

the microFAST GC

from ASI

*in the lab
or
in the field*



The Ultimate Field Analyzer

**PortaPack with
Data Processing
Computer**

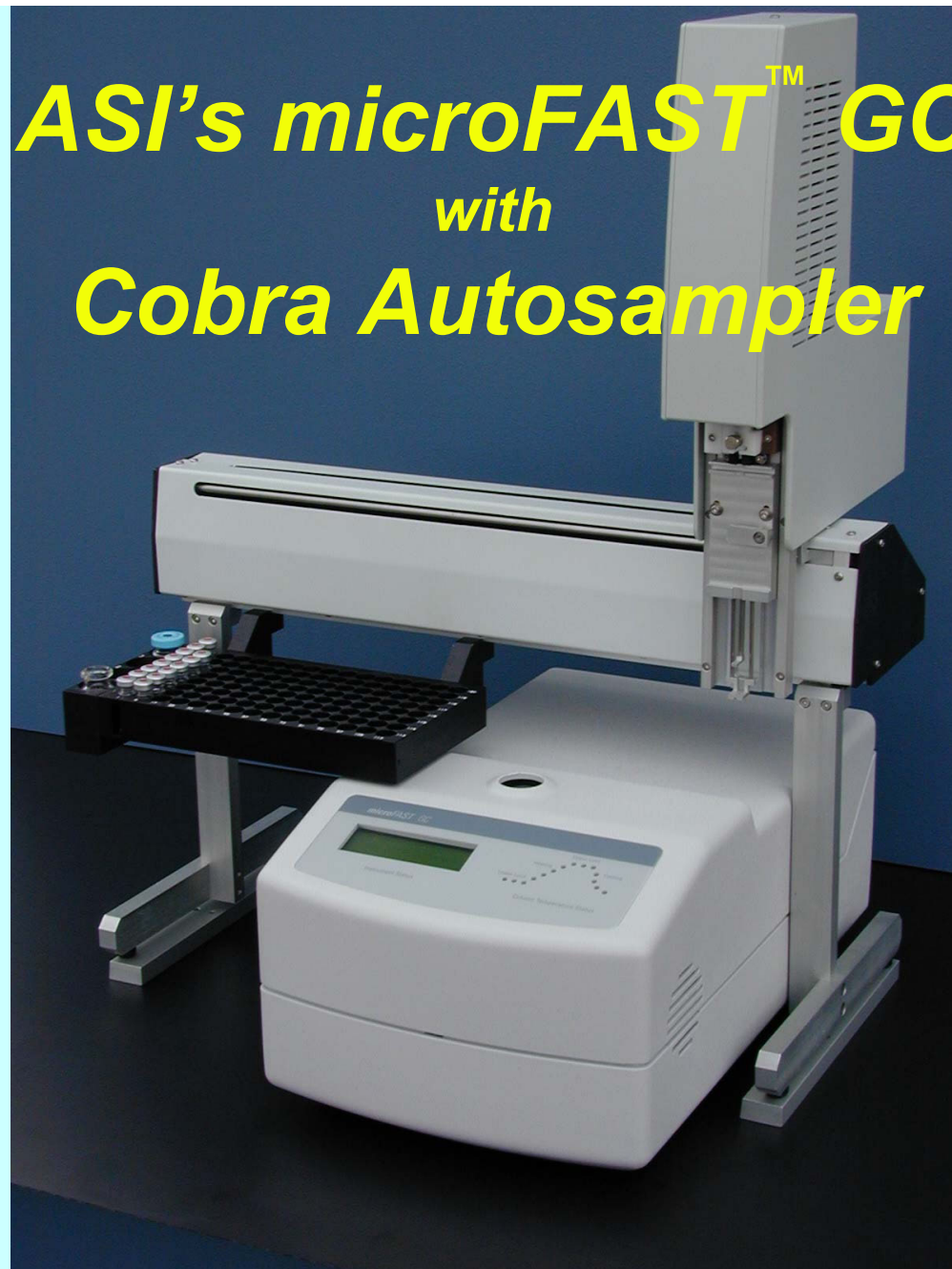
microFAST™ GC



ASI's microFAST™ GC

microfastgc.com

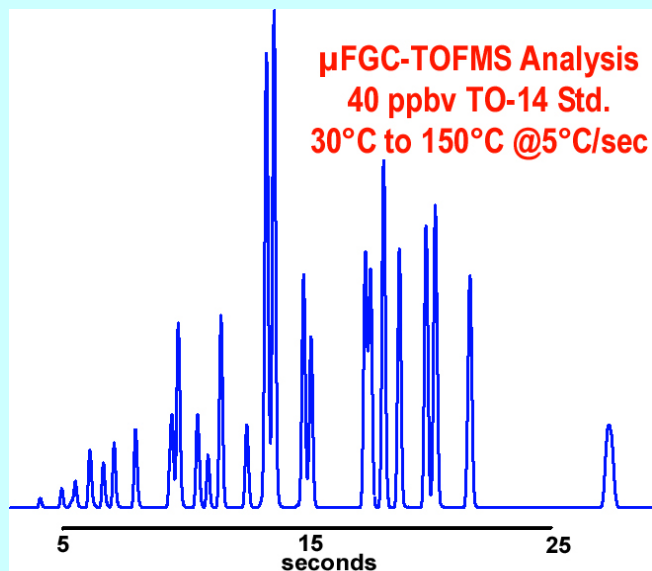
ASI's microFAST™ GC
with
Cobra Autosampler

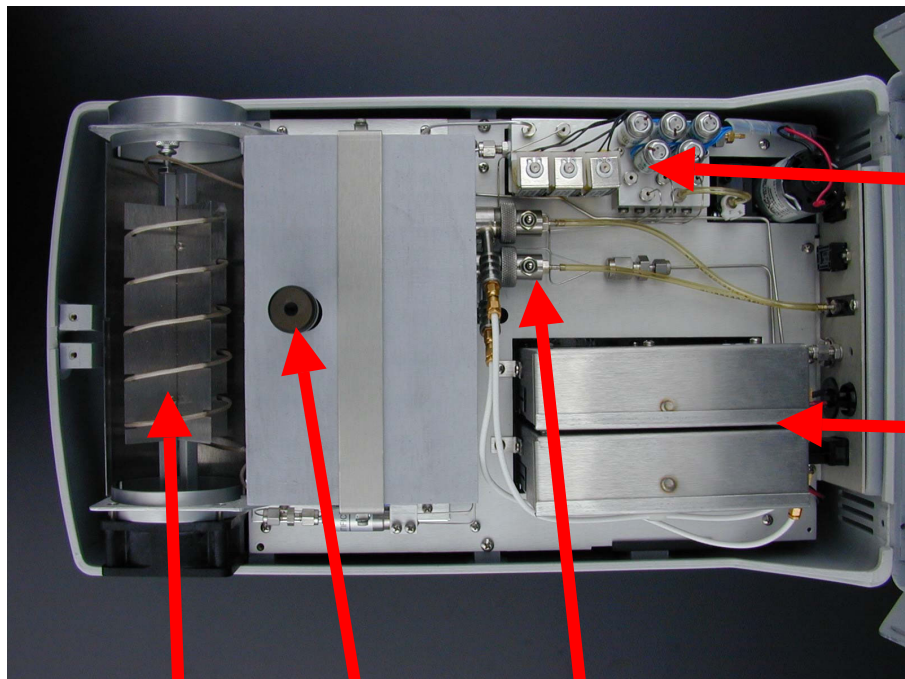




μ FGCTM - TOFMS

*the Ultimate
Really Fast
GCMS Analyzer*





**Pneumatic
Manifold
with EPC**

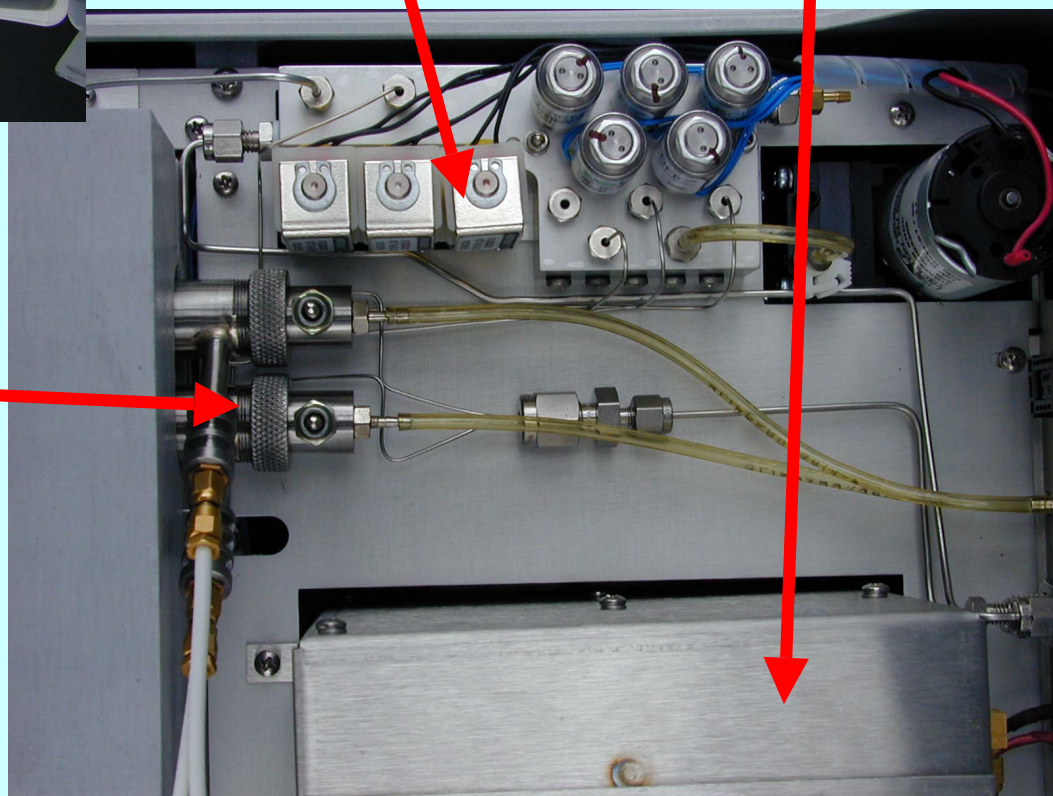
electrometers

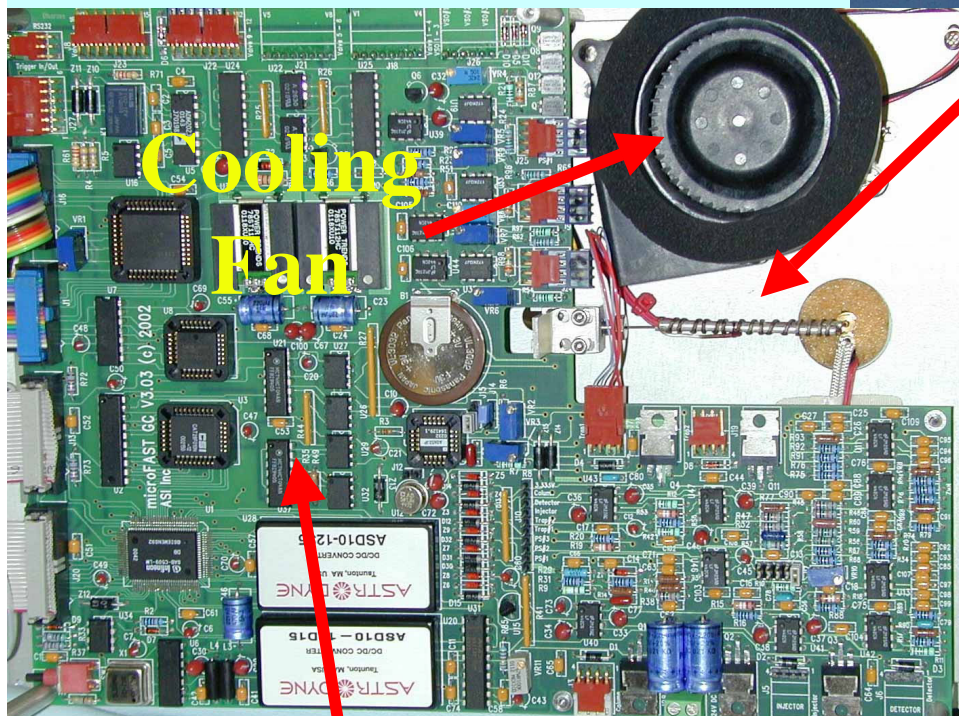
injector

**Columns
and heater**

FIDs

μF^{TM} GC



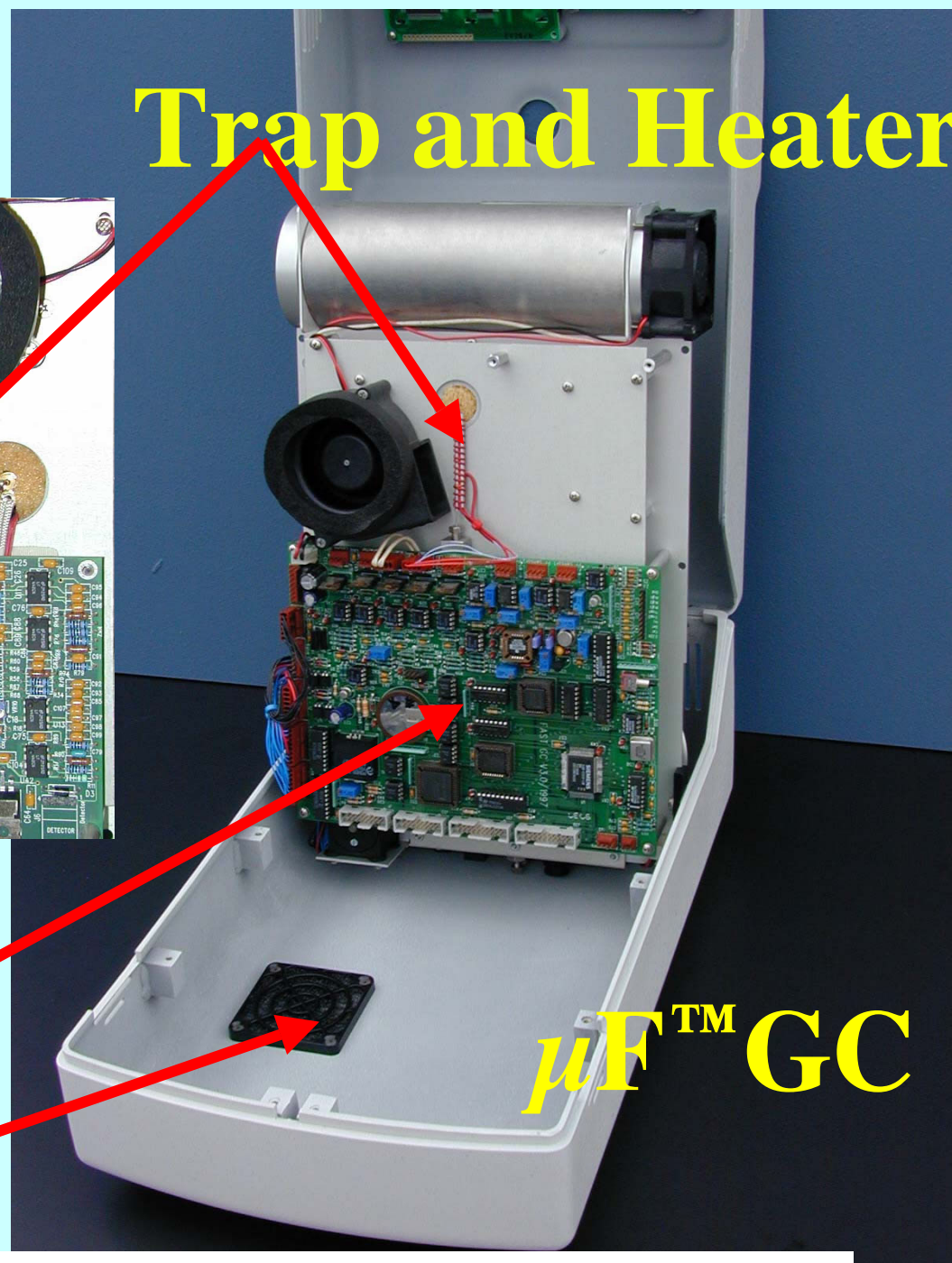


Cooling
Fan

Electronics Board

vent air inlet

Trap and Heater



μ F™ GC

microFAST™ GC

competitive edge with:

