Find out what is in your food – FAST!

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Director of New Technology and Business Development,
LabSmith
Livermore, CA

Why Speed Matters

FDA U.S. Food and Drug Administration

FOR IMMEDIATE RELEASE – Sun Prairie, WI - January 22, 2010 – The **Wisconsin Cheeseman**® announced today that it is **recalling cheese log/cheese ball** products in conjunction with the **voluntary recall** initiated by **Parkers Farm, Inc.** on January 5, 2010. Parkers Farm, Inc., located in Coon Rapids, Minnesota, believes some of its food items have the potential to be contaminated with ***Listeria monocytogenes* bacteria**. The recall was a result of a sampling done by the state of Wisconsin and the state of Minnesota

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Speed Matters for Residue Analysis

FOR IMMEDIATE RELEASE
June 28, 2007

FDA News

FDA Detains Imports of Farm-Raised Chinese Seafood

Products Have Repeatedly Contained Potentially Harmful Residues

During targeted sampling…FDA repeatedly found that farm – raised seafood imported from China were contaminated with antimicrobial agents that are not approved for this use in the United States.

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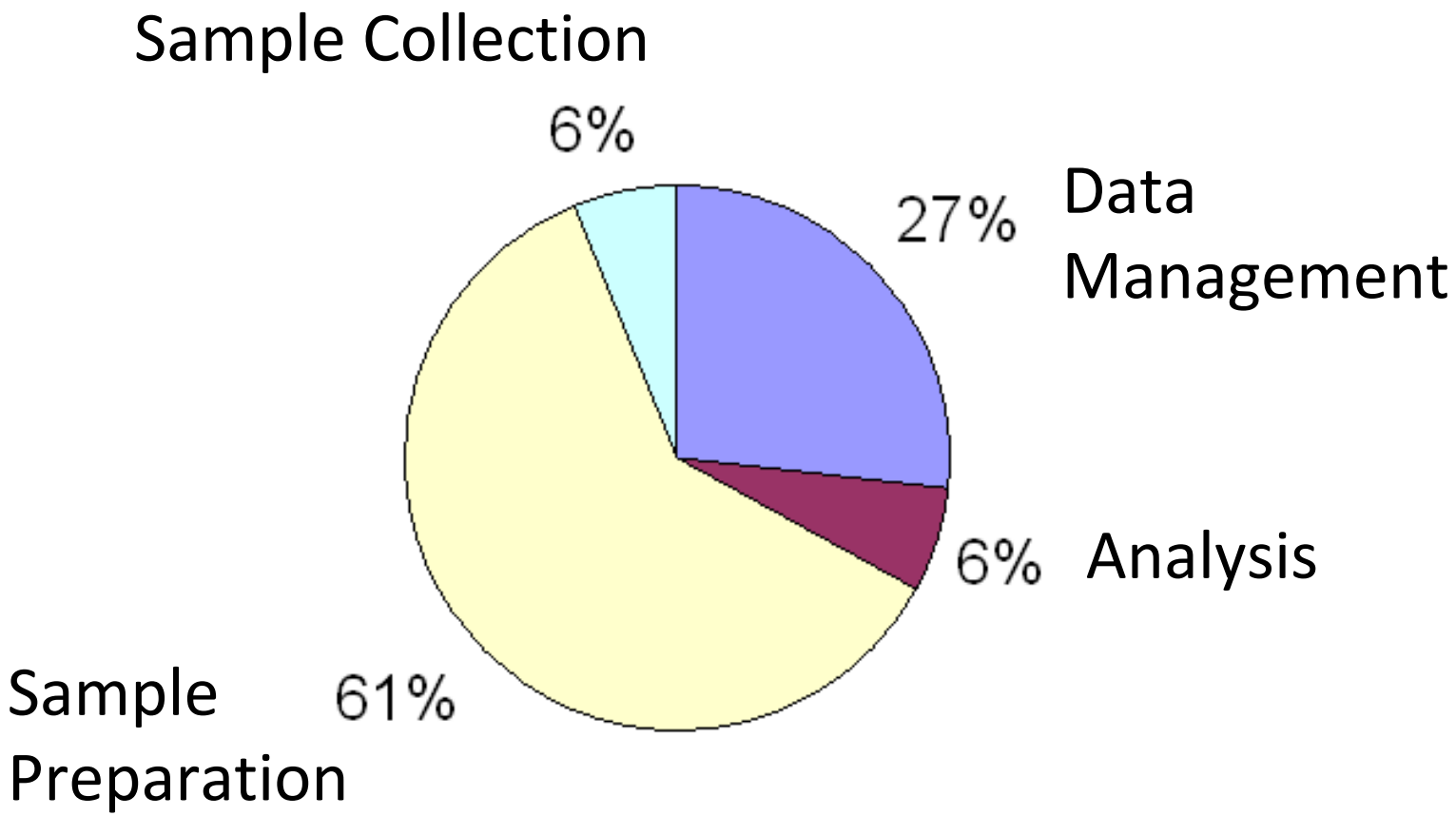
Automate What? The Analysis Workflow



