



The World's **Sixth Sense**®



## Griffin G510 Product Introduction

October 2017

# FLIR Detection

FLIR Detection safeguards people and property by providing tools that see and sense harmful substances

## Classes of Harmful Substances



- Biological Threats
- Chemical Warfare Agents
- Toxic Industrial Chemicals
- Explosives
- Drugs (illegal, designer, and prescription)
- Pollutants
- Environmental Contaminants
- Radioactive Materials

## Applications

- High consequence , checkpoint threat screening
- Reconnaissance and intelligence
- Emergency response
- Forensic analysis
- First responder threat screening
- Remediation and prevention



# Chemical Analysis in the Field

“Chemistry happens outside the lab...so should the analysis”



# Outside-the-Lab GC/MS: Missions

## Mobile Lab

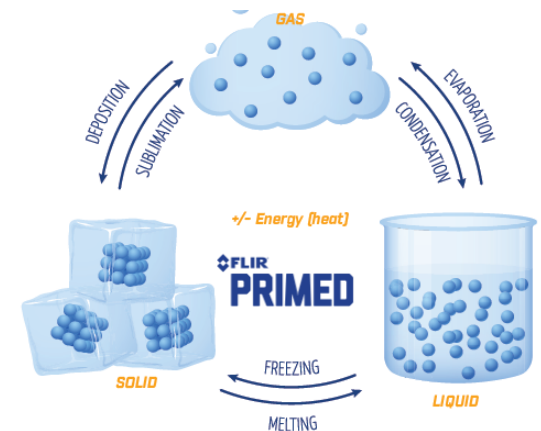


## Downrange



# Outside-the-Lab GC/MS: Spec-Driven Decisions

- GC/MS is gold standard for chemical analysis and can provide high fidelity data for data-driven decisions
- Size, weight, and power appropriate for a portable system
  - Weight analysis → single person portable
  - Power budgeting and management → mission compatible run-times
- Actionable data
  - Easily interpreted and comparable → NIST matchable data from quadrupole mass analyzer
- Capability to detect and identify analytes from all chemical phases
  - Liquid sample capability
  - Solid sample capability
  - High-fidelity vapor identification capability
  - Real-time vapor sampling capability



# FLIR Griffin G510 Key Features



## PORTABLE MINI-LAB

- Analyze all phases of matter (liquid, solid, vapor) in the field
- Quickly identify and confirm chemical hazards using standard NIST database
- Operate in the Hot Zone while wearing full personal protective equipment (PPE)
- Completely self-contained vacuum system, batteries, and carrier gas
- IP65-rated, dust-tight and spray-resistant, for simpler decon

# Analyze Solid, Liquid, and Vapor Samples

*Ultimate in-field sampling flexibility and NO MORE SERVICE MODULES!*



Vapor-phase chemical threats identified within seconds using Survey Mode in the Hot Zone



The integrated split/splitless injector allows for environmental, forensic, and hazardous material sampling via syringe injection of organic liquids

# Touchscreen Operation While Wearing Full PPE

*It's self-contained! You can take it anywhere, including downrange.*



IP65-rated,  
dust-tight and  
spray-resistant



9" on-board touchscreen with  
automated user controls, WIFI, & GPS

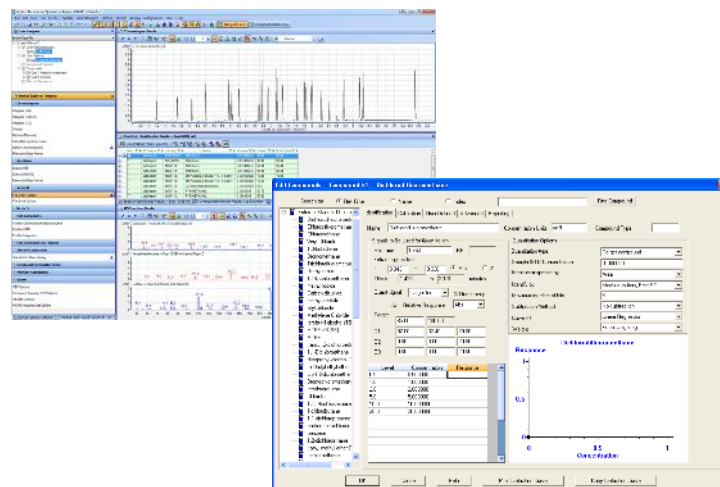
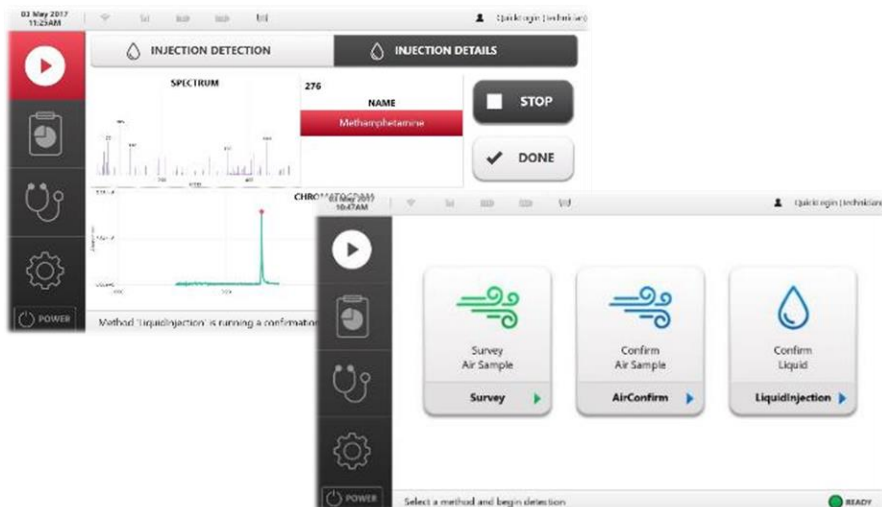


Hot-swappable  
batteries, up to 2 hour-  
battery life Confirm  
Mode or 4 hours Survey  
Mode



# Lab Quality GC/MS Any Responder Can Use

*Scientists will love the lab-quality capability – responders will love that you don't need a Ph.D. to use it!*



## GSS Touch Interface

Analyze unknowns using NIST library and automatically confirm chemical identity. Visual & audible alarms provide confirmation and minimize data interpretation.