❁ Small Size

❁ Fast Analyses

❁ Versatile Applications

❁ out performs other GCs in size and speed

❁ analyzes both volatile and semivolatile compounds in a fieldable on-site, at-site instrument

❁ internal solid sorbent trap for injection and/or concentration

❁ versatile sample inlet and fast temperature programming supports many diverse applications

❁ bottom line: ***efficiency*** in time,
space, cost, applications, satisfaction

microFast GC™ Features

Chromatographic Capabilities

❁ Chromatographic Separation Times:

- ❁ • VOC in less than 10 seconds
- ❁ • SVOC in less than 50 seconds

❁ Chromatographic Features:

- ❁ • dual column configuration
- ❁ • separations with narrow bore 100 μ ID, 1 meter columns
- ❁ • temperature program rates up to 25° C/sec (1500°C/min.)
- ❁ • upper column temperature 350° C
- ❁ • column heater uses < 100 watts average power @ 24VDC
- ❁ • pressure programming for carrier gas
- ❁ • carrier gas consumption < 5ml/ minute
- ❁ • total H₂ gas consumption < 50ml/minute
- ❁ • dual FID detectors
- ❁ • EZ Chrom Data Software

Features of the microFAST™ GC

- ❁ versatile sample inlet (gases or liquids)
- ❁ novel sorbent trap injection system
- ❁ column flows independent of injector functions
- ❁ rapid pressure & temperature programming
- ❁ 2 high resolution separations per injection
- ❁ capable of analyzing volatile and semivolatile compounds @ 1ng per compound injected
- ❁ can be configured with sample loop injector and/or high volume trap concentrator

microFAST GC™ Features

Samples Accommodated:

- ✿ gases such as air, soil gas, process streams
- ✿ dilute gases
- ✿ purge and trap water samples
- ✿ static headspace water samples
- ✿ dynamic headspace water samples
- ✿ solid phase microextraction samples (SPME)
- ✿ membrane extractions
- ✿ thermal desorption tubes
- ✿ organic solvent liquid extracts
- ✿ organic liquids
- ✿ aqueous liquids
- ✿ thermal and SCF extracts from soils/sediments

Operational Capabilities

First, very low thermal mass components, with intimate temperature sensing and 10ms heater control, allows very fast and reproducible temperature programming (typically 5° to 10° C/sec).

Second, typical chromatographic separation times are less than 20 sec for VOCs and less than 60 seconds for SVOCs with cycle times in the 3 to 5 minute range and peak capacities of 100 or more.

Third, the instrument has two columns and two detectors thus providing redundant, simultaneous analysis of each sample over a wide range of analyte volatilities.

Fourth, since all zones that contact the samples and analytes are heated, the unit can analyze both volatile and semivolatile compounds in a transportable instrument package.

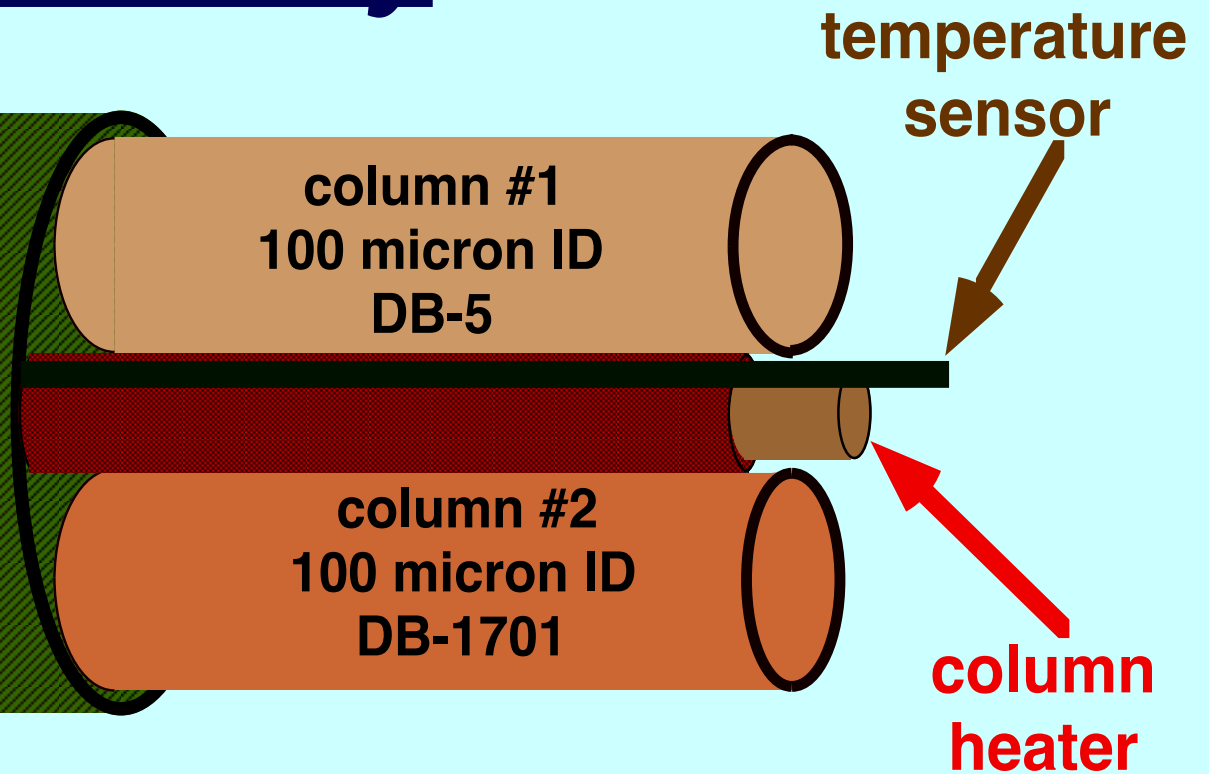
Fifth, sampling and injection is achieved using a unique injector with thermal desorption from a solid sorbent trap allowing versatility in the types of samples analyzed.

Sixth, the system weighs less than 15 pounds, occupies less than 1 square foot of space, and typically uses less than 150 watts of power.

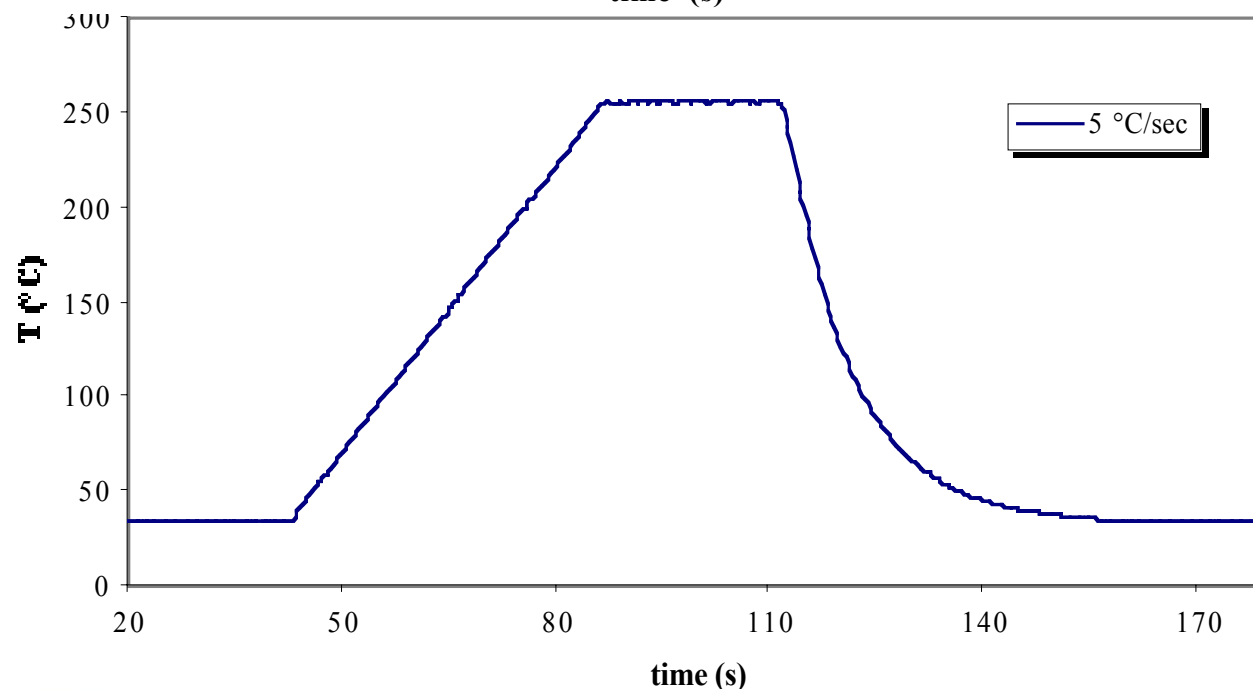
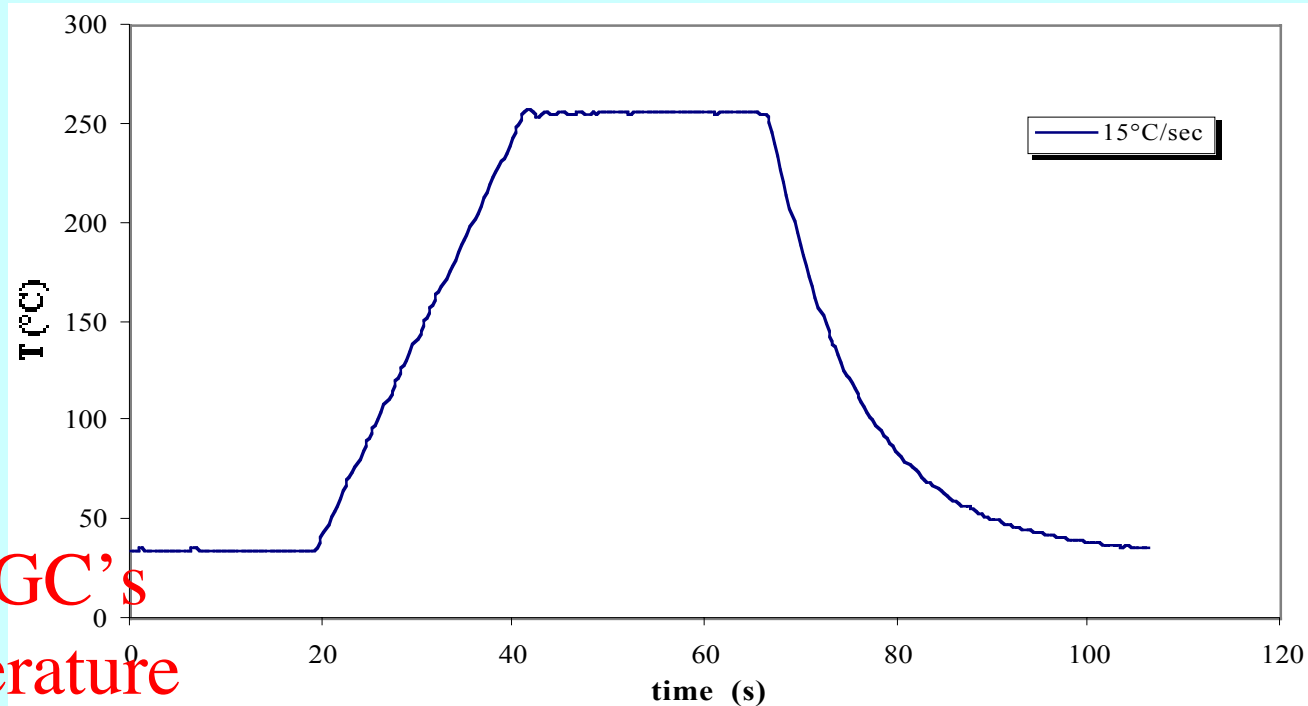
These features translate into a GC instrument that is small, fast, versatile, and has no equivalent commercial competition.

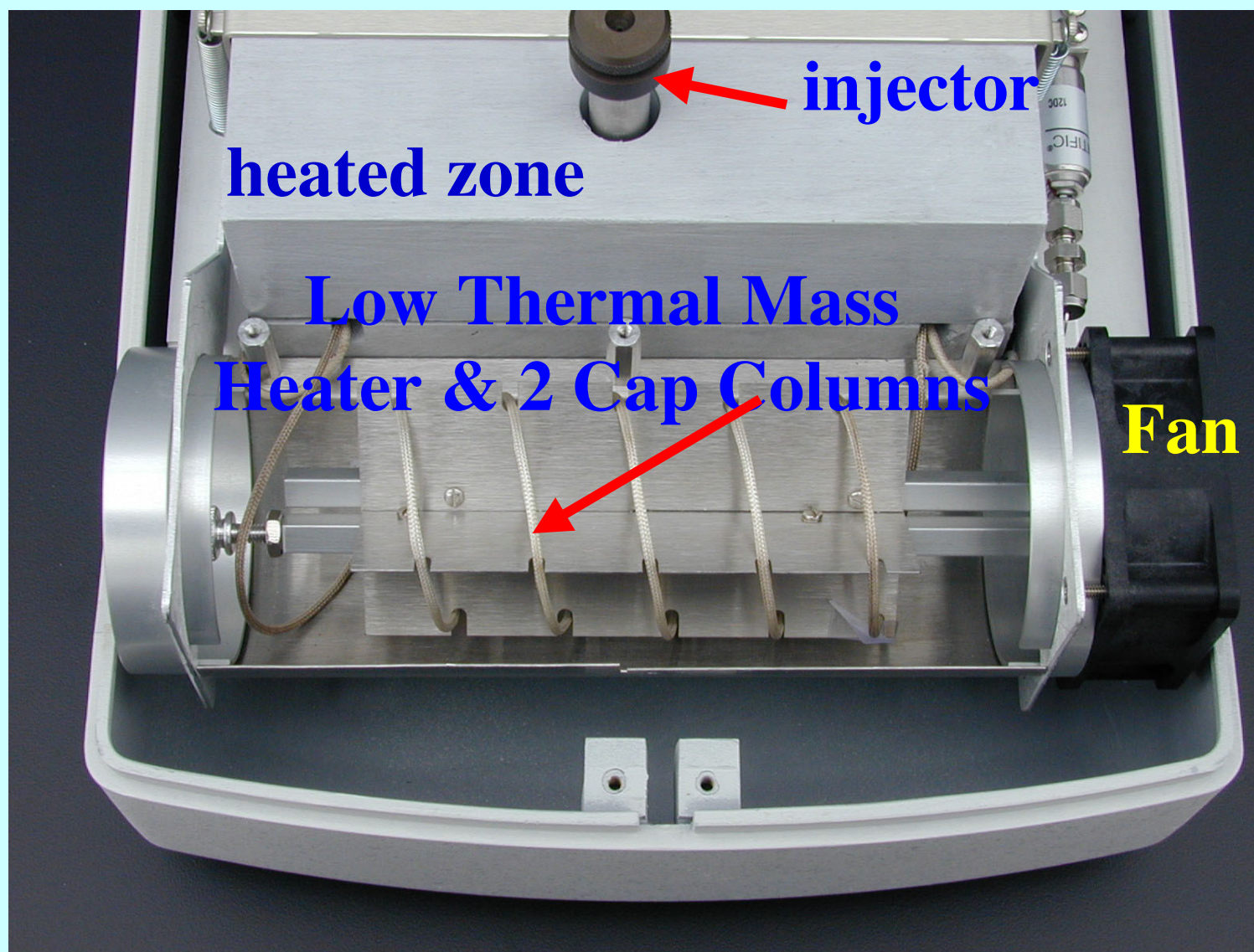
microFAST GC2
analytical columns
assembly