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Sample Prep Automation

- Requires a good understanding of sample variability
- Focuses on removing human error and saving time
- May require an improved sample prep workflow in order to automate

Automation is NOT always robotics

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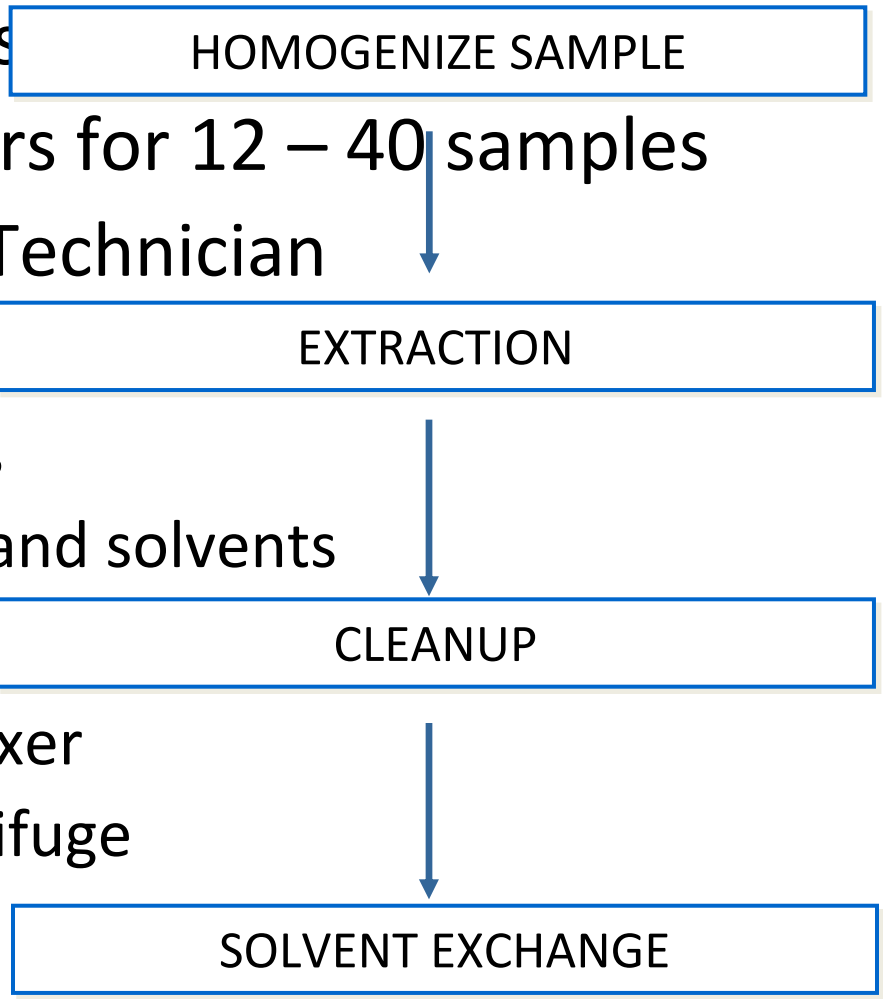
Automating QuEChERS?

- 15 steps
- 2.5 hours for 12 – 40 samples
- Skilled Technician
- Consum
  - Tubes
  - Salts and solvents
- Other e
  - Vortexer
  - Centrifuge