## Traditional Lab Interface



# G510: Advancing the Industry

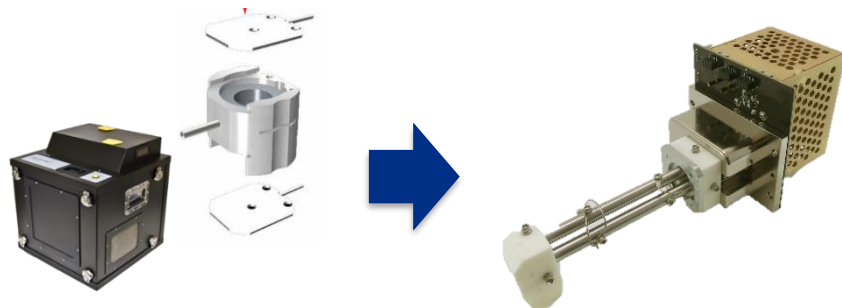


## Completely integrated pumping system

*Why do I have to buy a service module?*



**Integrated liquid sample injector**  
*SPME is too fragile and time-consuming.*



## Quadrupole mass analyzer

*I need the broadest library for unknown analysis.*



**Industry-first IP65 rating**  
*I want my GC/MS to decon like my other response tools.*

# G510: Vapor Analysis

Provides high-fidelity vapor identification and real-time sampling with alarming capability for both modes

- Sorbent preconcentration with GC-MS analysis for high-fidelity vapor identification
- Membrane-inlet MS (MIMS) for real-time vapor analysis
- Heated sample line with sampling head



# G510: Vapor Analysis (Survey Mode)

## Vapors are drawn into Heated Sample Line

- Sample pump built into unit
- Heated to prevent sample loss to walls and to limit carryover

## Rapid, near real-time detection

- Detection in seconds, not minutes
- Substantially increases sample resolution

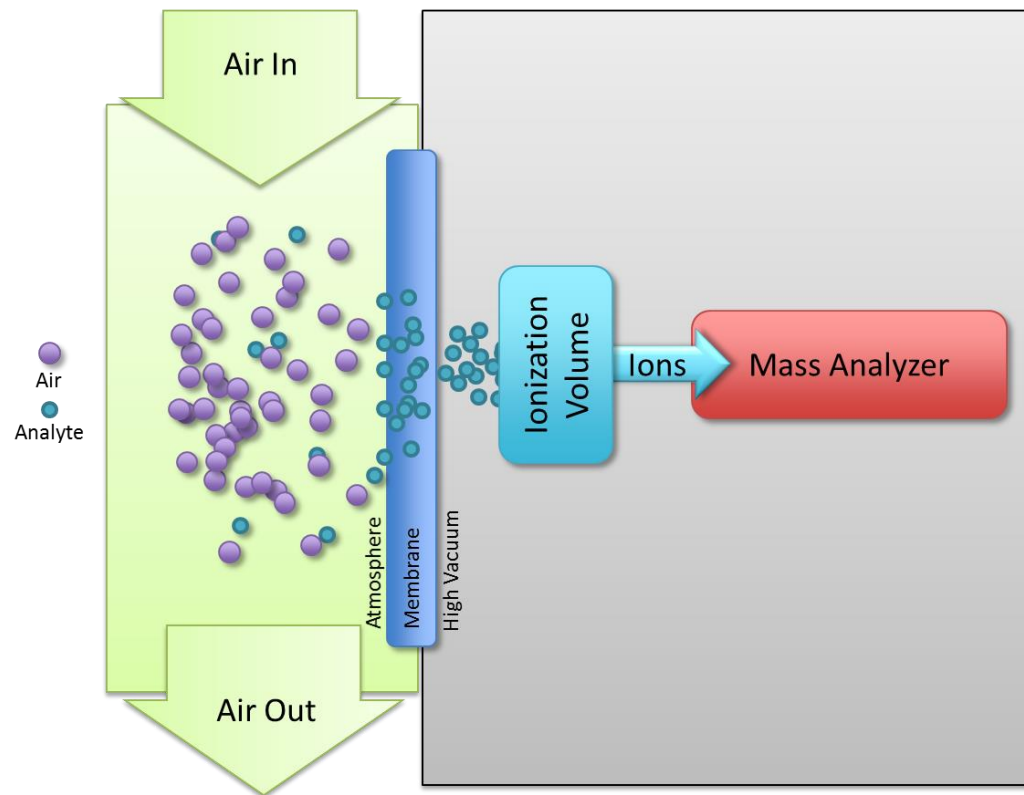
## During Survey Mode operation, carrier gas consumption is significantly reduced