columns
oven
sheath
1mm ID



microFAST™ GC's
Column Temperature
Verses
Heating Rates

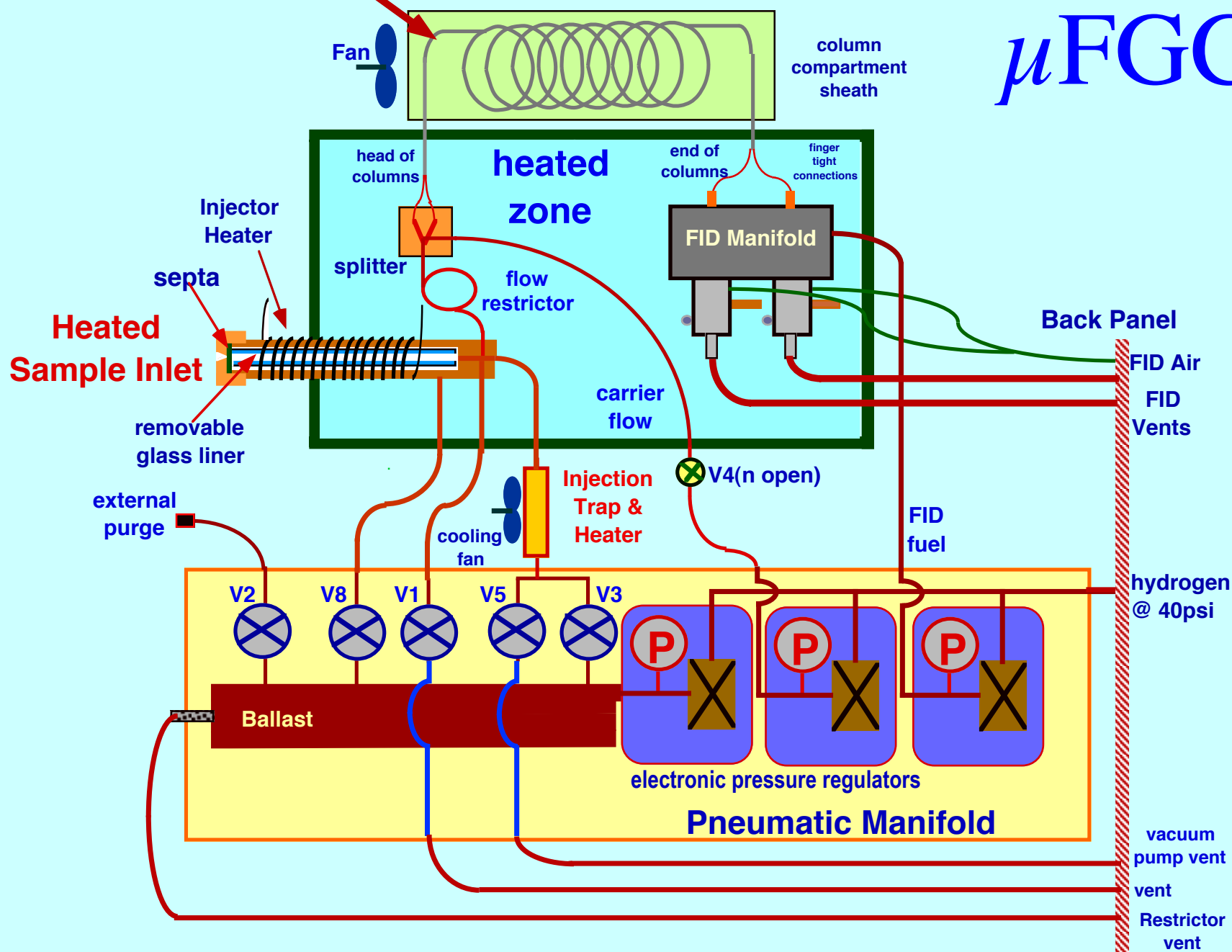


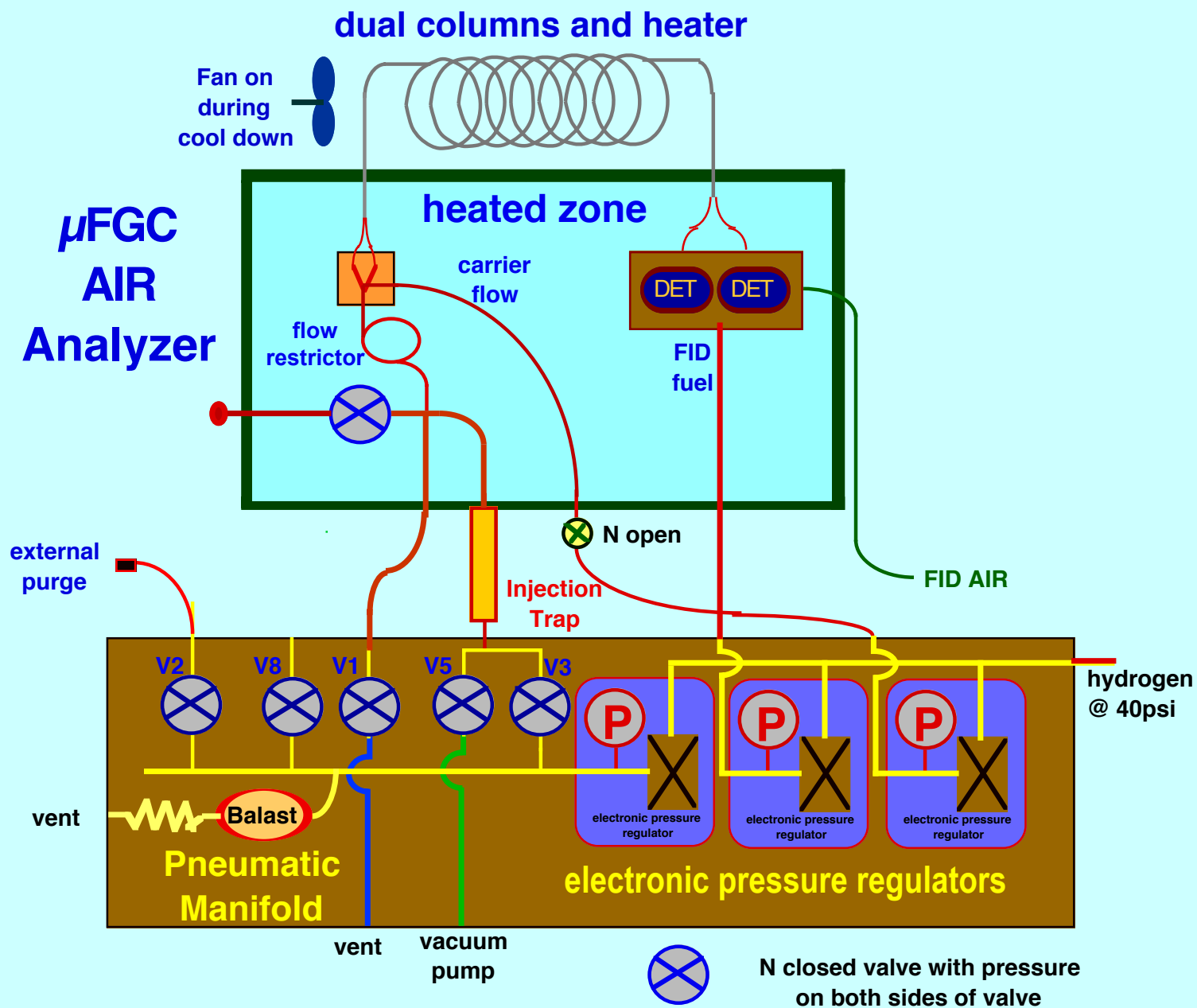


**ultra fast temperature programming
up to 25°C/second**

dual columns and heater assembly

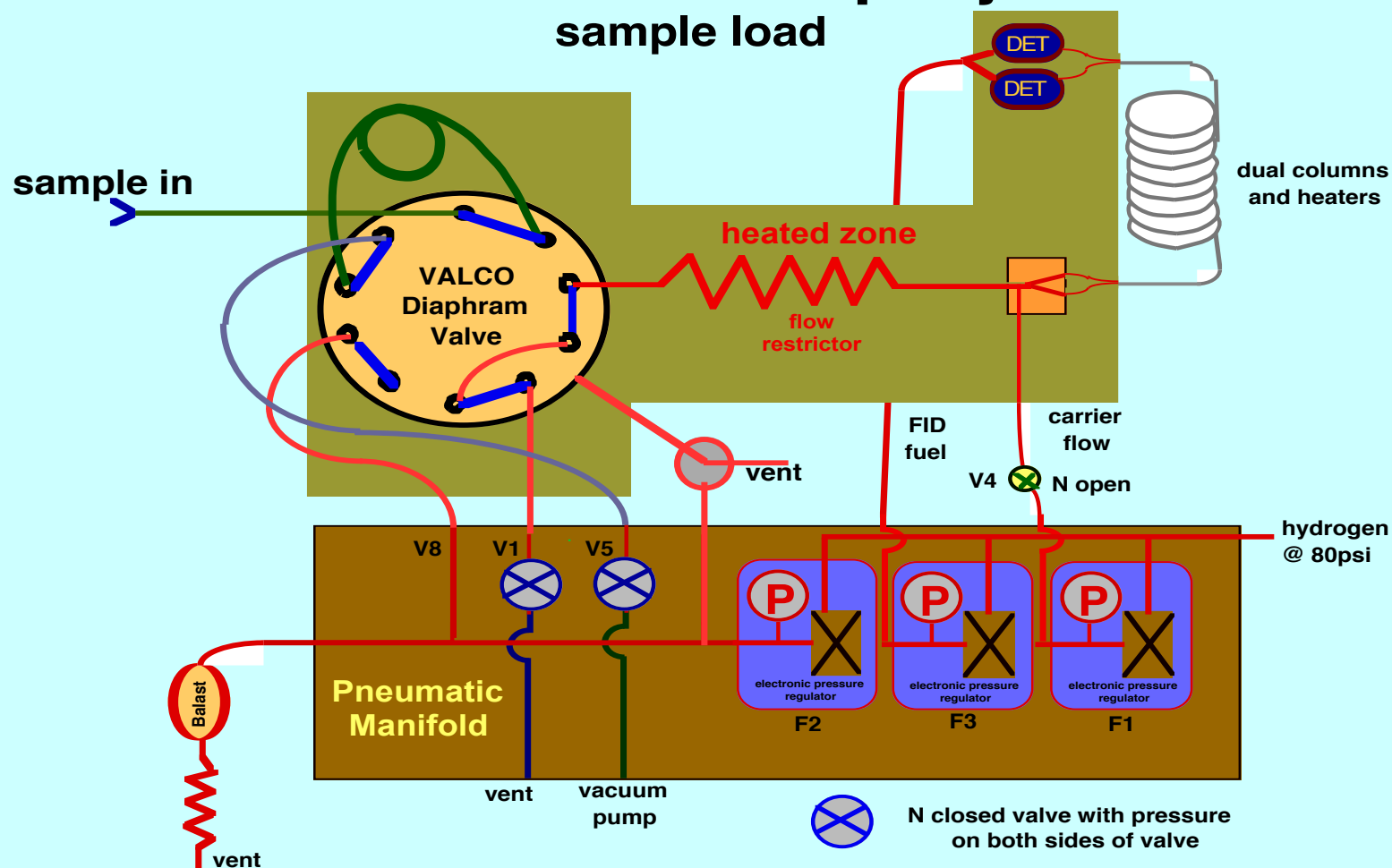
μ FGC





Possible Configurations of μ FGC

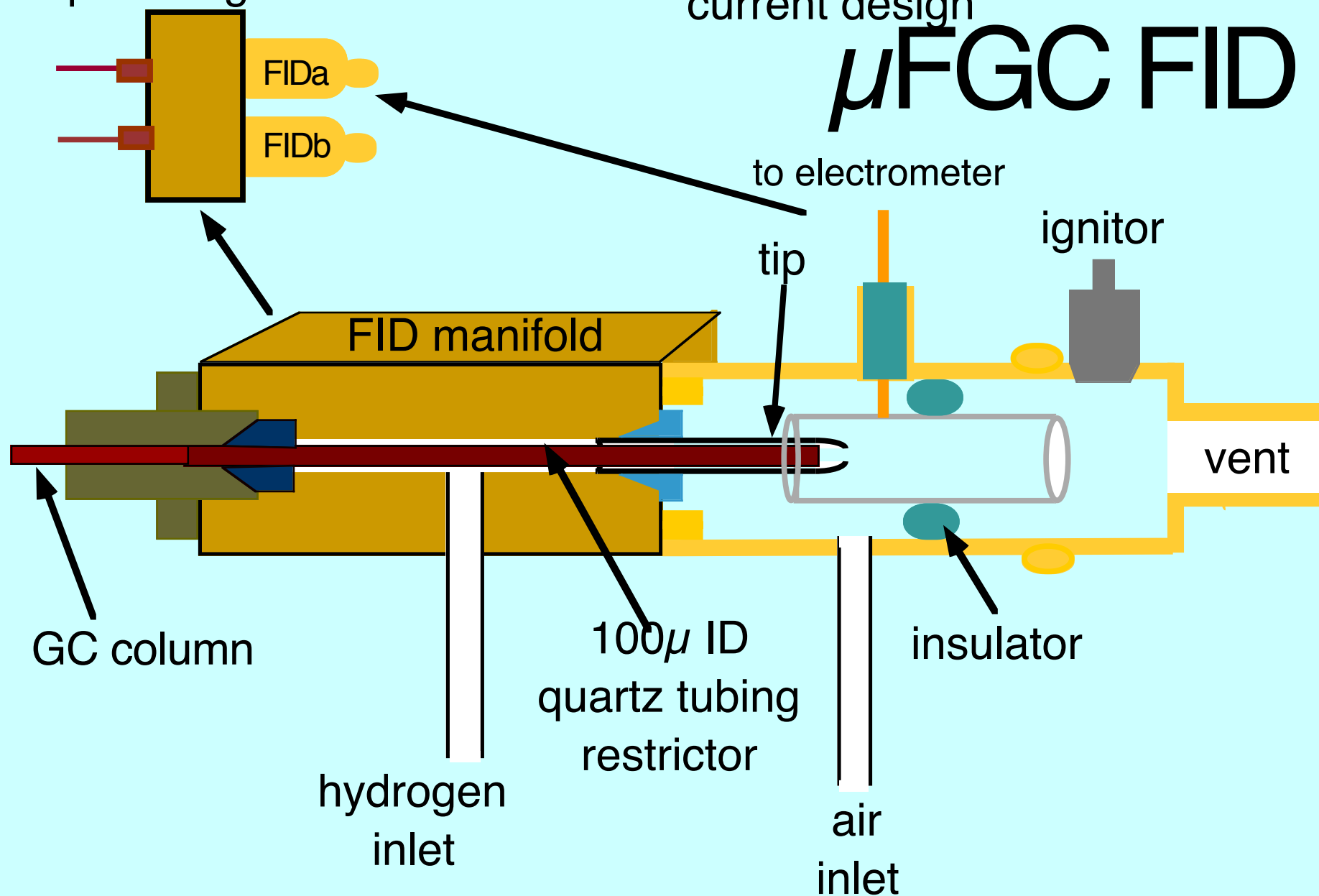
microFAST GC2 Loop Injector



top looking down

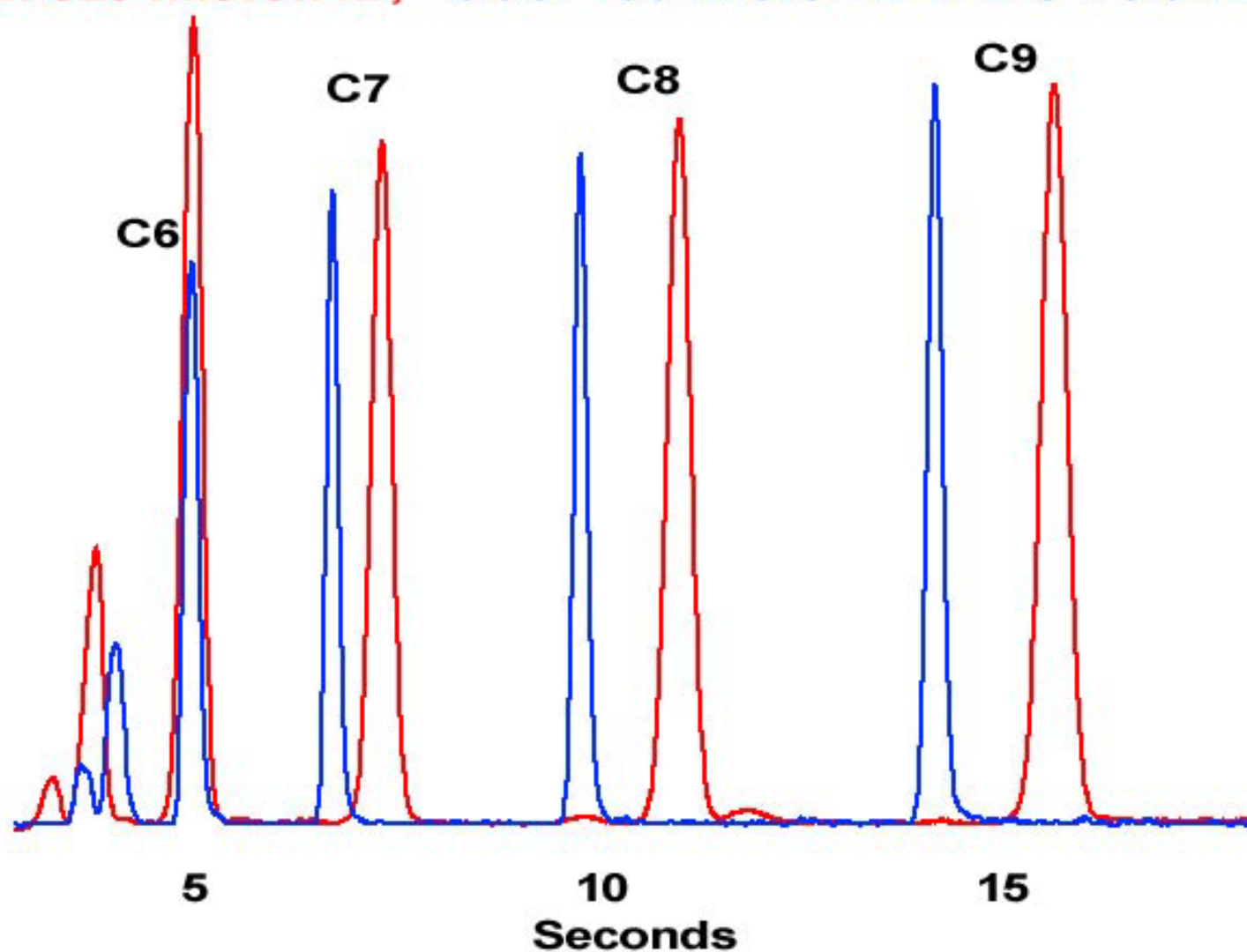
current design

μ FGC FID



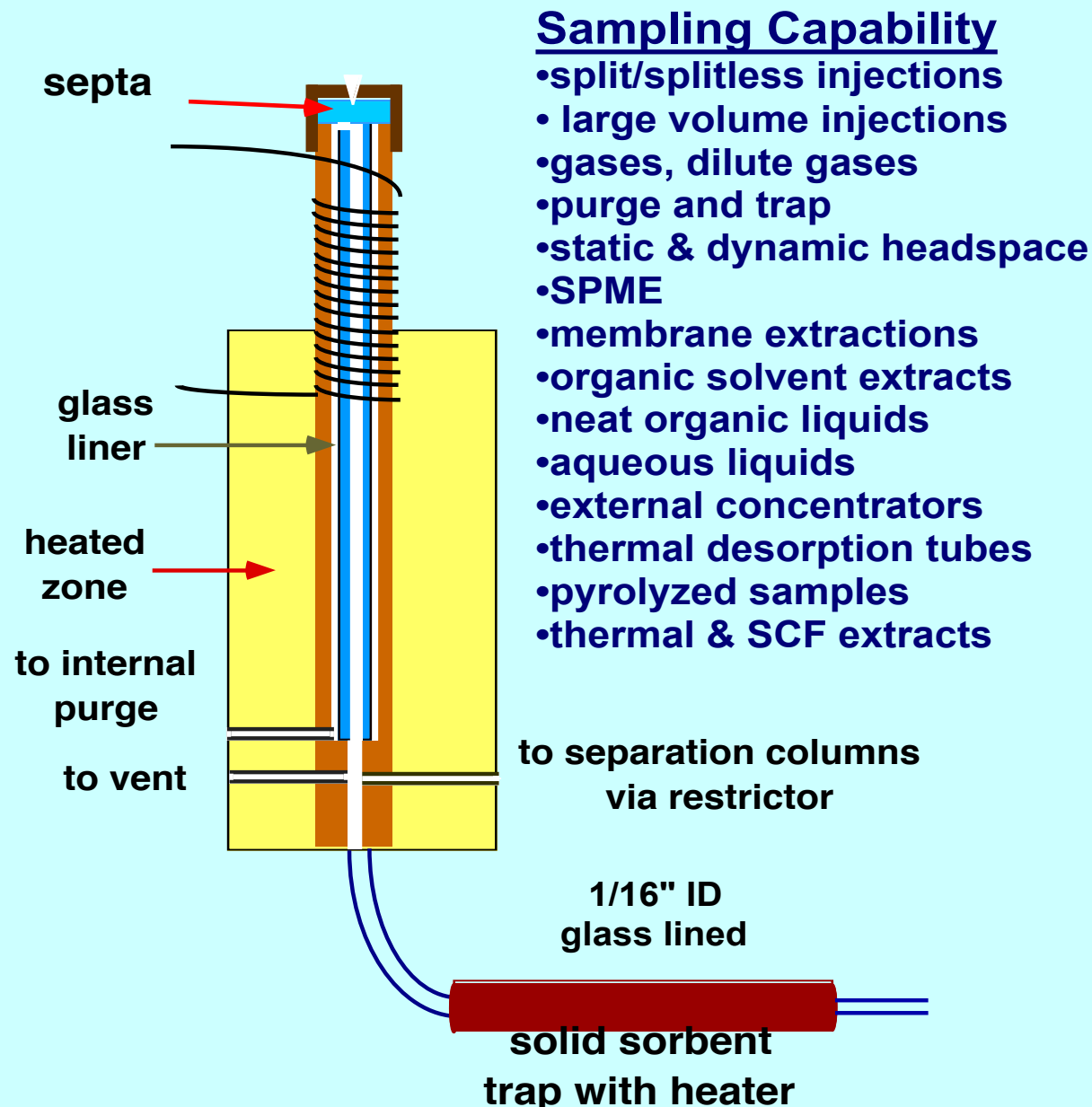
microFAST GC Analysis, 40°C to 150°C @ 3°C/sec.

red: 320 micron ID, blue: 100 micron ID DB-5 Column



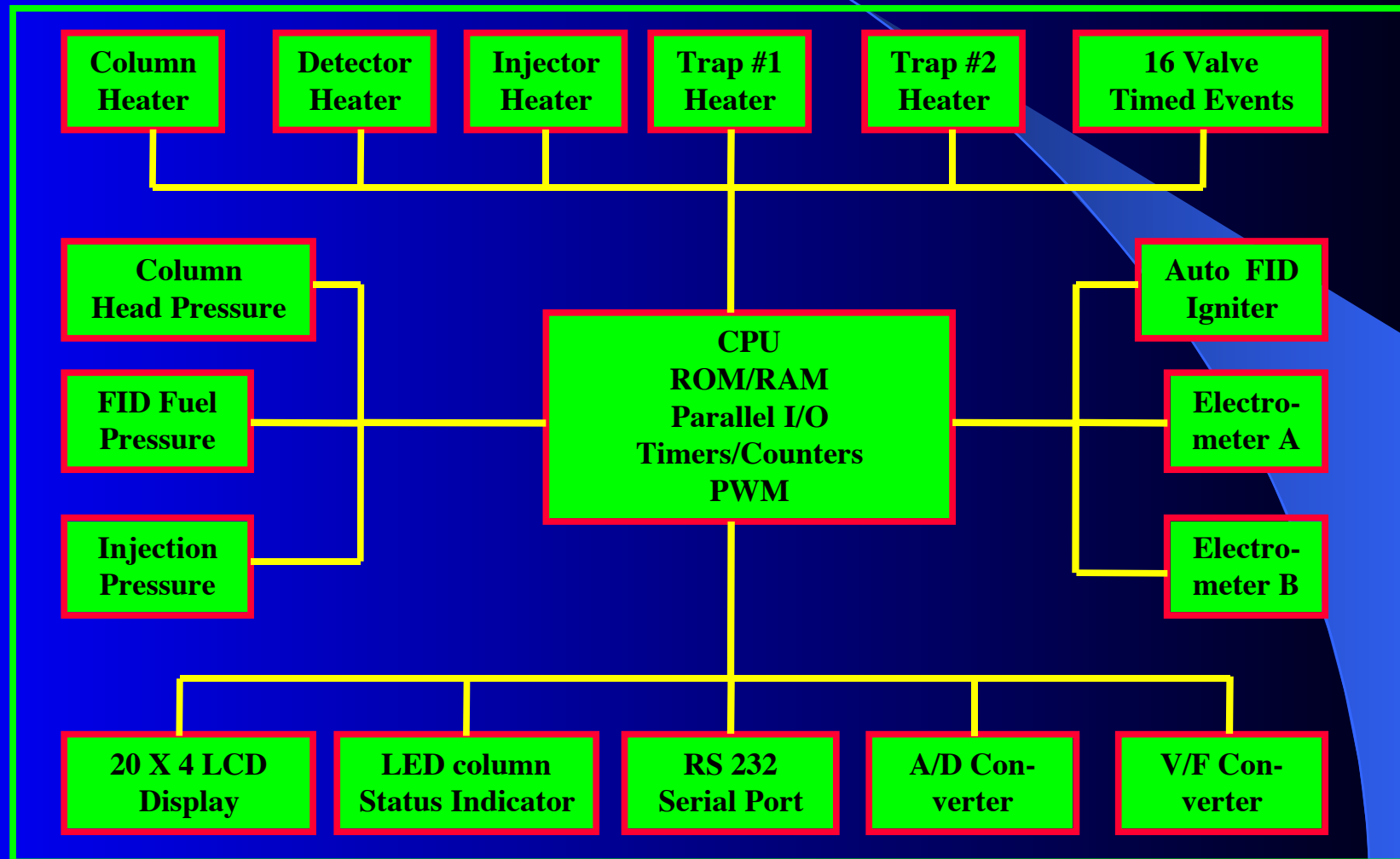
microFAST GC Injection System

Volatile and Semivolatile Analytes



- | | |
|---|---|
| • flash evaporative injectors | neat liquids, organic solvent extracts of liquid and solid samples |
| • sample loops | permanent gases
gases under high pressure |
| • solid sorbent traps | dilute gases, Industrial Hygiene Samples
Purge and Trap VOCs,
Static/Dynamic Headspace VOCs |
| • Solid Phase Micro Extractions (SPME) | primarily VOCs in liquid and head-space samples |
| • microFAST GC's flash evaporative solid sorbent trap injection system | <u>all of the above</u> , plus
SCF and pyrolysis extracts and direct aqueous samples |

GC Board Block Diagram



GC Control Frequency

Control	Interval	Frequency	Accuracy
Column Temperature	10 ms	100	$\pm 0.1^{\circ}\text{C}$
Column Head Pressure	40 ms	25	$\pm 0.1\text{psi}$
Injector Temperature	80 ms	12.5	$\pm 0.5^{\circ}\text{C}$