M. Anastassiades, *et al.,* J AOAC Int 86 (2003) 412.

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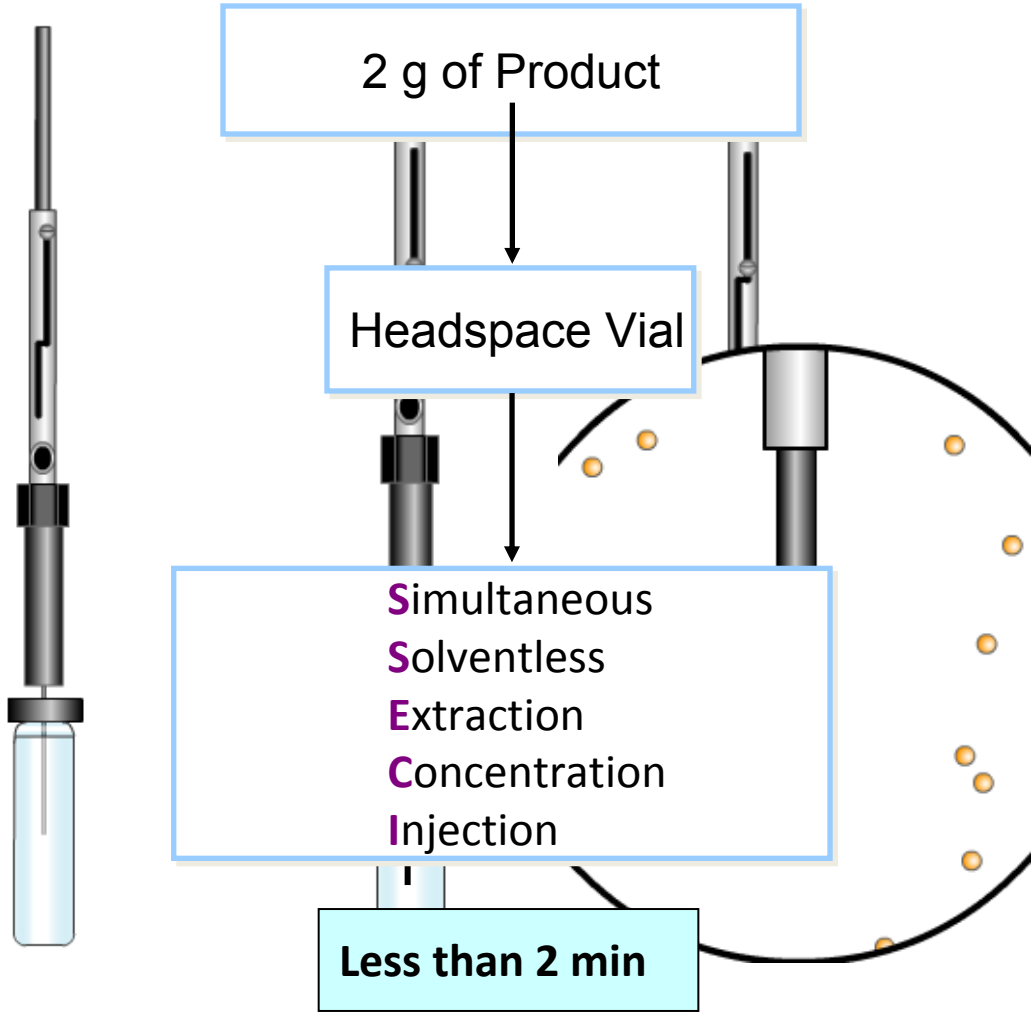
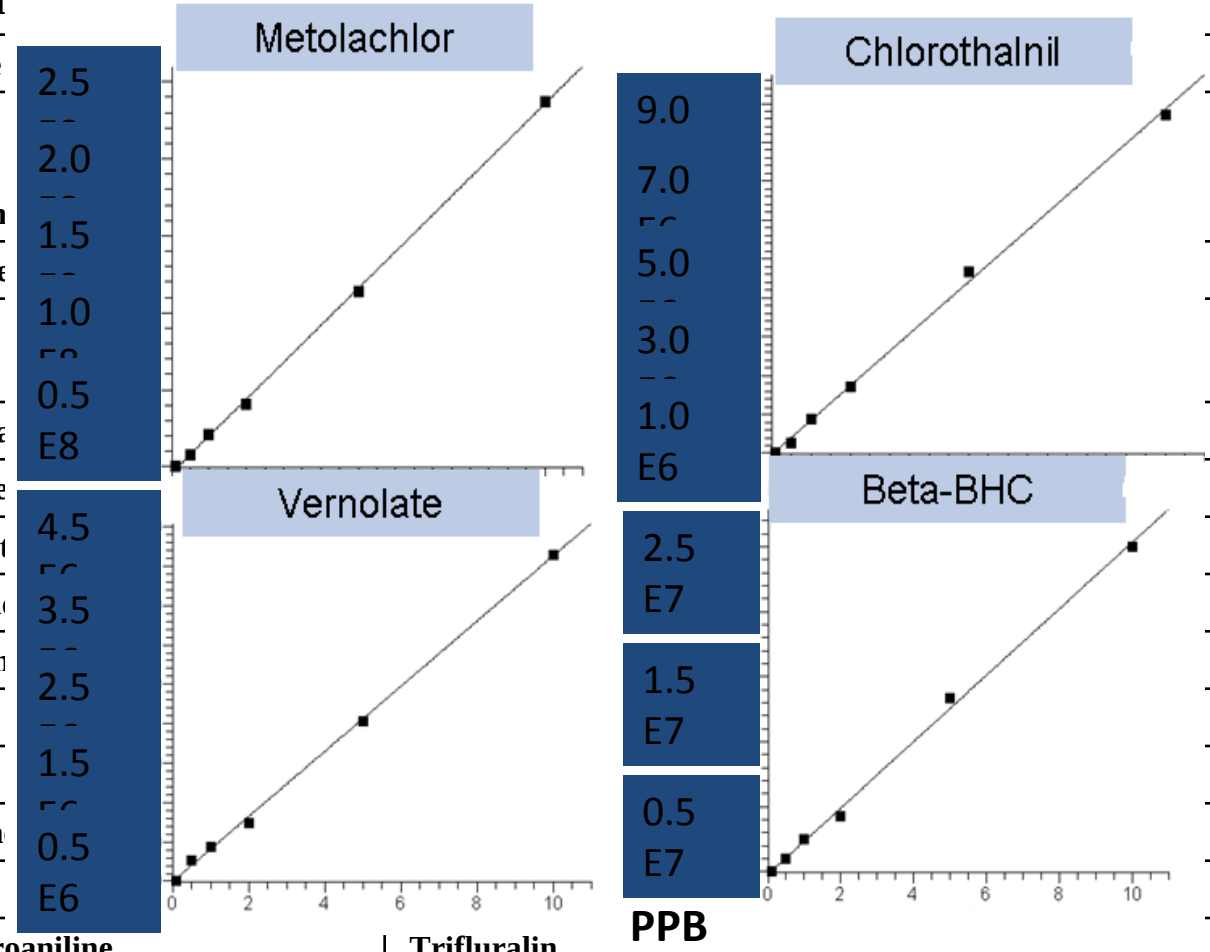
Automated Solid Phase Microextraction (SPME)