- Lowers cost of ownership – cylinder can last >2 weeks of continuous operation



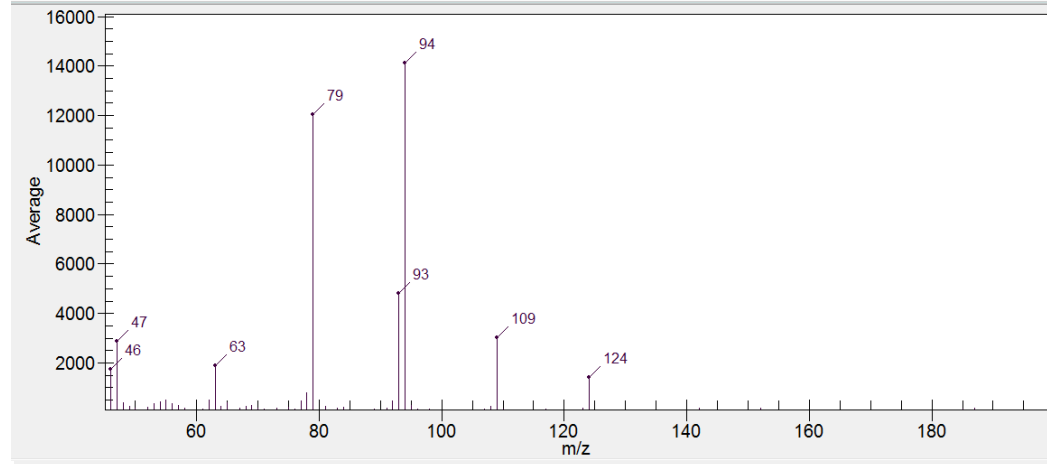
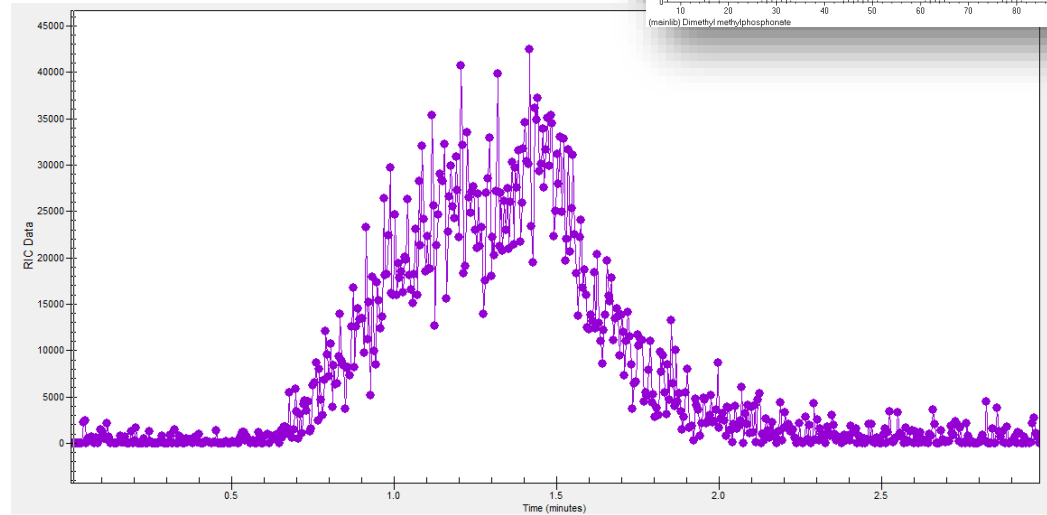
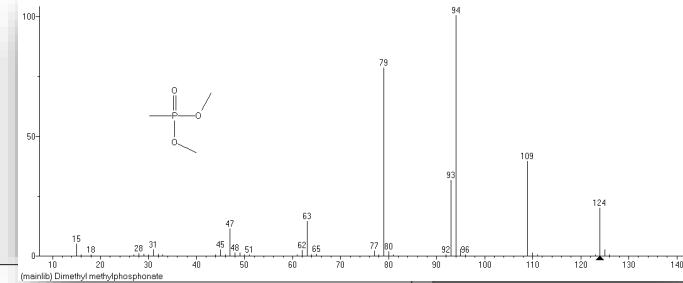
# G510: Vapor Analysis (Survey Mode)

- MIMS Sampling
- Real-time vapor analysis and alarming for vapor samples
- Used in conjunction with sorbent preconcentration evaluate vapor threats



