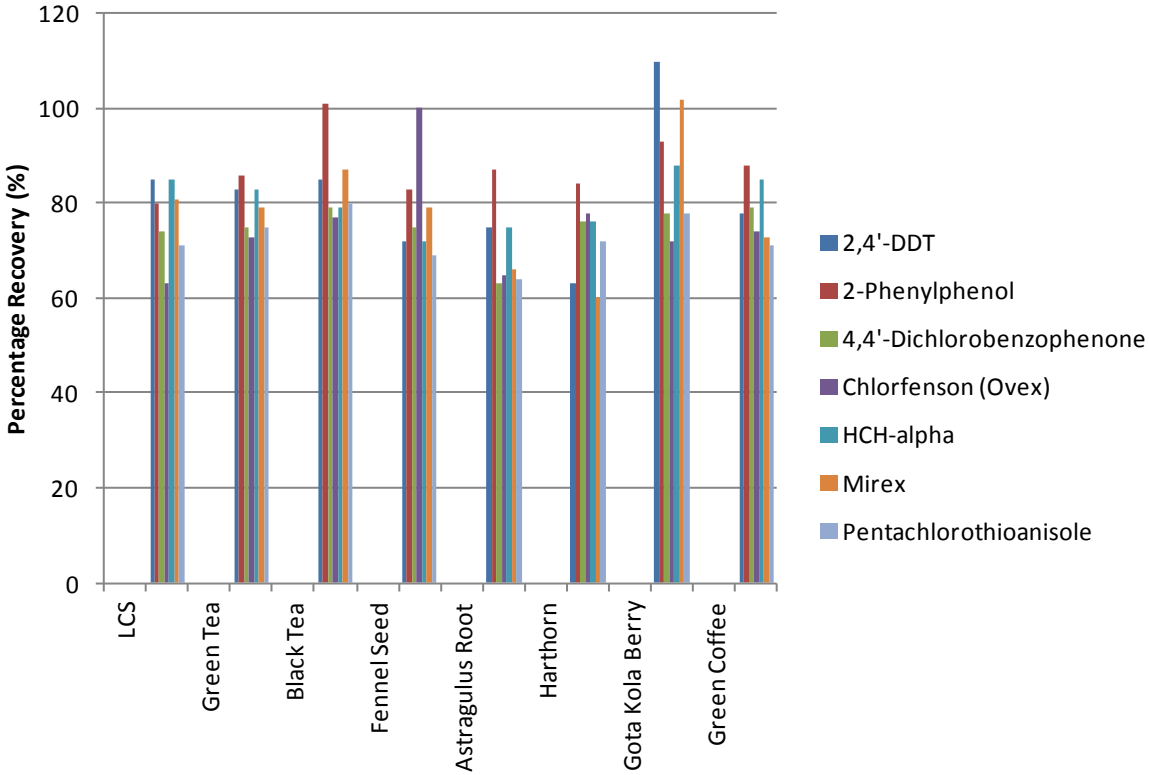
Pyrethroid Pesticides



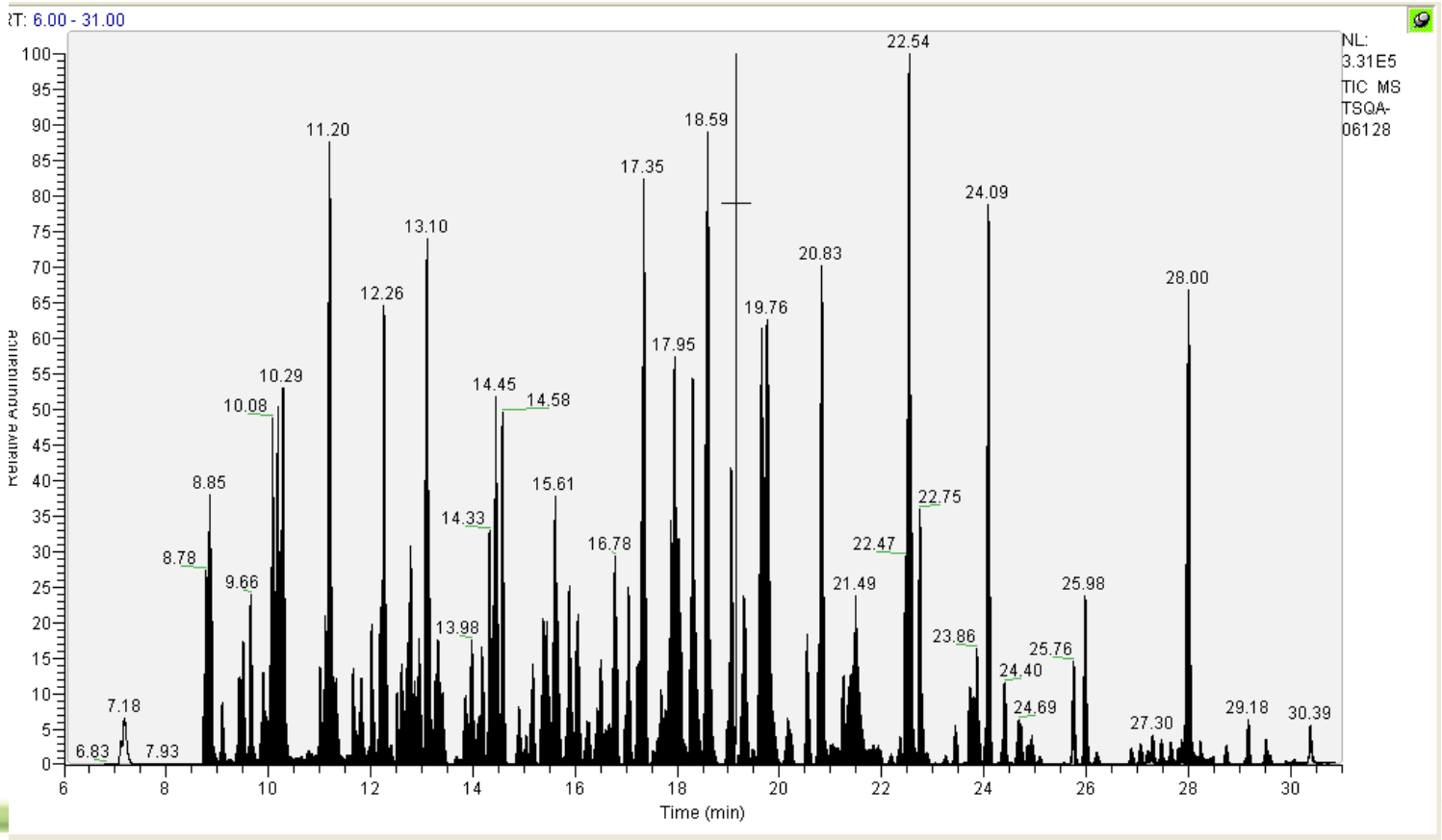
Organonitrogen Pesticides



Organochlorine Pesticides & Methylated Herbicides



Results
TIC of Spiked Green Tea Extract from the PLE w/In-Cell Clean-up



PLE for the Analysis of Pesticides

- High Throughput Pesticide Analysis
  - 20 minutes per run up to 24 samples per hour
  - 192 samples per 8 hour Shift
- One Extraction Method for all Matrices
- One/Same Extraction for GC/MS and LC/MS analysis
- Eliminate Manual Steps and Human Error
  - Automated Extraction and Cleanup

Fast, Reproducible Extractions

- Using the PLE®
  - Sample Prep processes are combined into one step
    - Extraction
    - Cleanup
  - Put the sample in get it out and directly inject it
  - Consistent, Reproducible, Results
  - Increased productivity

Fast, Reproducible Extractions

- Faster and easier operator training
- Automatic documentation of extraction and cleanup and concentration conditions
- Reduced errors due to mistakes eliminating manual steps and conditions.
- Reduced solvent usage and disposal costs.

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Questions?