Chang *et al.* , Invited Talk, PittCon 2009

SPME with Quantum GC



Explosive	
Organoch	
Chloroace	
Triazine	
Thiocarba	
Substitute	
Carbamat	
Pyrethroi	
Organoph	
Amide	
Thiazole	
Pyridazin	
Uracil	
2,6-Dinitroaniline	Trifluralin
Azole	Triadimefon
Unclassified herbicide	Fluridone

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Benefits of automation and manual sample preparation

SPME	Manual sample prep
Extraction and concentration in one step	Extraction and concentration in different steps- more time
Minimum use of solvent (or none)	Use of more solvent
Headspace and liquid extraction	Liquid extraction
Less maintenance for source & column	More matrix contamination
Works well for low fat matrices	Works for high and low fat samples
Excellent selectivity & sensitivity w/ TSQ Quantum GC	

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In-Line Sample Prep Automation – Turbulent Flow Chromatography

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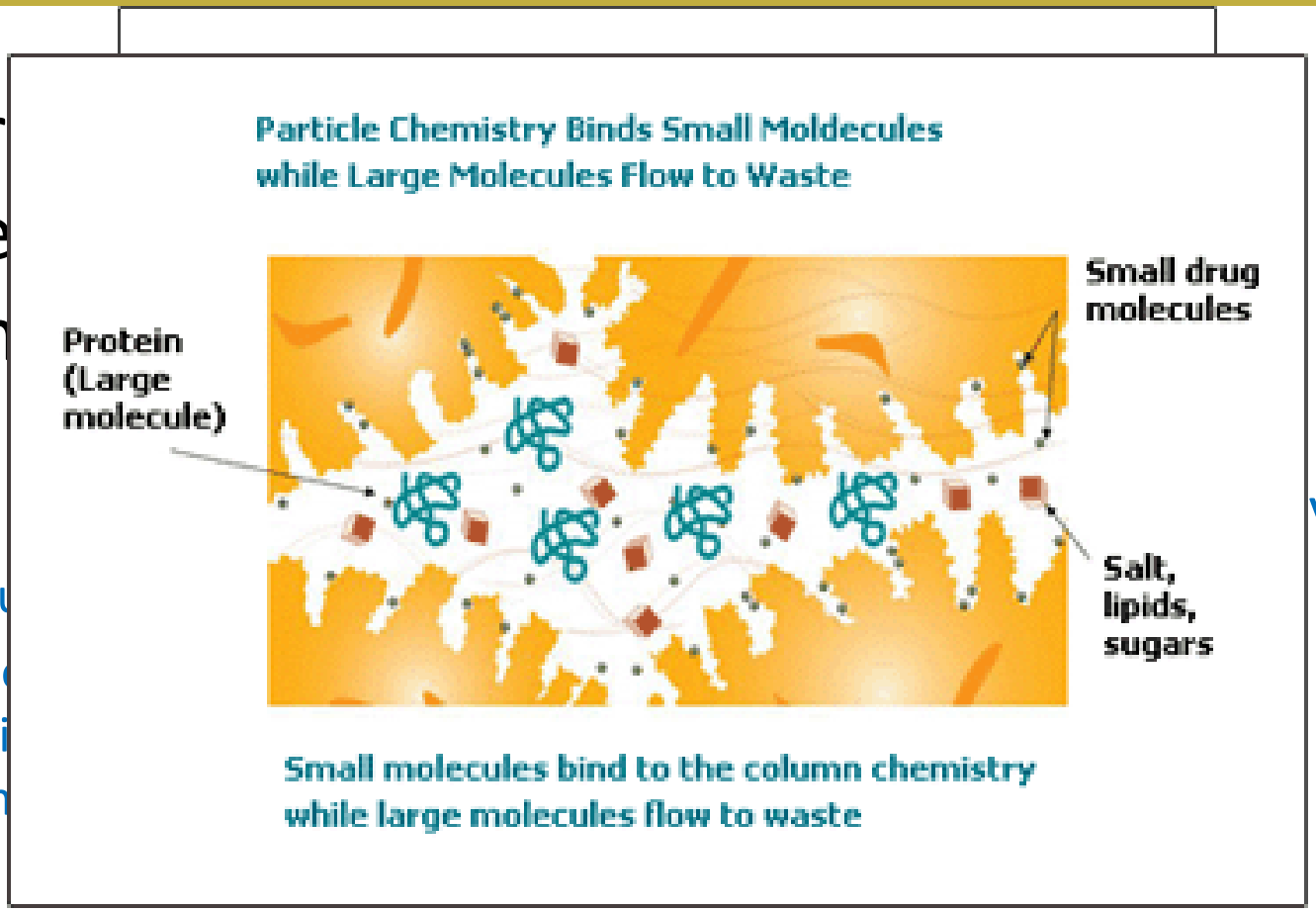