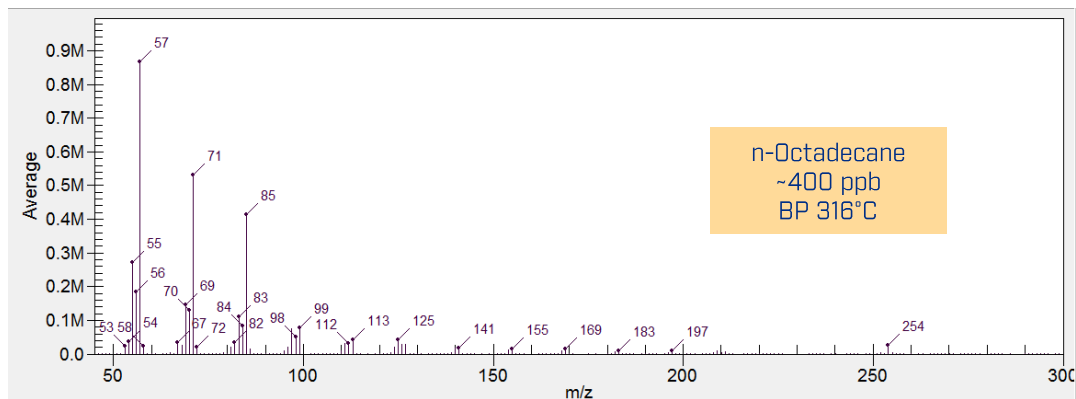
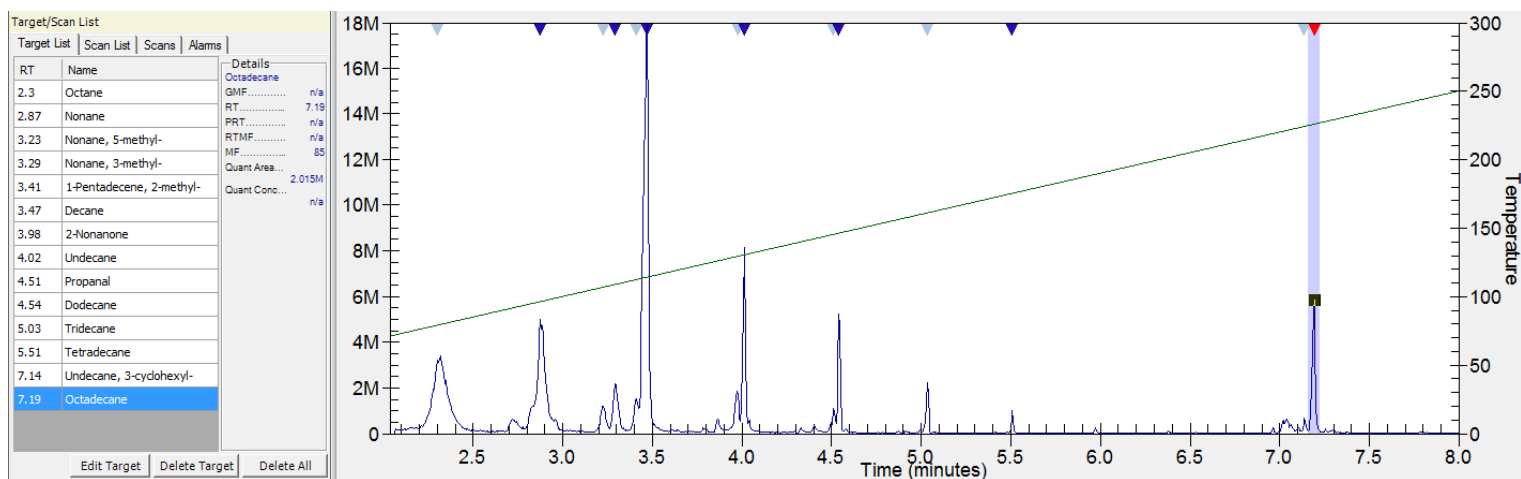
# G510: Vapor Analysis (Survey Mode)

- MIMS Sampling
- TICs and CWAs
- Toluene
  - TIC
- Methyl Salicylate
  - CWA Simulant
- DMMP
  - CWA Simulant



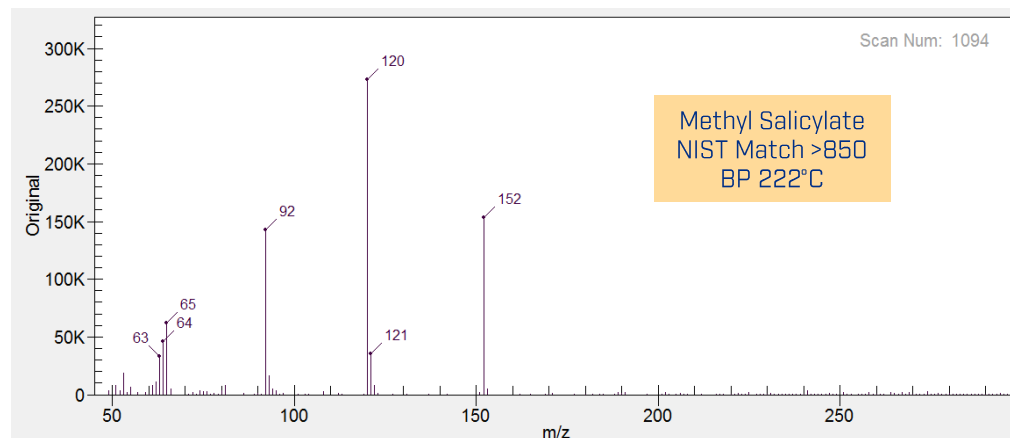
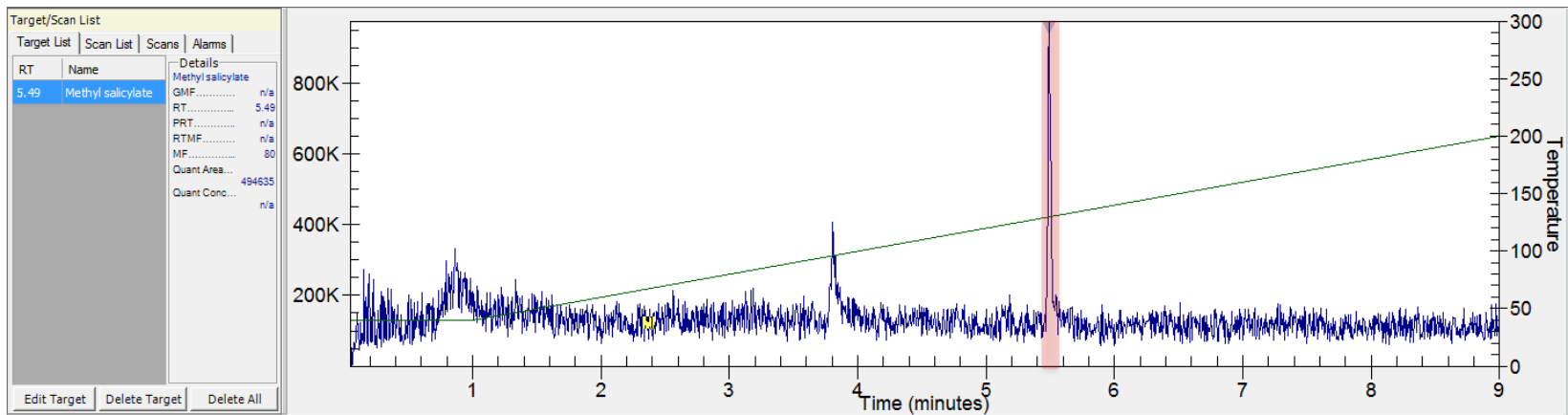
# G510: Vapor Analysis (Confirm Mode)