Detector Temperature	80 ms	12.5	$\pm 0.5^{\circ}\text{C}$
Trap Temperature	80 ms	12.5	$\pm 0.5^{\circ}\text{C}$
Injection Pressure	80 ms	12.5	$\pm 0.1\text{psi}$
FID Fuel Pressure	80 ms	12.5	$\pm 0.1\text{psi}$
Valve Events	10 ms	100	
LED Display/Column Status	250 ms	4	
LCD Display	1000 ms	1	

microFast GC - Method Setup



Injector

Sample mode **Liquid/SPM**

Injection Time **1000.** ms

Sample Time **15.** s

Injector Temperature **240** oC

Injection Pressure **1.** psi

Detector

Detector temperature **25** oC

Fuel Pressure **30.** psi

Sample Concentrator

Trap desorb temperature **275** oC

Trap preheat time **20** s

Trap prepurge time **0.** s

Trap cleanout time **30.** s

Pressure Program

Initial column pressure **14.** psi

Initial pressure hold **80.** s

Final column pressure **14.** psi

Final pressure hold **50.** s

Pressure prog rate **1.** psi/s

Pressure program length **130** s

Pressure program error indicator: **22**

Temperature Program

Initial Temperature **40** oC

Initial hold time **0.** s

Final Temperature **250** oC

Final hold time **10.** s

Column heating rate **5.** oC/s

Temperature program length **51** s

☐ Auxilliary heater

Heater setpoint oC

Start time s

Stop time s

Read Current

Apply

OK

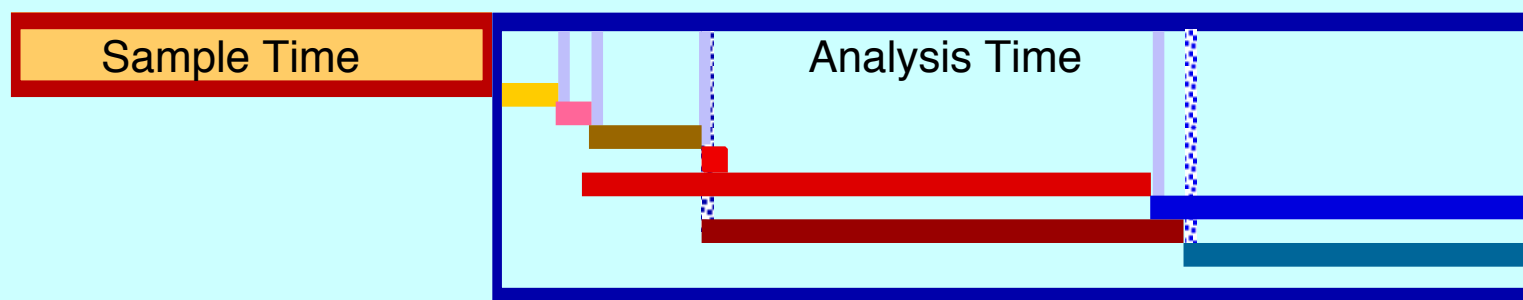
Cancel

Analytical Cycle

(typically, 3 to 5 minutes)

analytes passed through
& adsorbed onto trap material

analytes desorbed from trap, injected into
and separated by columns



Trap prepurge time----- V8+, V5+ at beginning, off at end of "Trap prepurge time"