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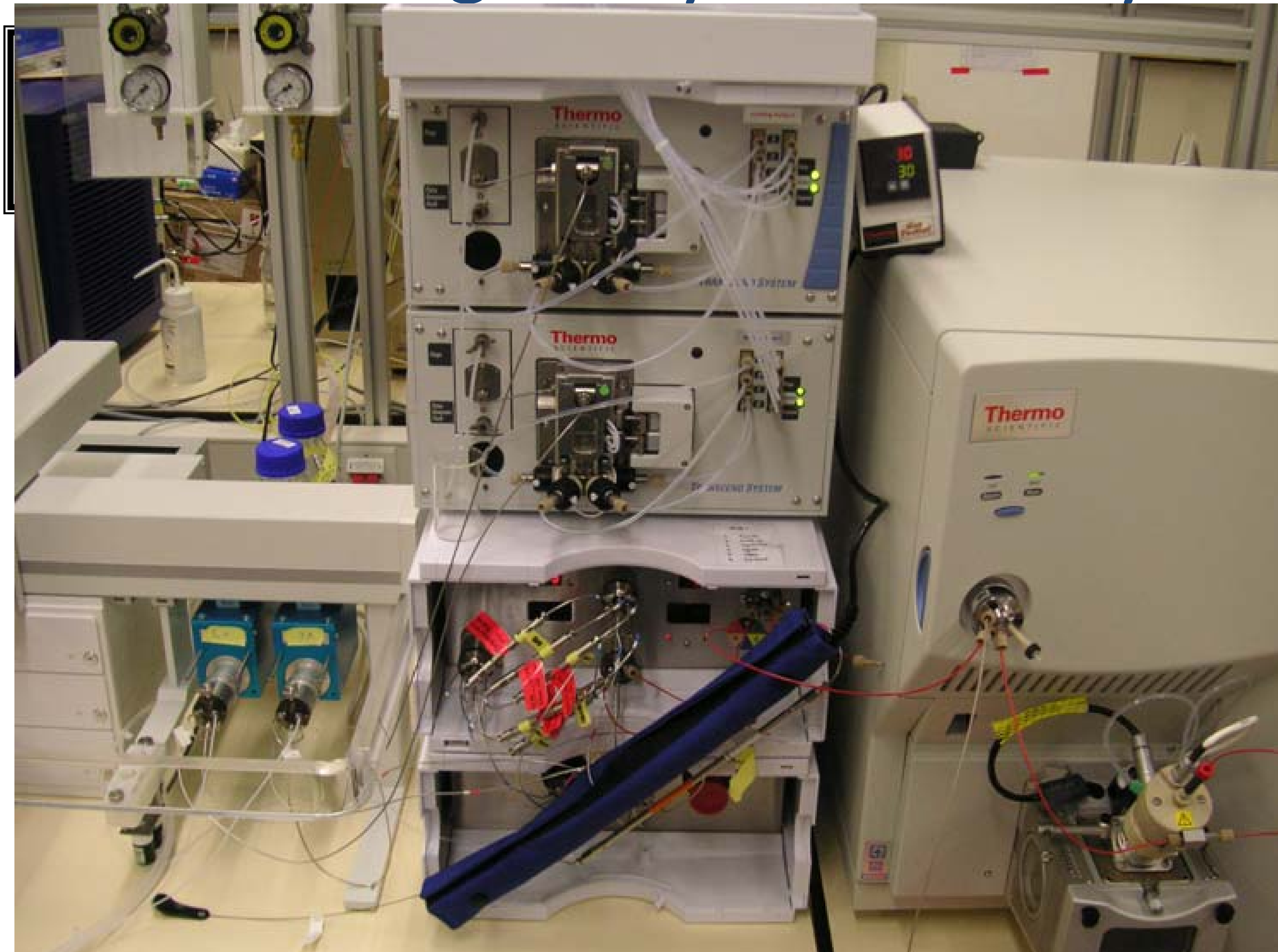
Vet Drug Analysis in Honey



Dr. Philippe Guy, Nestlé Research Center

Cost/Benefit Analysis TurboFlow Technology

Costs Include	Benefits Include
Initial investment for TurboFlow system	Simplify sample preparation by eliminating SPE/PPT/LLE
Service maintenance	Direct injection of fluid samples
TurboFlow column	Reduce ion suppression
	Can be multiplexed to increase sample throughput
	Cost saving in time, labor and solvent

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Solving Salmonella in Peanut Butter

WebMD
Better information. Better health.