- Sorbent preconcentration
- Sample of headspace of sample of n-octadecane (99% purity) showing octadecane and various semi-volatile impurities in sample



# G510: Vapor Analysis (Confirm Mode)

- Sorbent preconcentration
- Sample of methyl salicylate vapor (CWA simulant) at ppb levels





# G510: Liquid and Solid Analysis (Confirm Mode)

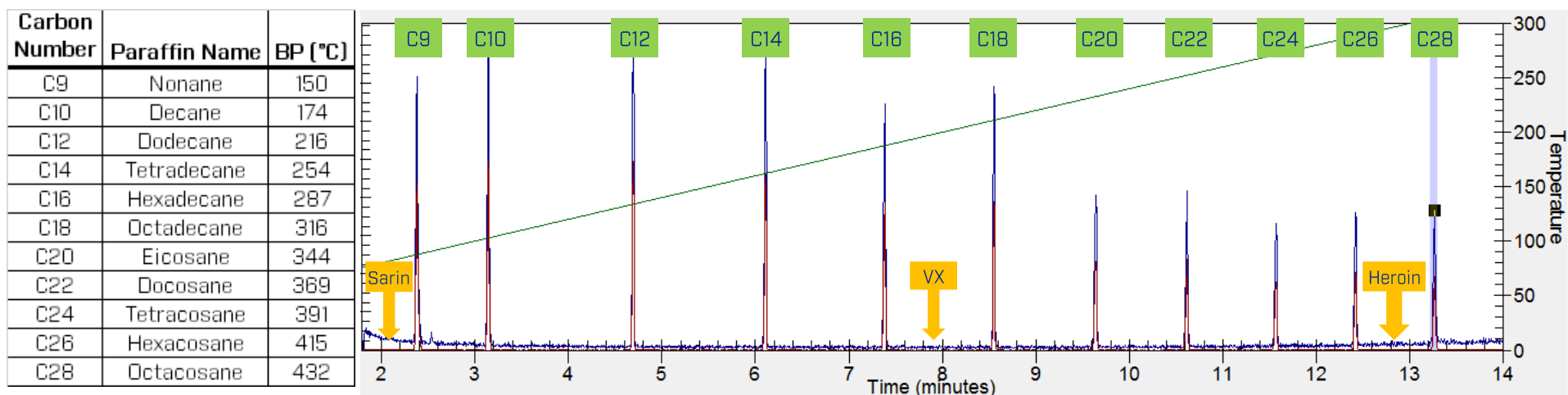
Capability to sample solids, liquids, and gases

Use of standard split/splitless injector enables user to analyze wide range of samples in a similar manner to lab GC/MS systems

- Compatible with standard syringe liquid injections, solid-phase micro extraction (SPME), and head-space syringe samples
- Solid sample injector adapter