Equilibrate time----- V8-, V5-, back flow into injector through restrictor

Trap preheat time----- trap heater on, inj. starts at end of "xx" sec "Trap preheat time"

Injection time----- V4- for "xx" ms inj time, V3+, V5+ at end of "Injection Time"

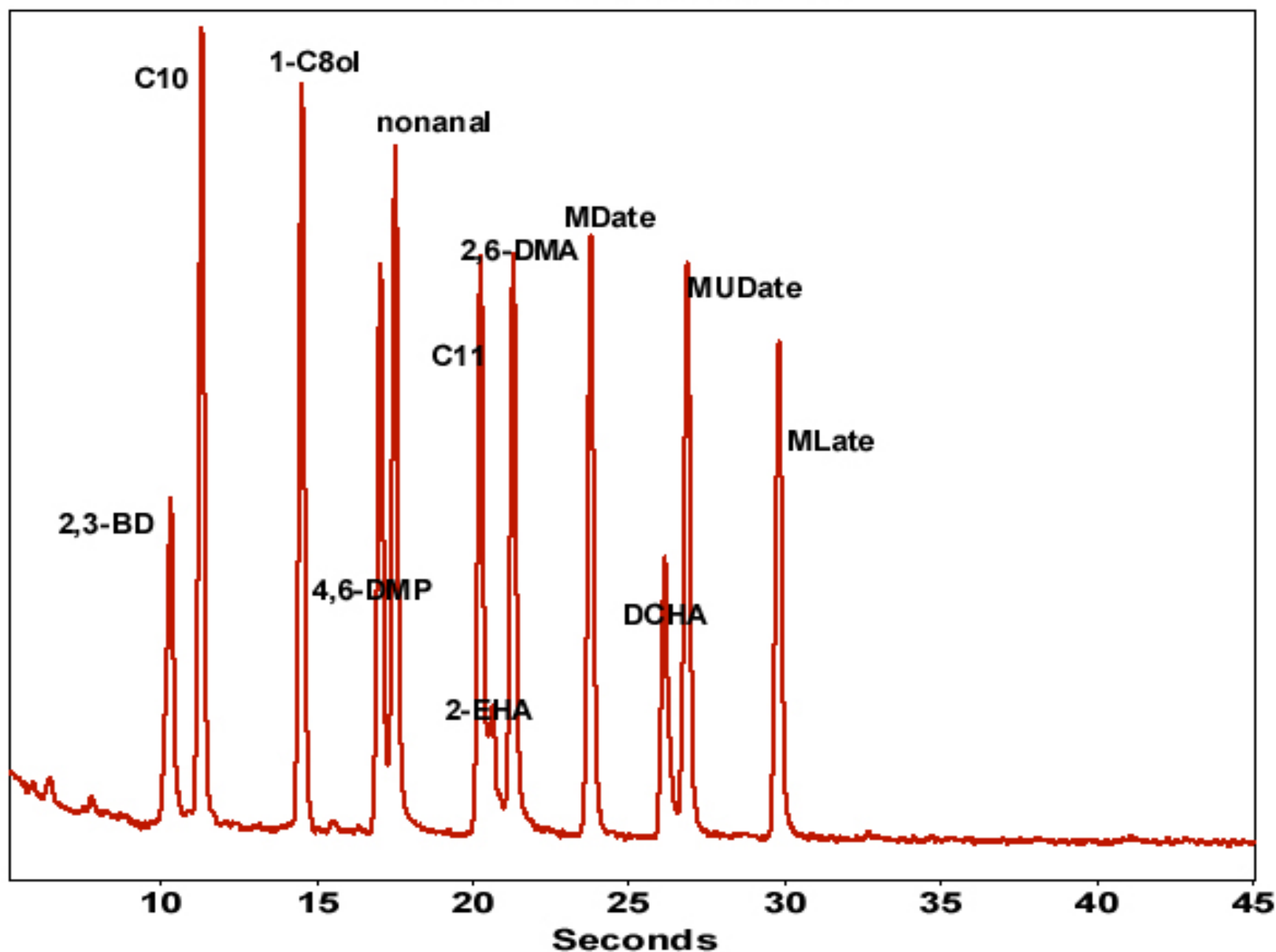
Trap cleanout time-----trap heater turned on for "xx" sec duration of "Trap cleanout time"

trap cooldown time----- trap heater turned off for cooldown

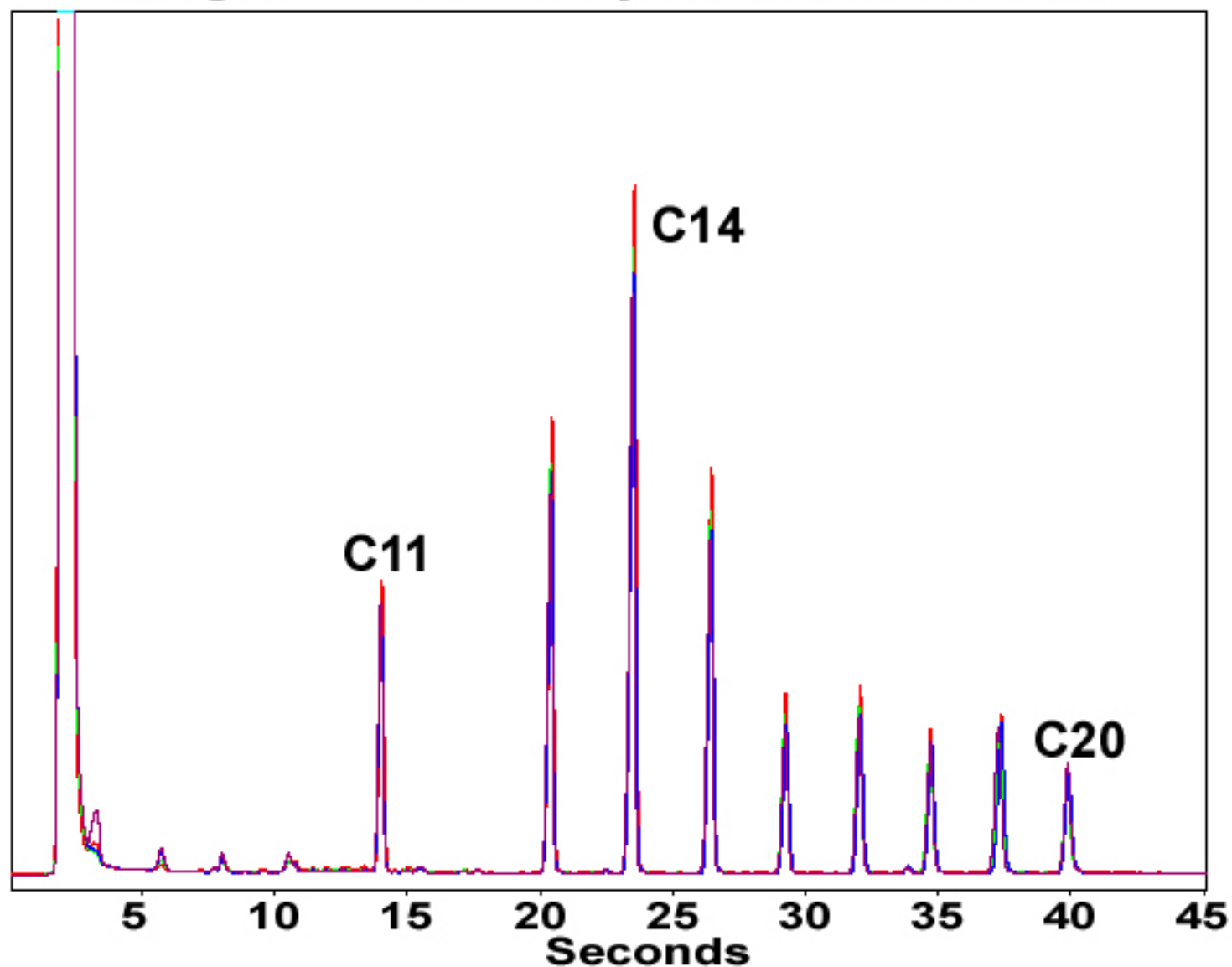
Column separation time--- column temperature/pressure programs begins

column cooldown time----- column heater turned off, pressure resets to "Initial column pressure"

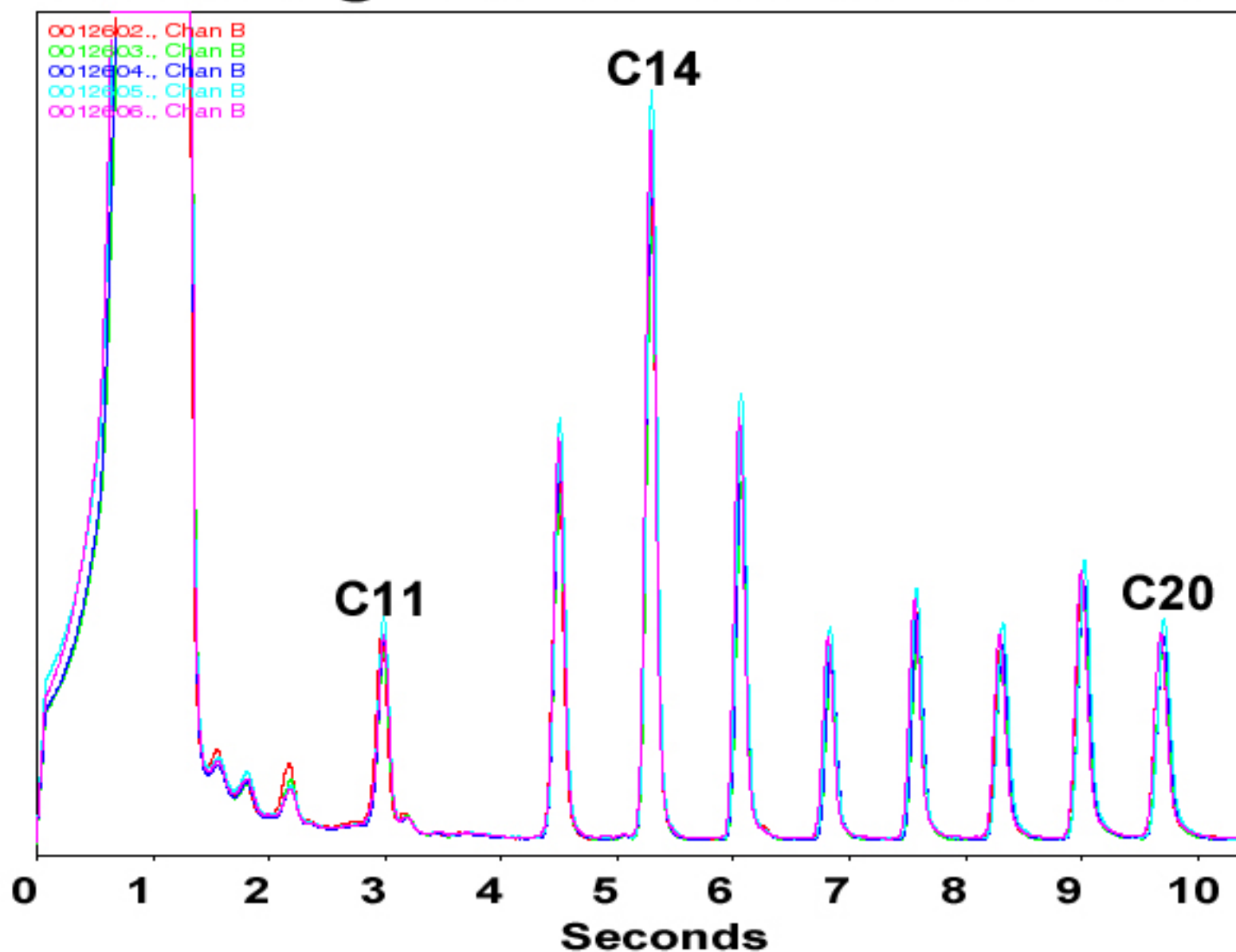
**microFAST GC2: 40°C to 250°C @ 5°C/sec.
Grob Test Mixture**



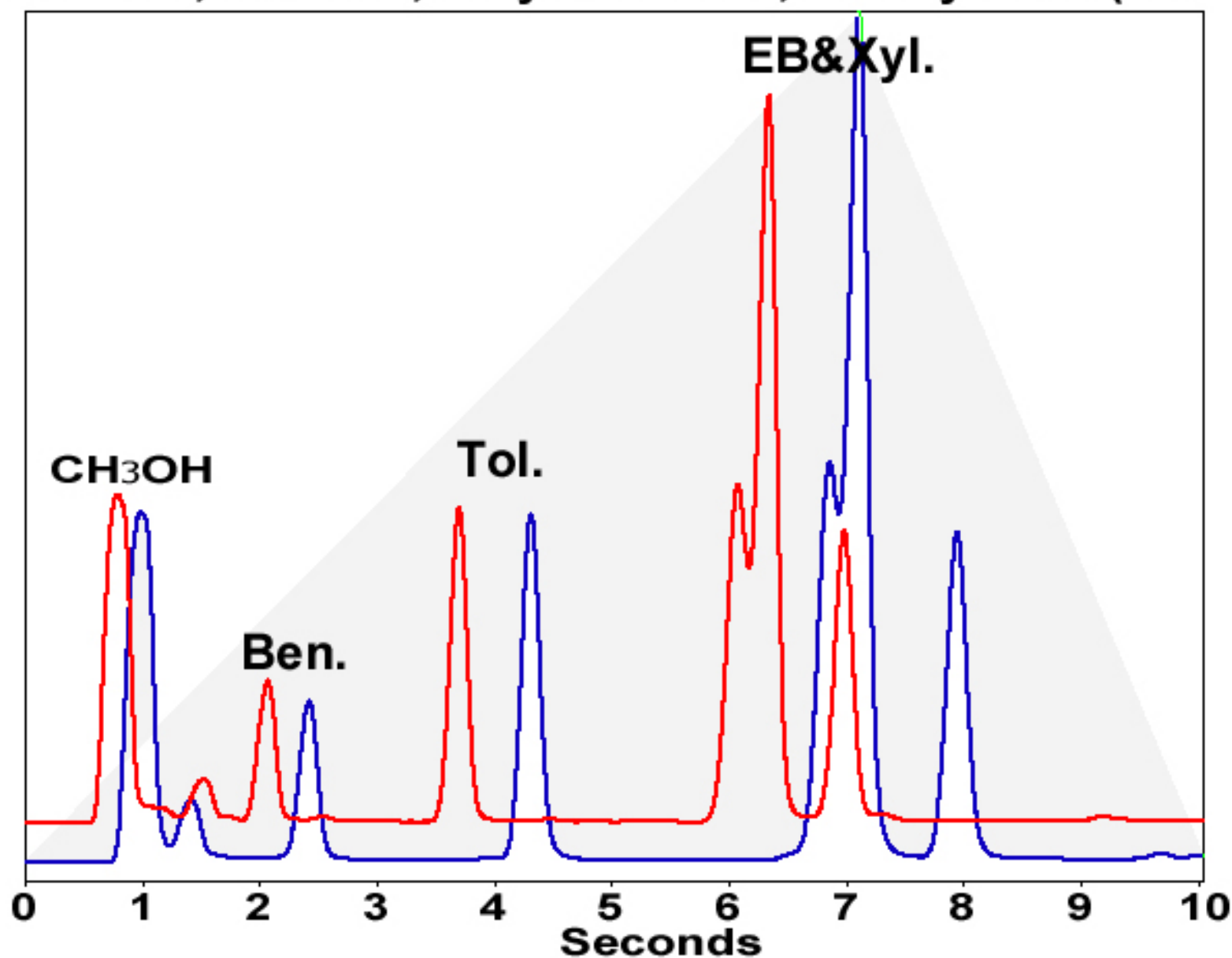
**microFAST GC2 Replicate Analyses, 40°C to 250°C @ 5°C/sec
25ng of C11 to C20 Hydrocarbon Standard**