Peanut Butter Salmonella Outbreak Rages On

CDC: Infected People Ate Salmonella-Contaminated Peanut Butter Crackers

By Daniel J. DeNoon

WebMD Health News

Jan. 21, 2009 -- More than 125 consumer peanut butter products, from more than 70 companies, have been recalled in the ongoing U.S. salmonella outbreak.

The most recent person to get sick fell ill on Jan 8…

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Challenges for Analysis of Pathogens

- Multiple serotypes
- Traceability
- Enrichment
- Complying with regulations
- Identification
- Time

Salmonella typhimurium

Salmonella enteritidis plate

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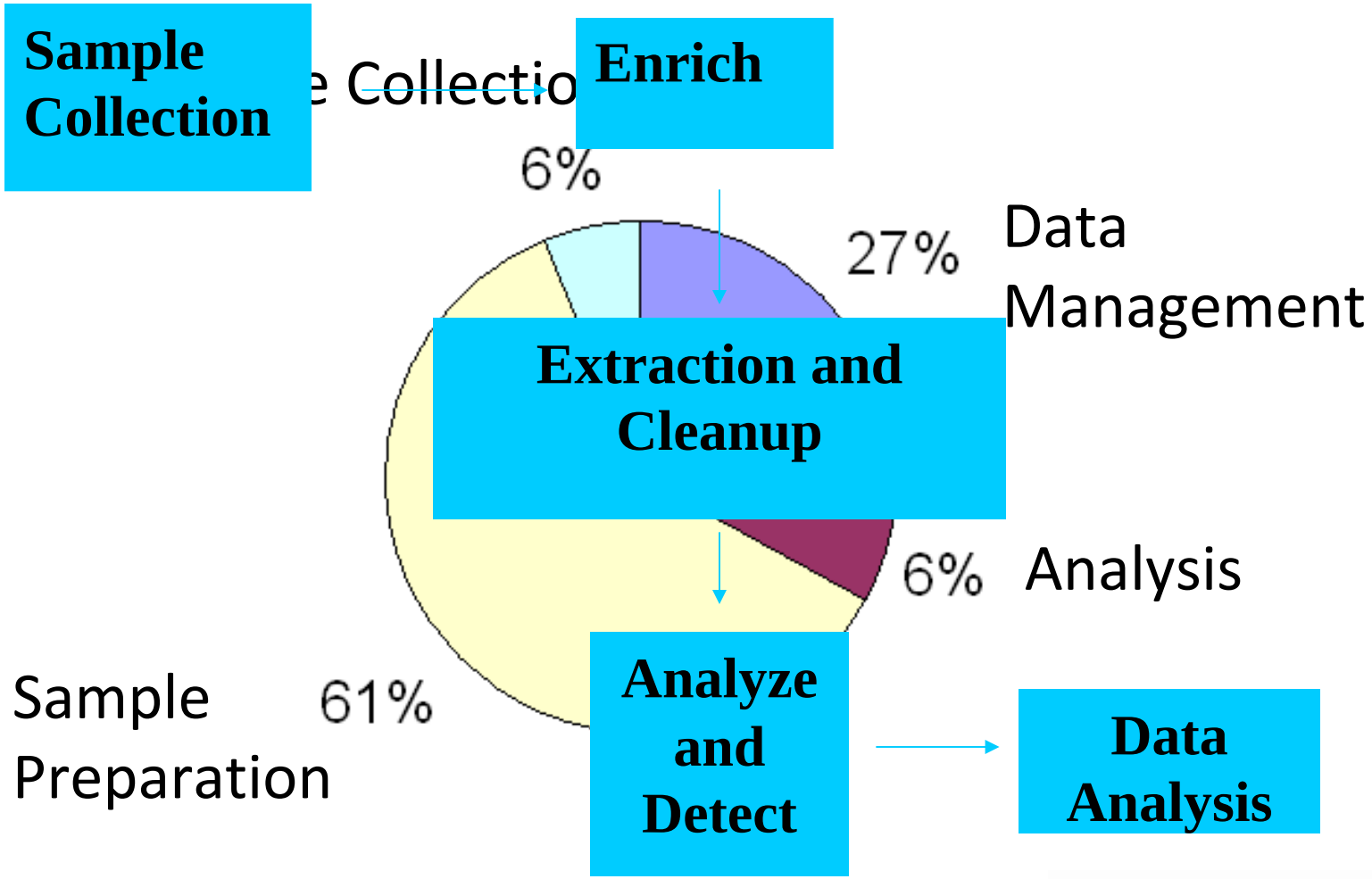
The Sample Prep Bottleneck