Use of helium carrier gas to maximize performance of GC

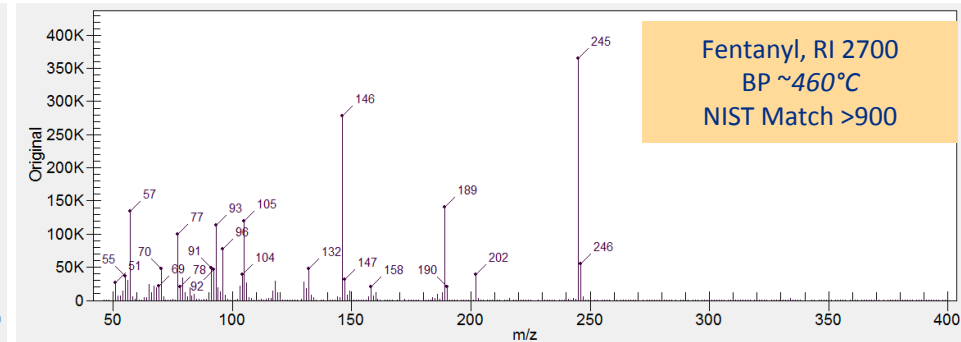
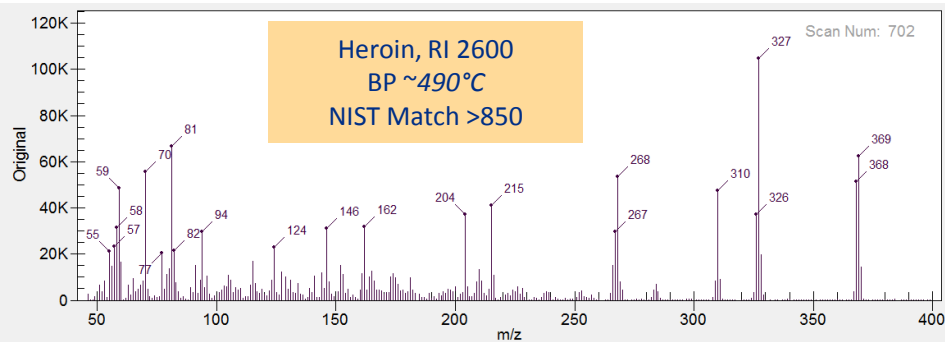
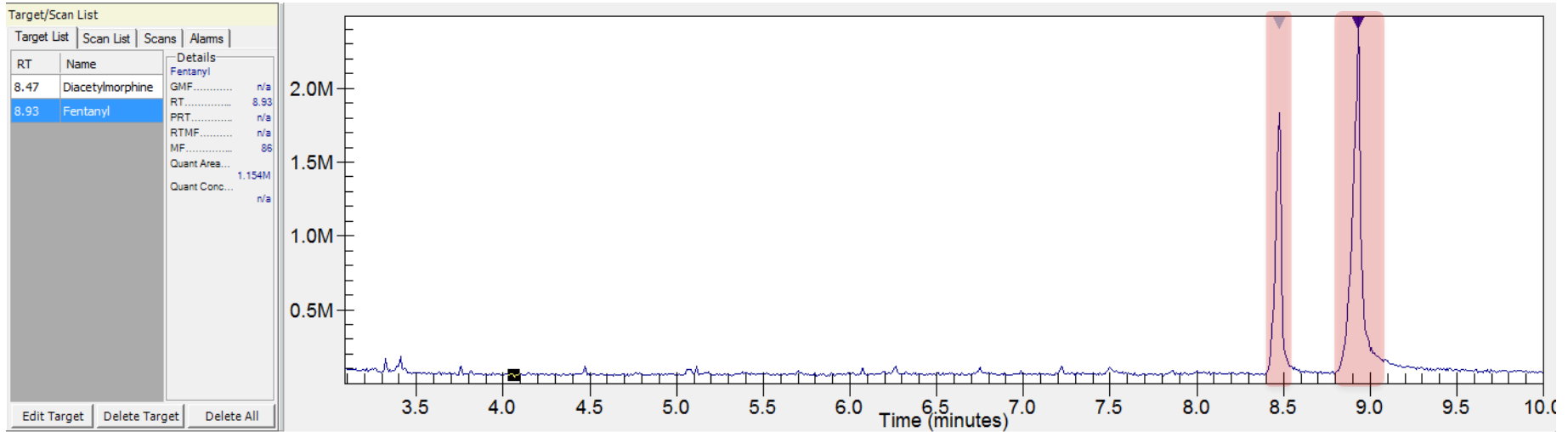
- Low thermal mass GC column
- 100°C/min up to 300°C



# G510: Liquid and Solid Analysis (Confirm Mode)

Liquid Injection

Drugs of abuse (mix of heroin and fentanyl)



# G510: Quadrupole Mass Analyzer

High fidelity mass spectral data that can be easily matched/compared to library of known compounds

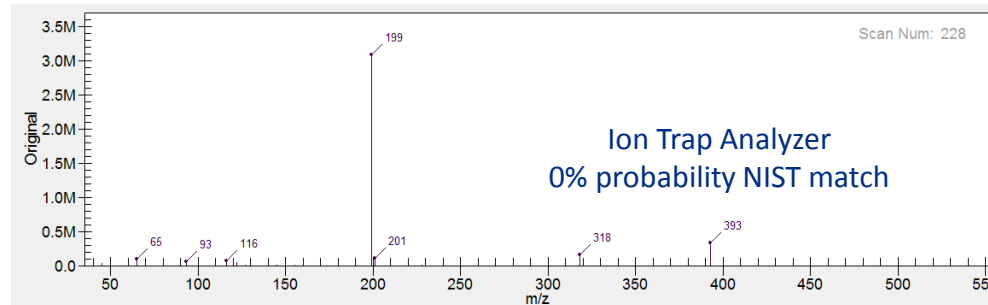
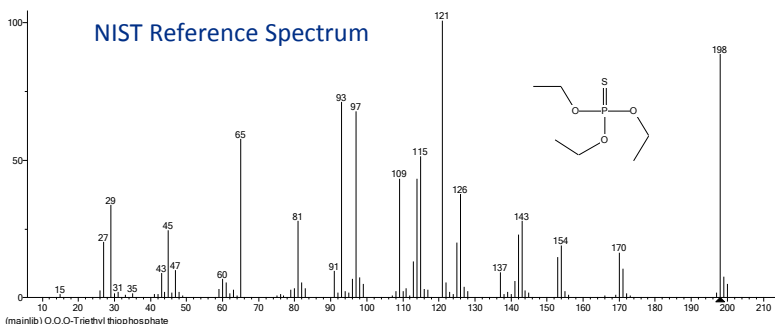
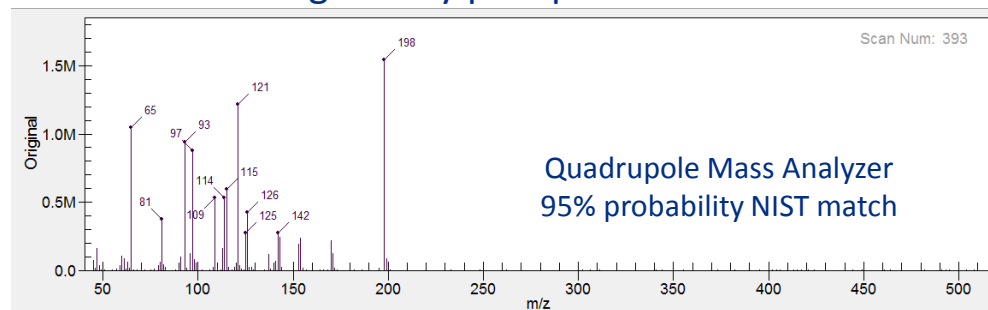
- NIST mass spectral library: >240,000 compounds analyzed by EI MS with a quadrupole mass analyzer