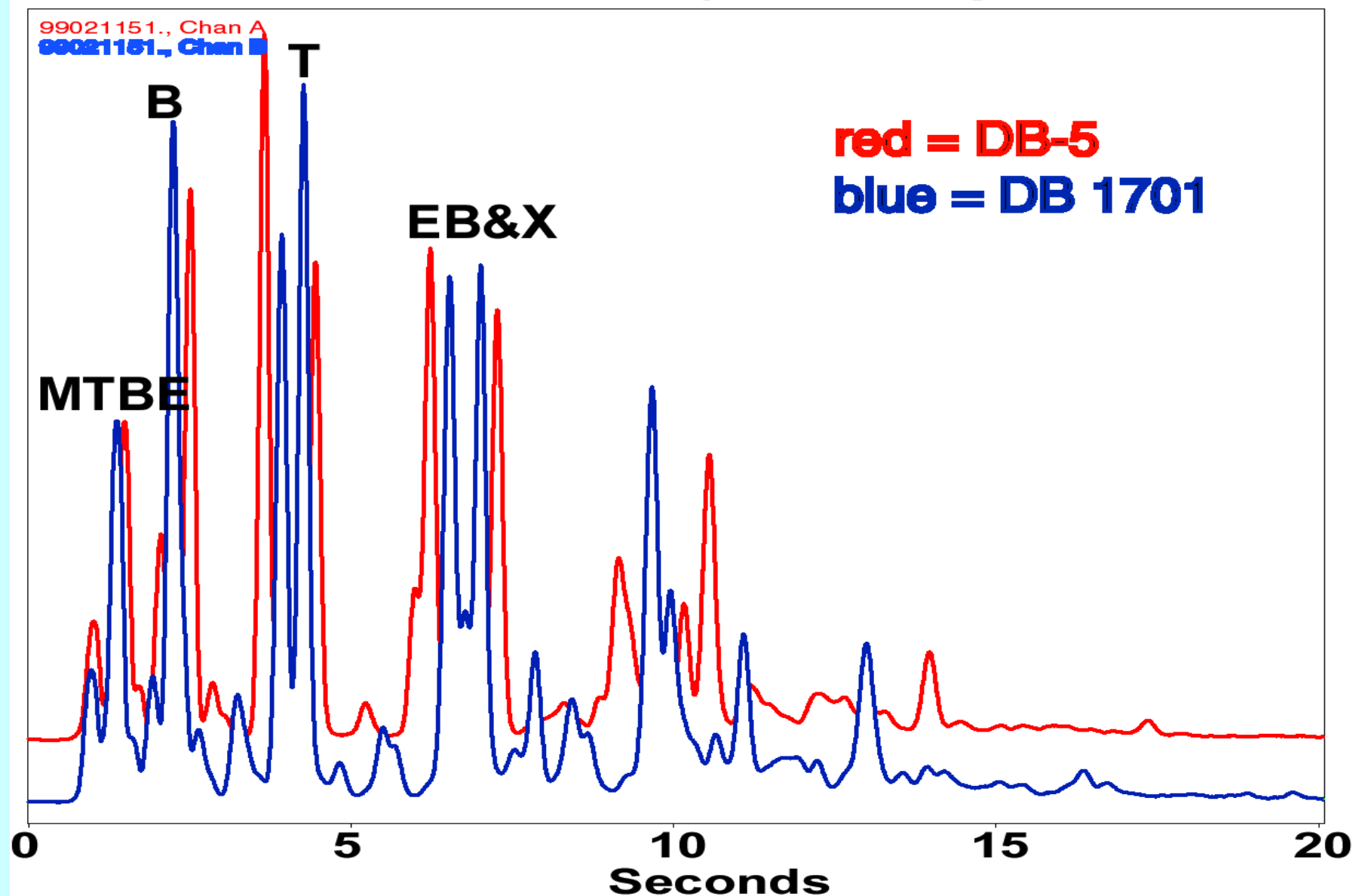
5 Replicate microFAST GC Analyses of Semivolatile Std. 90°C to 270°C @ 20°C/sec, one meter DB1701 Column



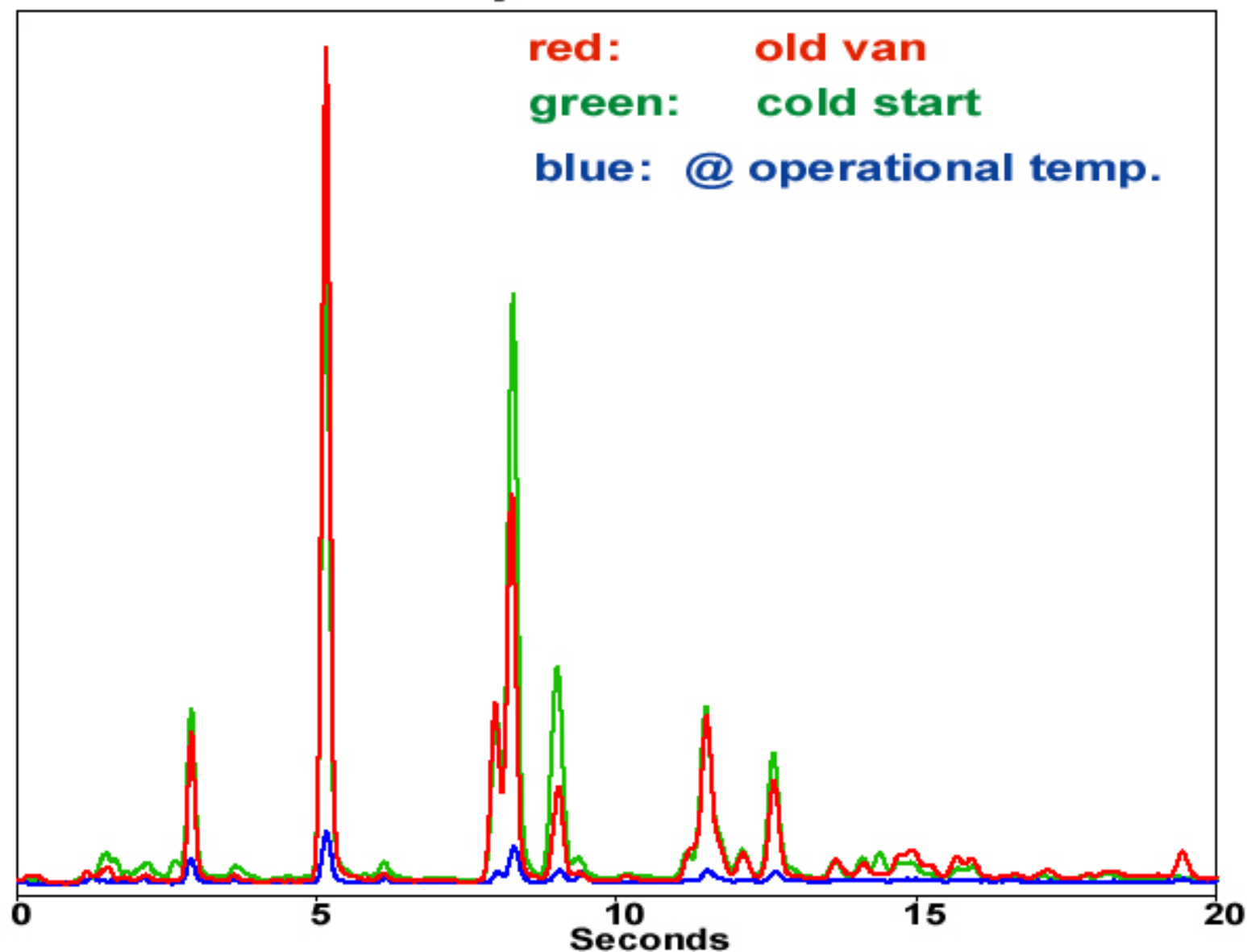
microFAST GC2 Analysis, 40°C to 150°C @ 5°C/sec
Benzene, Toluene, Ethyl Benzene, and Xylenes (BTEX)



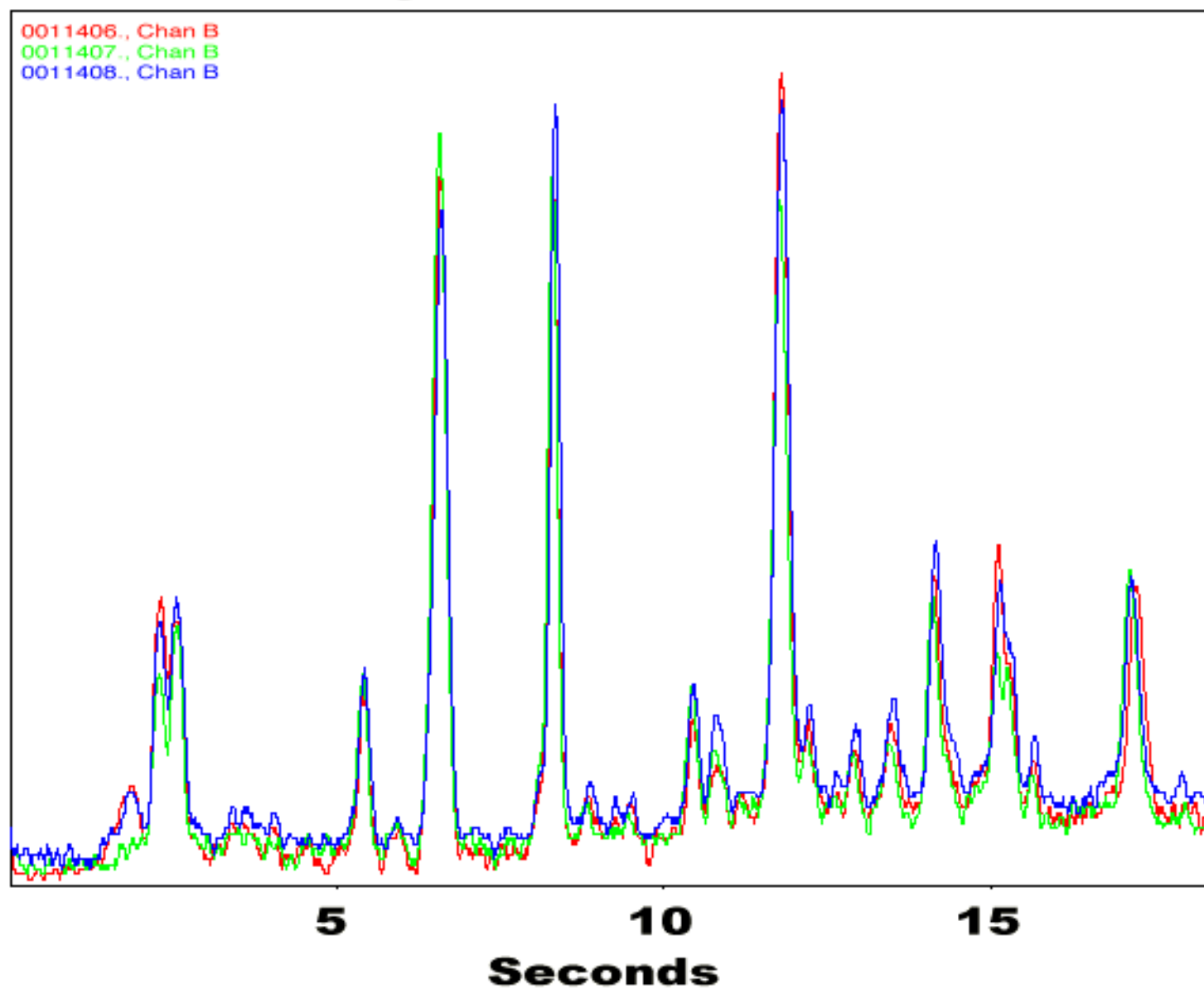
microFAST GC2 Analysis, 40°C to 150°C @ 5°C/sec
0.1 ul neat liquid injection of gasoline



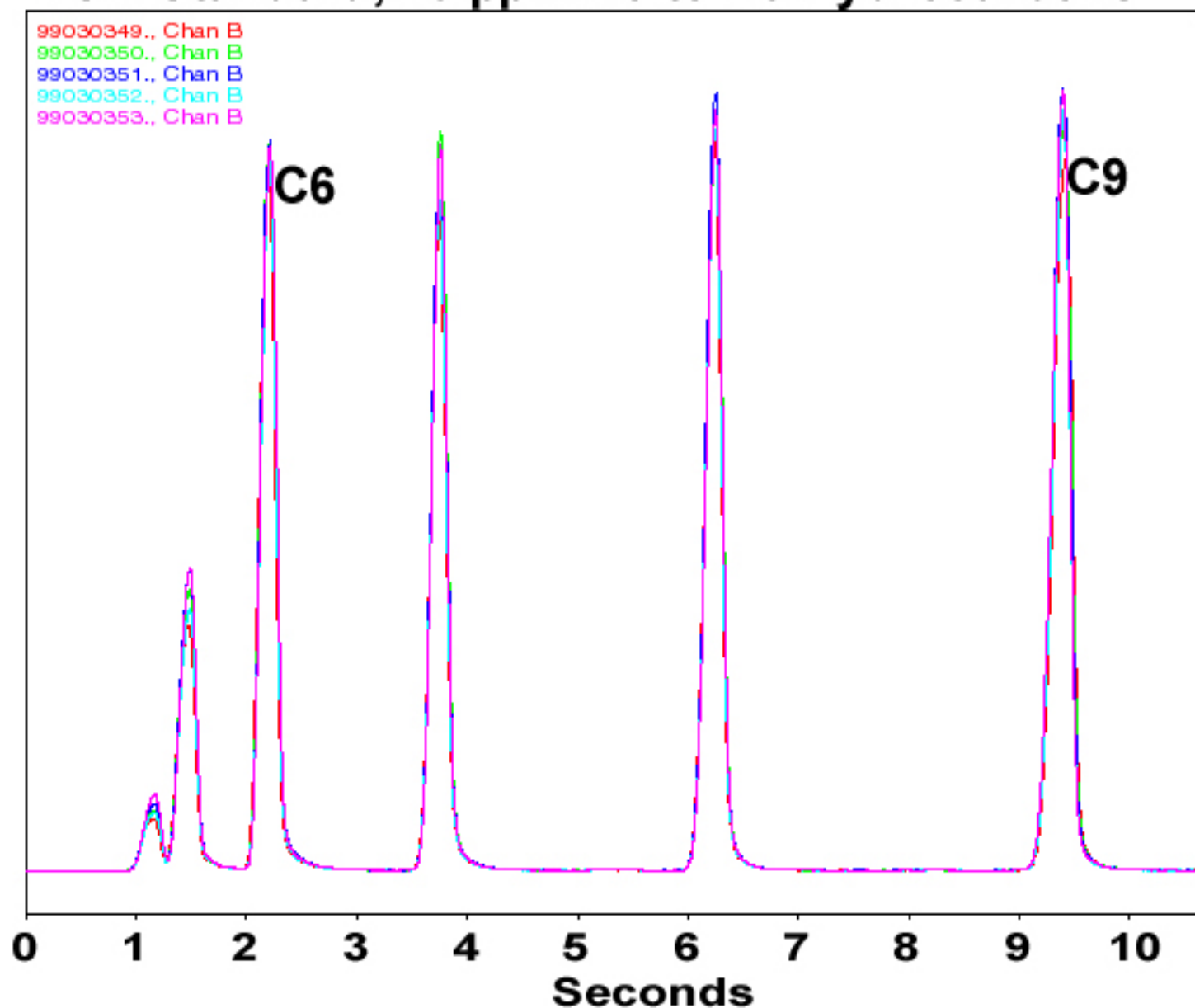
microFAST GC2: 25°C to 150°C @ 5°C/sec. Tail Pipe Emissions