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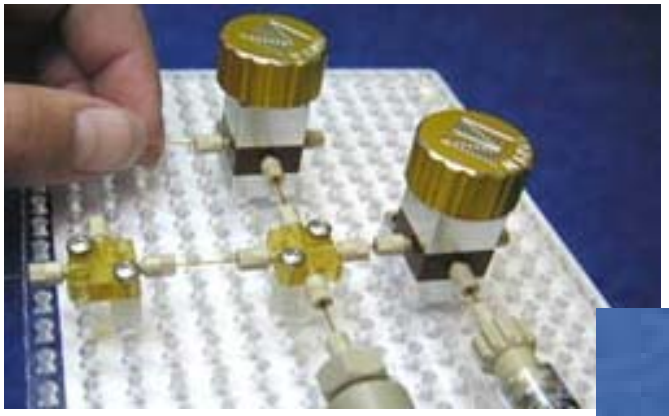
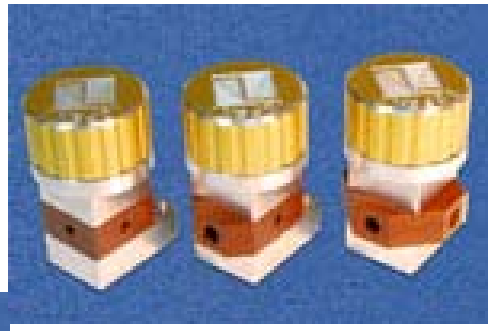
The Modular Approach – Functional Fittings

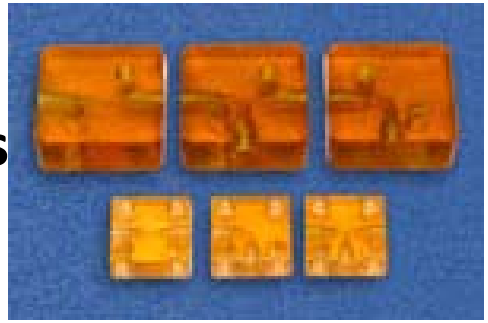


Fluidic and electronic breadboard



Zero dead volume valves and connectors

Luer Lock
Capillary connectors



Refillable functional cartdriges

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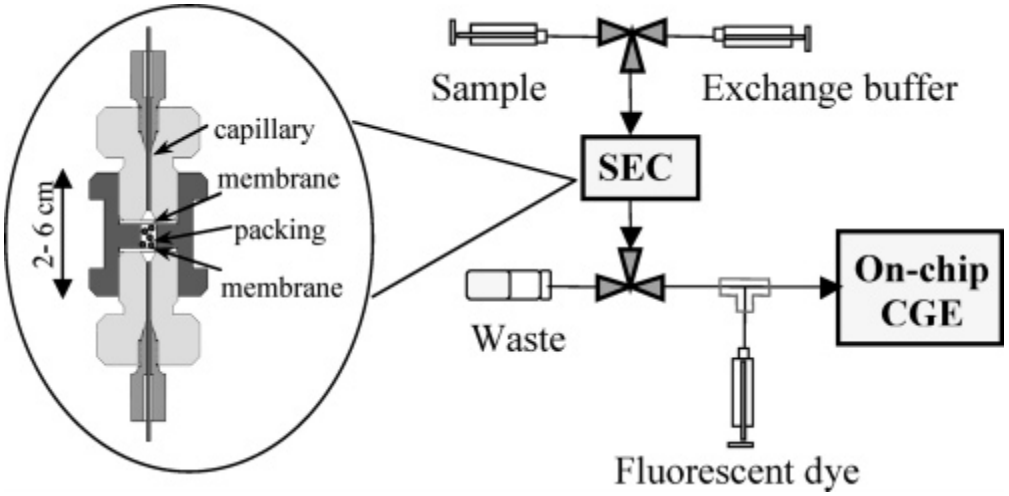
Automating Centrifugation