## Ion trap analyzer vs. quadrupole mass analyzer

- Ion trap: easy to miniaturize but spectra can be concentration dependent
- Quadrupole: spectra more reproducible but can be difficult to make portable



## 50 ng Triethylphosphorothioate



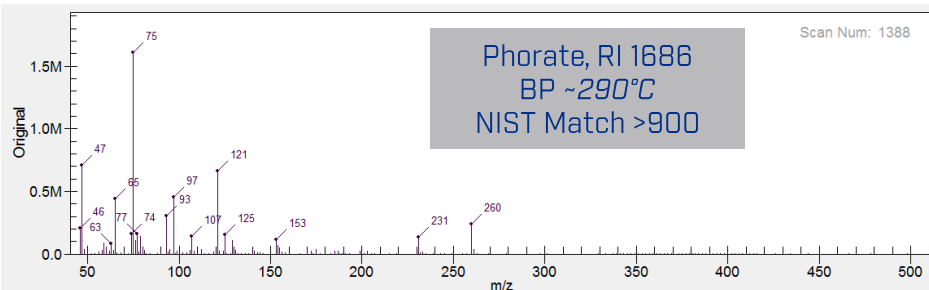
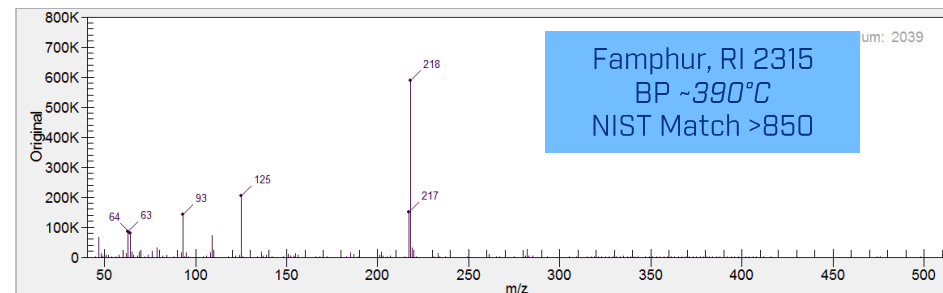
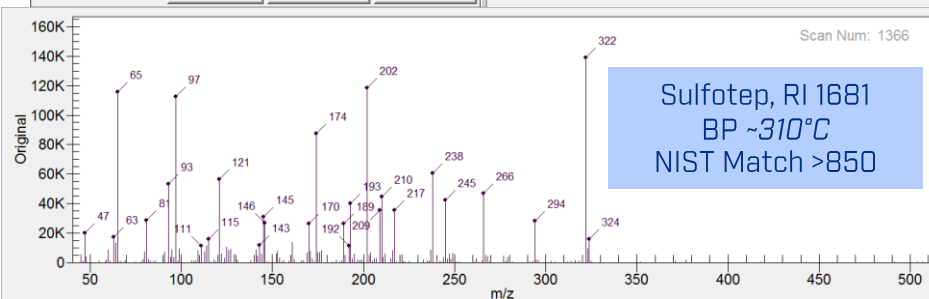
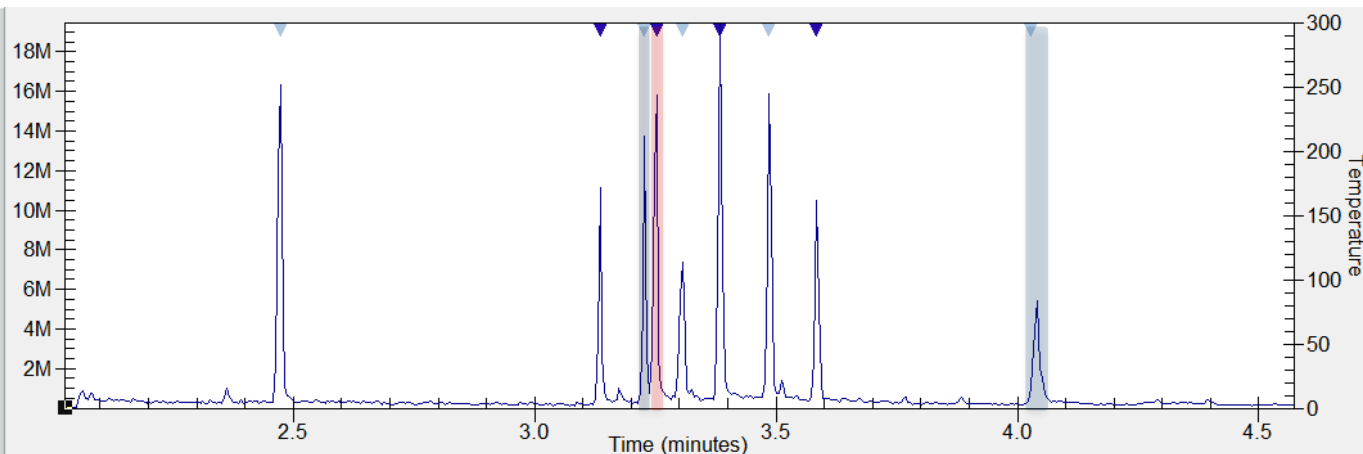
# G510: Environmental Analysis

- Liquid Injection
- EPA 8270P mixture (mix of organophosphorous pesticides)

Target/Scan List	
Target List	Scan List
RT	Name
2.47	O,O,O-Triethyl thiophosphate
3.14	Thionazin
3.23	Sulfotep
3.25	Phorate
3.31	Dimethoate
3.38	Disulfoton
3.49	Methyl parathion
3.58	Parathion
4.04	Famphur