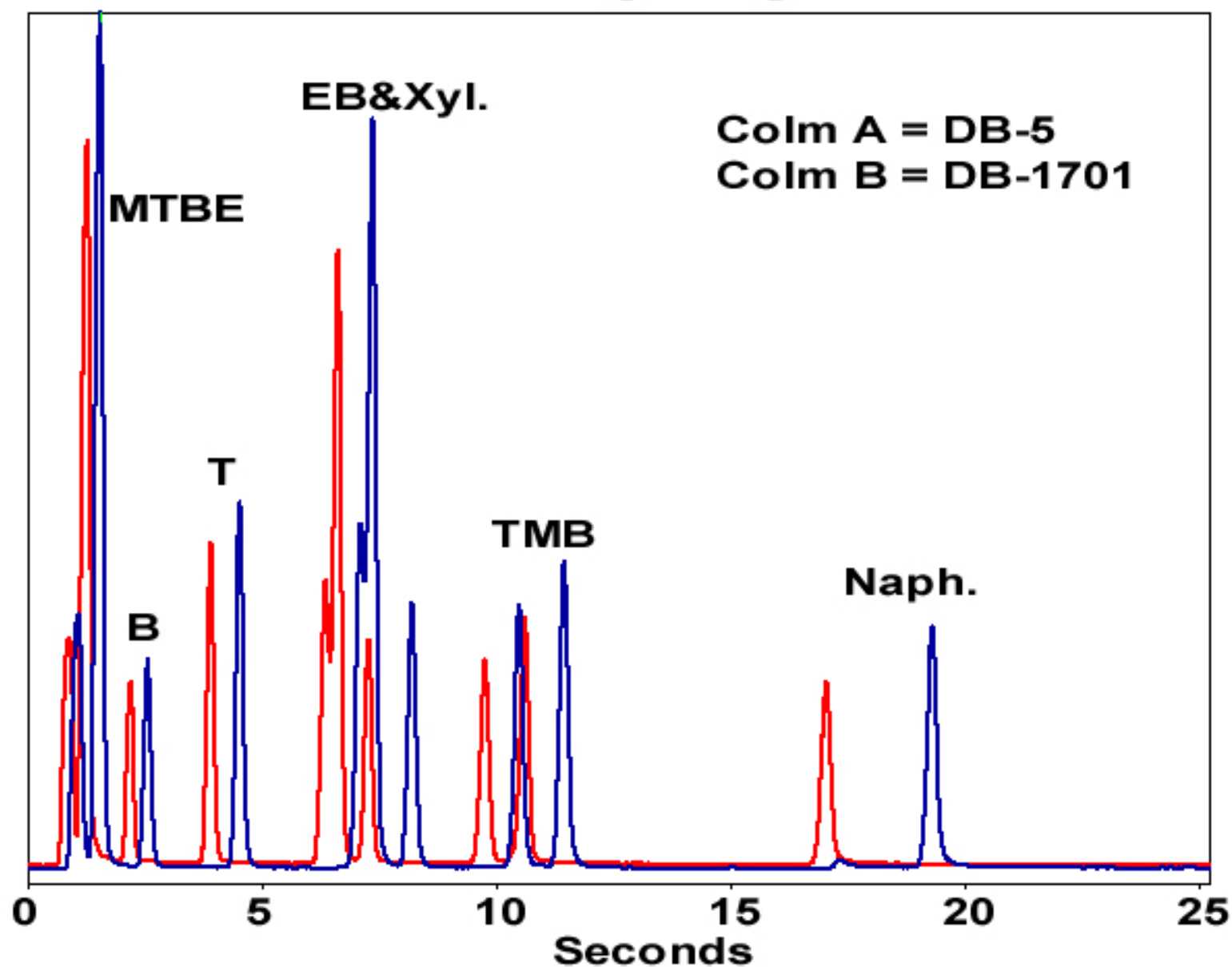
microFAST GC Analysis, 35°C to 150°C @ 5°C/sec. Room Air @ Three Different Times



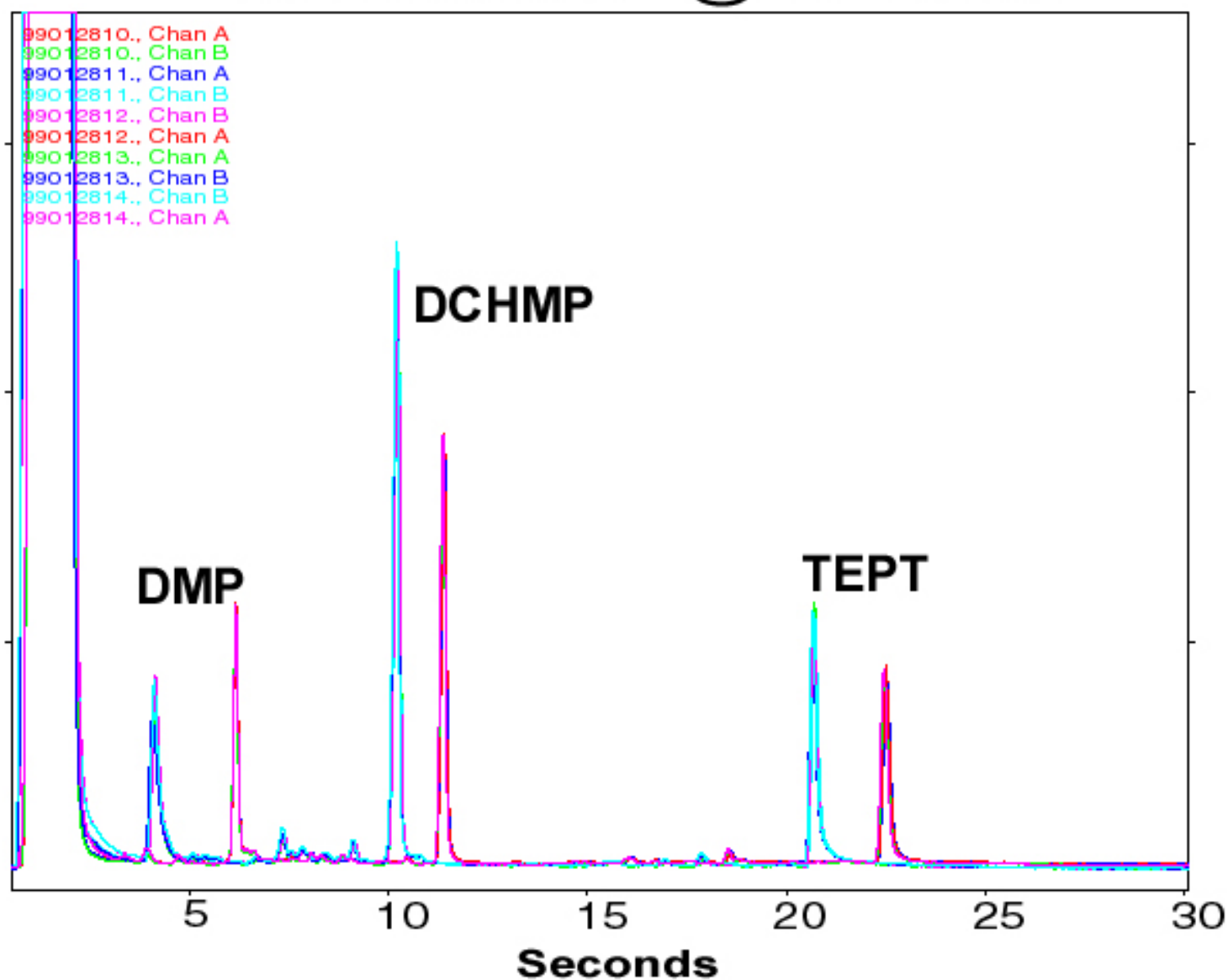
5 Replicate microFAST GC2 Analyses, 40°C to 140°C @ 5°C/sec. VOC Standard, 20 ppm C5 to C9 Hydrocarbons



microFAST GC2 Analysis @ 5°C/sec, 40°C to 150°C Gasoline Range Organics



5 Replicate Analyses of CWA Simulants, Colm. A & B 40°C to 250°C @ 10°C/sec.



microFAST GC Analysis CWA Simulants

solvent

#1=DMP

#2=DCHMP

#3=TEPT

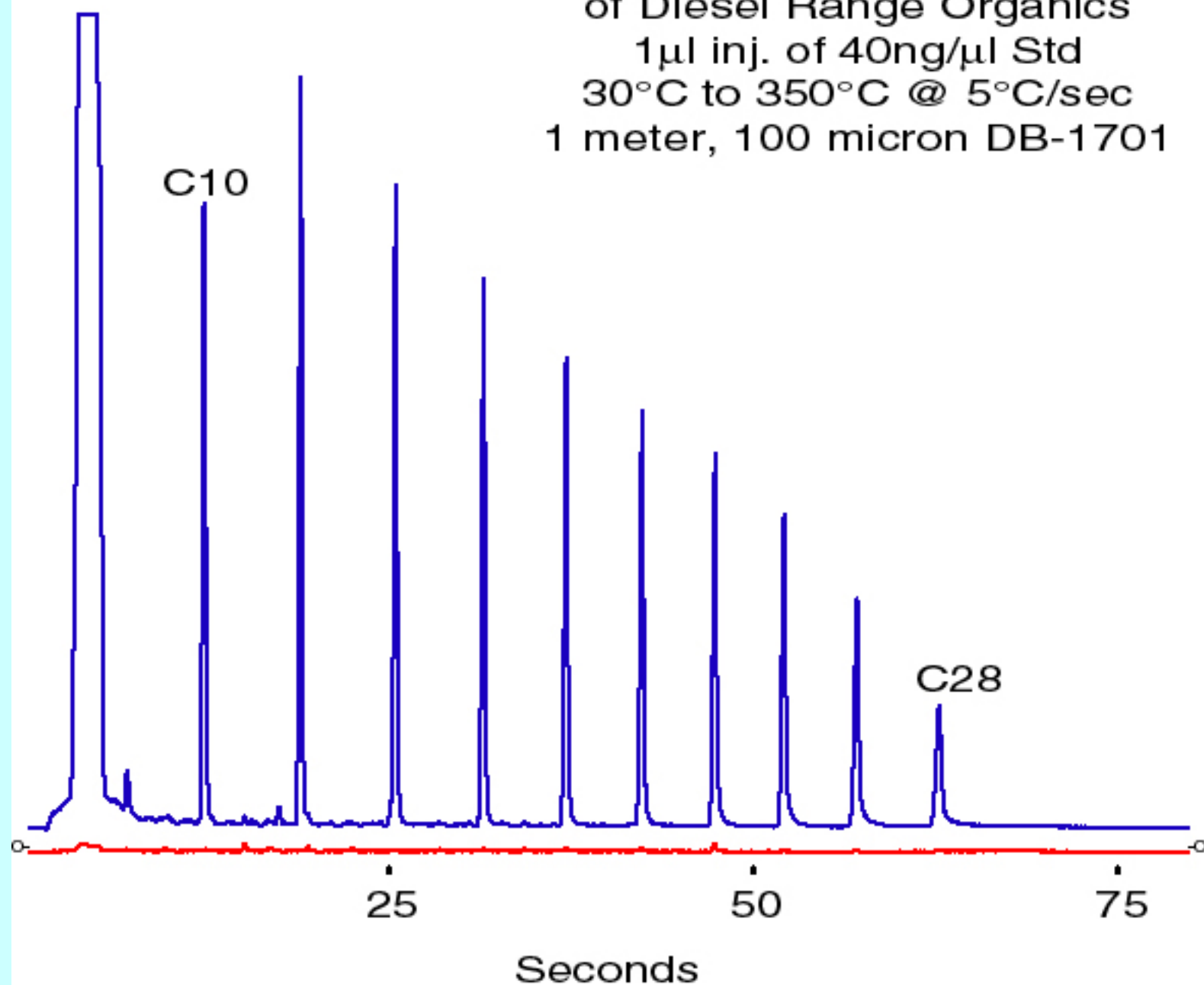
0 5 10 15 20 25 30 35 40
5°C/s

#1

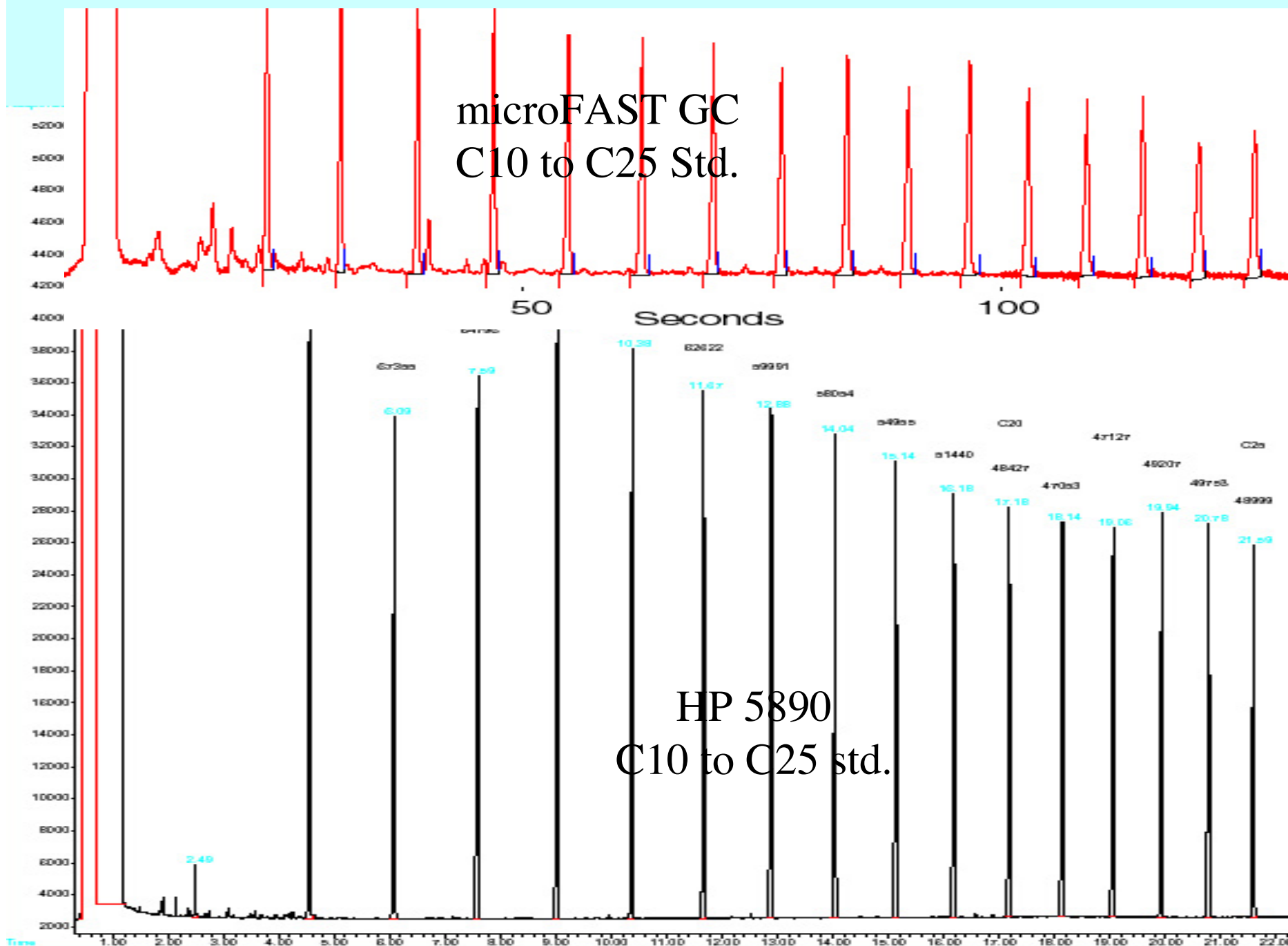
#3

20°C/s from 40°C to 250°C

microFAST GC Analysis
of Diesel Range Organics
1 μ l inj. of 40ng/ μ l Std
30°C to 350°C @ 5°C/sec
1 meter, 100 micron DB-1701