- Chirica, *et al*. Anal. Chem. **2006, 78, 5362-5368**

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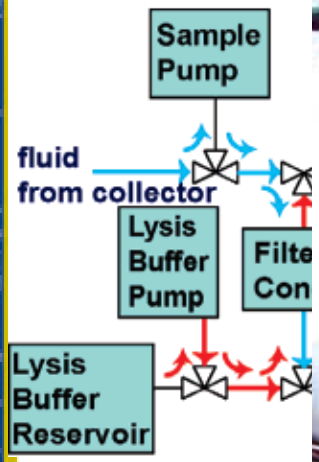
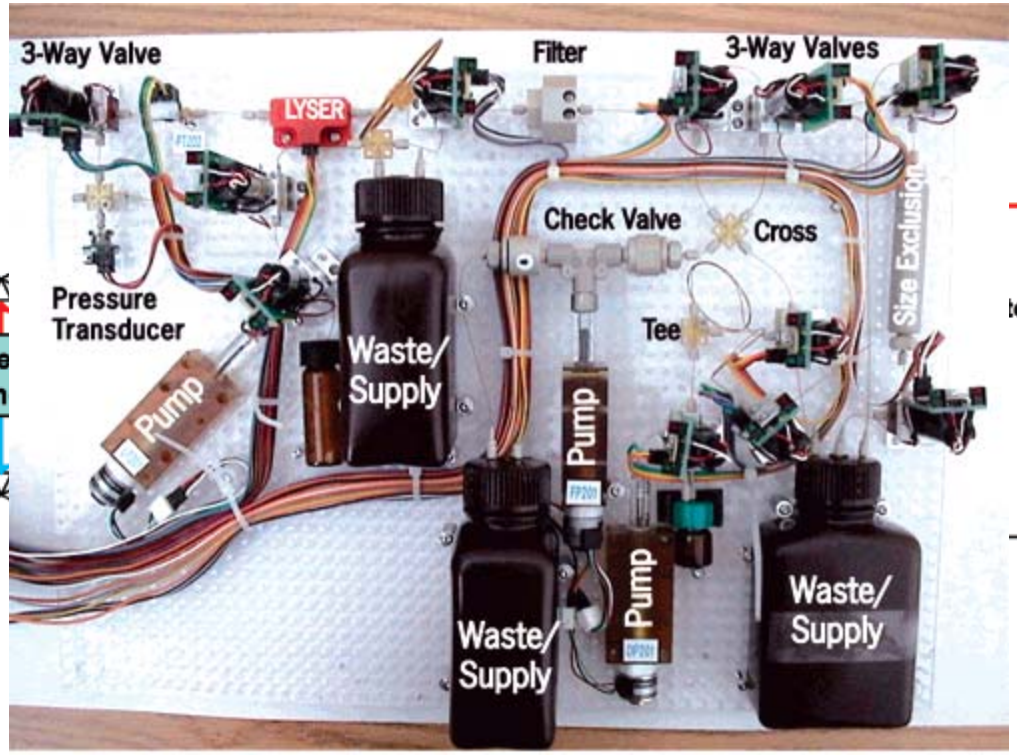
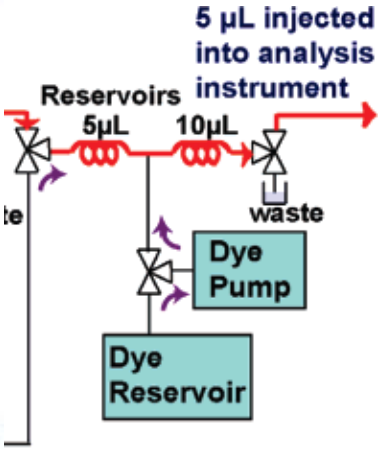
Room for R&D: Automated Pathogen Detection







The automated sample preparation (ASP) system had a total cycle times of 15 minutes for *Bacillus subtilis*.

Vandernoot *et al*, Anal. Chem. **2007, 79, 5763-5770**

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Could this apply to assays for food?

FOOD navigator.com

- **Portable labs detect water toxins faster**
  By Wai Lang Chu, 29-Sep-2005

…designed and built at Sandia/California. …."*This on-site monitoring approach would enhance current utility monitoring systems that require water samples to be sent to laboratories for analysis, which sometimes takes days for results,"* …

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Conclusions

- Automation is more than robotics
- Advantages include
  - Precision
  - People free to solve complex problems
  - Reduced Time
  - Reduced Cost
- There is room for automation in food safety analysis!

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Acknowledgements

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  - Ron Renzi
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Thank You!

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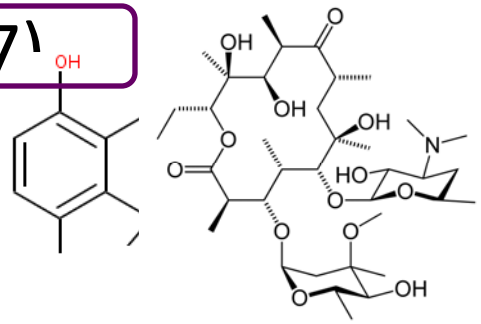
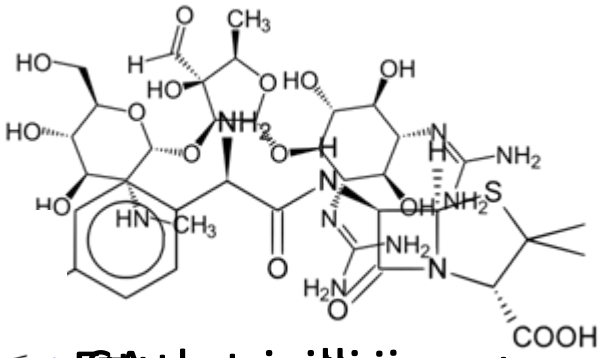
Seven Classes of Vet Drugs in Honey

- Macrolides (2)
- Amphenicols (2)
- β-Lactams (8)
- Aminoglycosides (3)
- Acaricides (12)
- Sulfonamides (17)
- Tetracyclines (5)





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Common Approaches to Rapid Pathogen Analysis in Food

- Immunoassay
  - Test strips
  - Latex agglutination assays/reverse passive latex agglutination assays
  - ELISA/ELFA
  - Immunomagnetic
  - Immunodiffusion
- Nucleic acid
  - PCR
  - RT-PCR
- Biochemical
- ATP

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