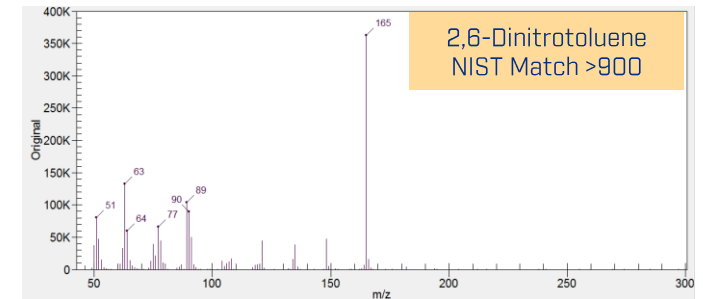
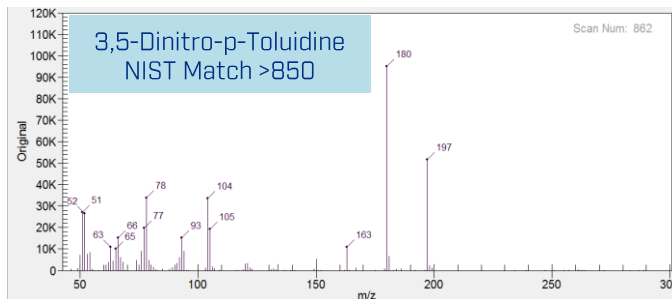
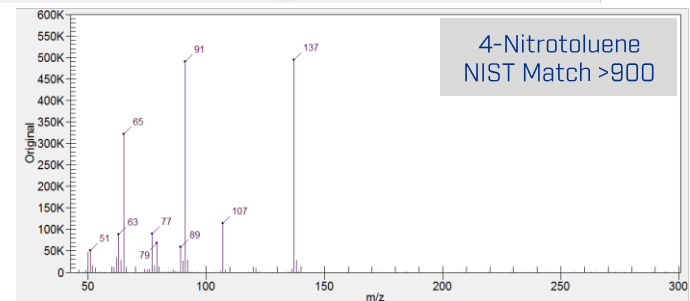
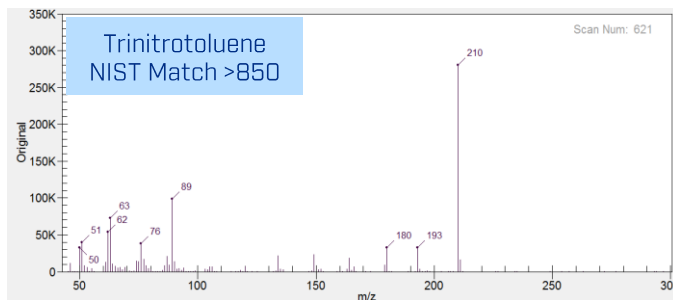
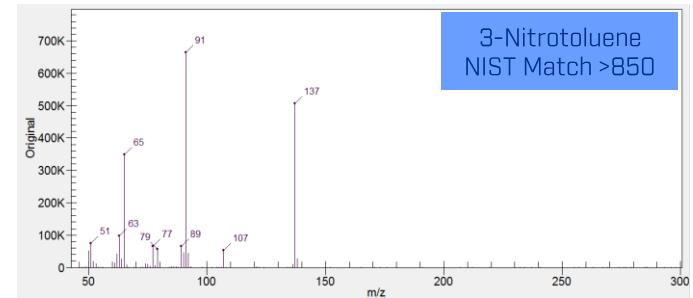
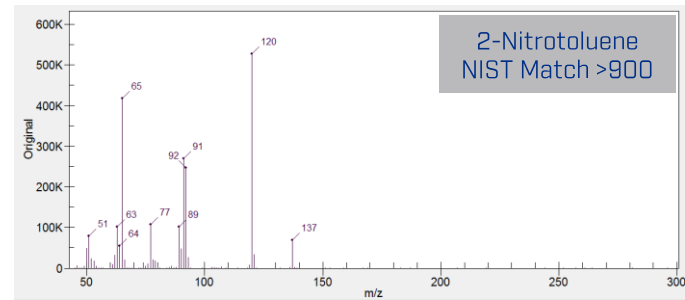
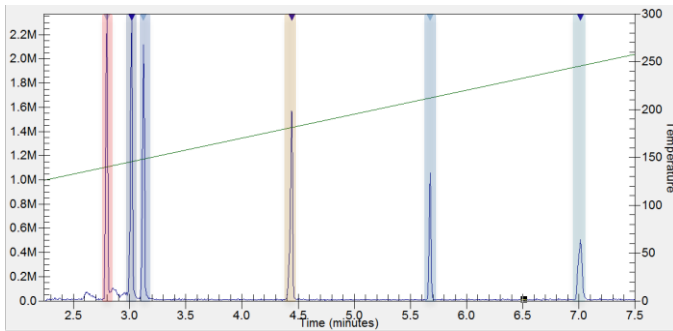
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Famphur  
GMF..... n/a  
RT..... 4.04  
PRT..... n/a  
RTMF..... n/a  
MF..... 80  
Quant Area... 1.471M  
Quant Conc... n/a

Edit Target Delete Target Delete All



# G510: Explosives Analysis

- Liquid Injection
- Explosives mixture



# Summary

- Identified and responded to the need for advanced, portable downrange GC/MS system
- Supporting industry has responded with significant advancements
  - Pumps
  - Electronics
- Achieved balance of performance, SWaP, and cost while maintaining operability in challenging environments





The World's **Sixth Sense**®

Thank you

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Product Manager

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