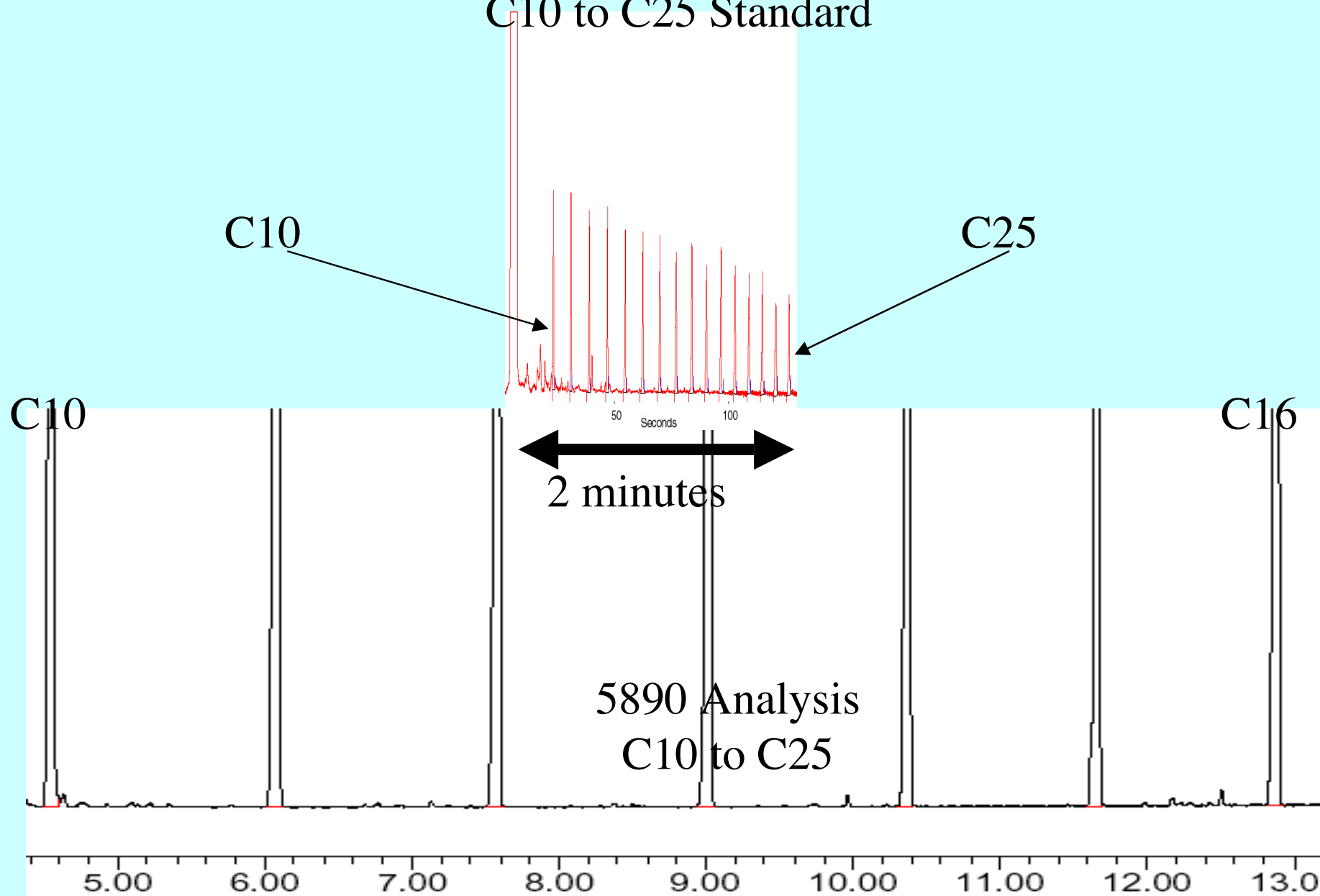


microFAST GC
C10 to C25 Std.

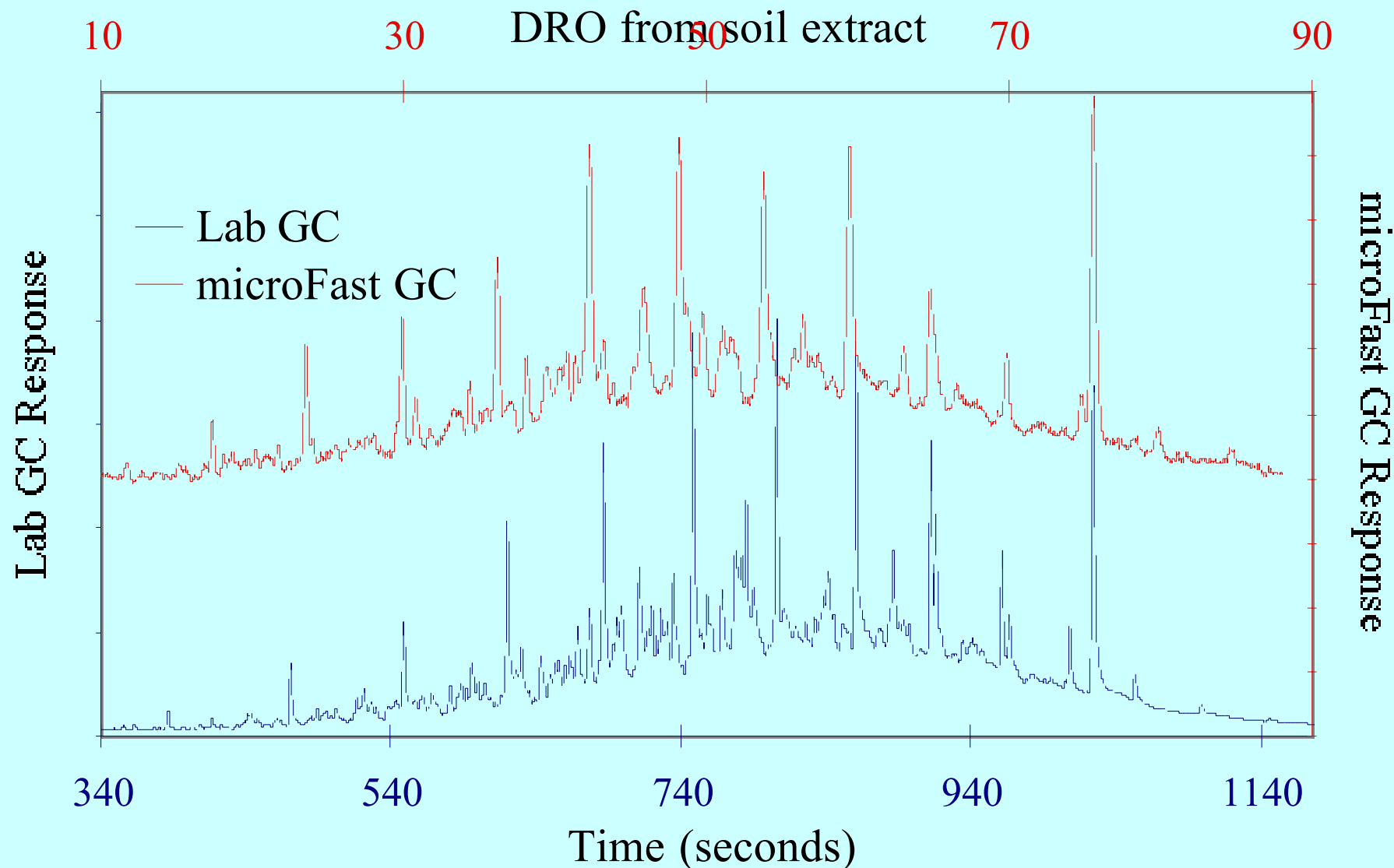


HP 5890
C10 to C25 std.

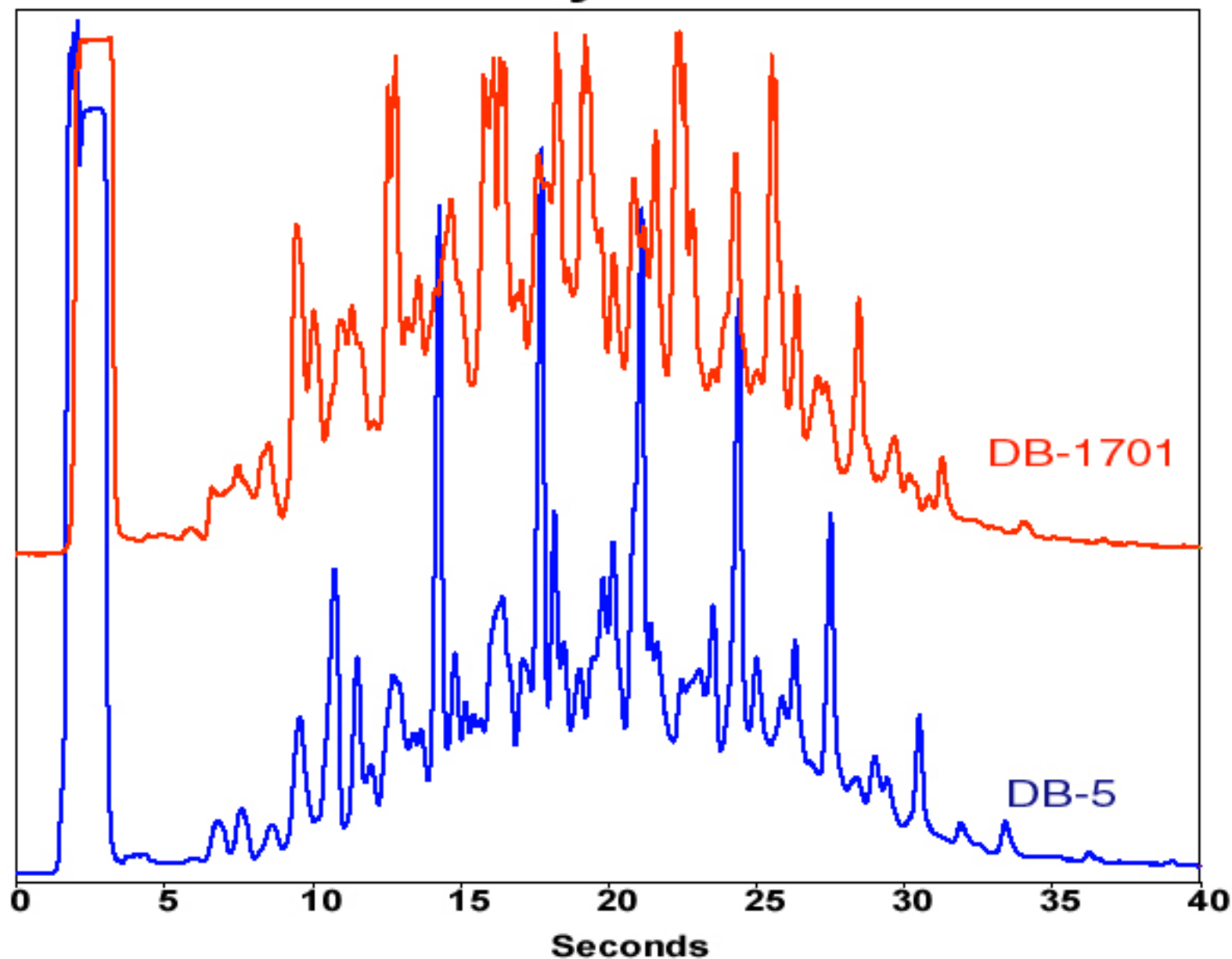
microFAST GC Analysis C10 to C25 Standard



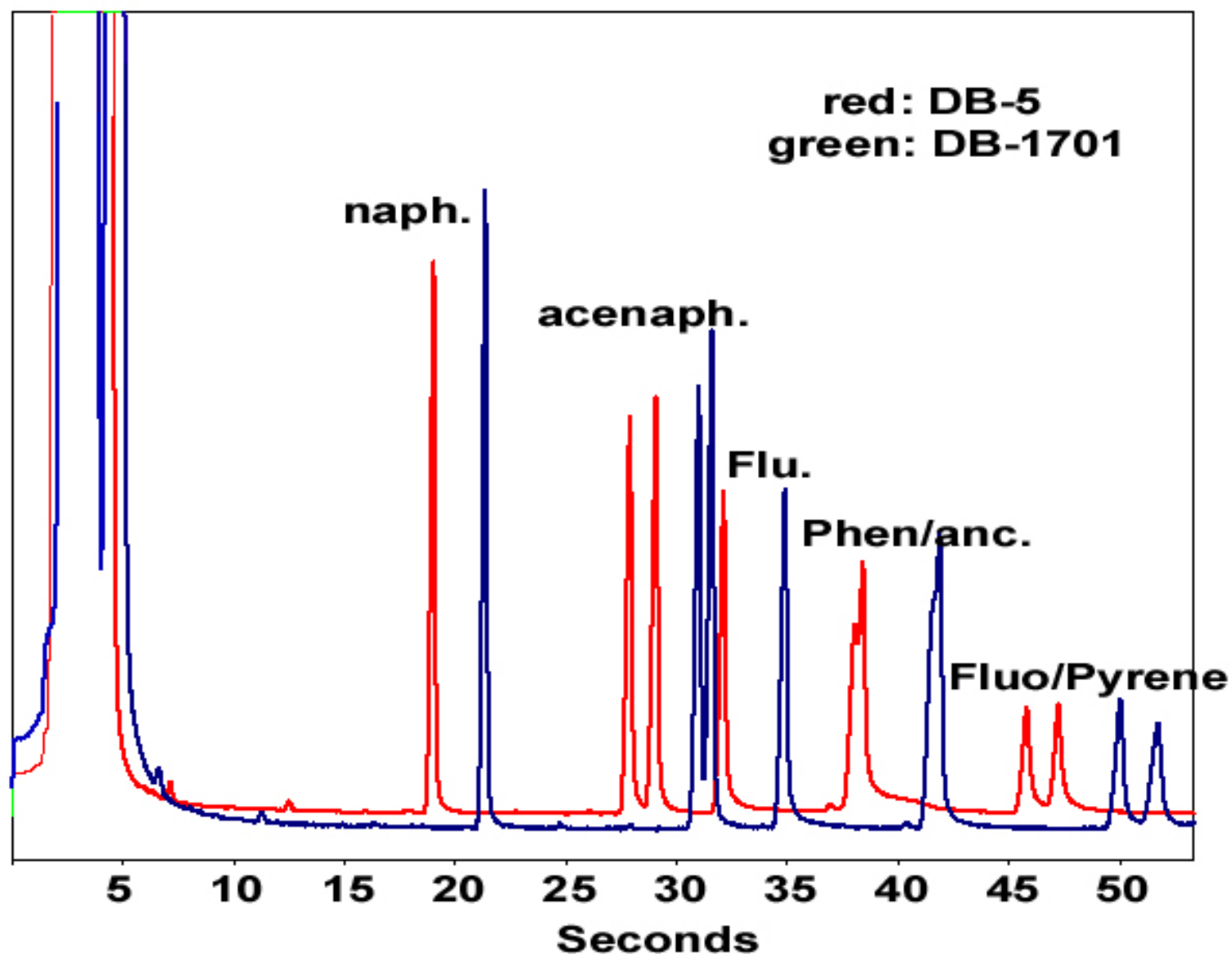
Conventional and Fast Chromatograms, expanded



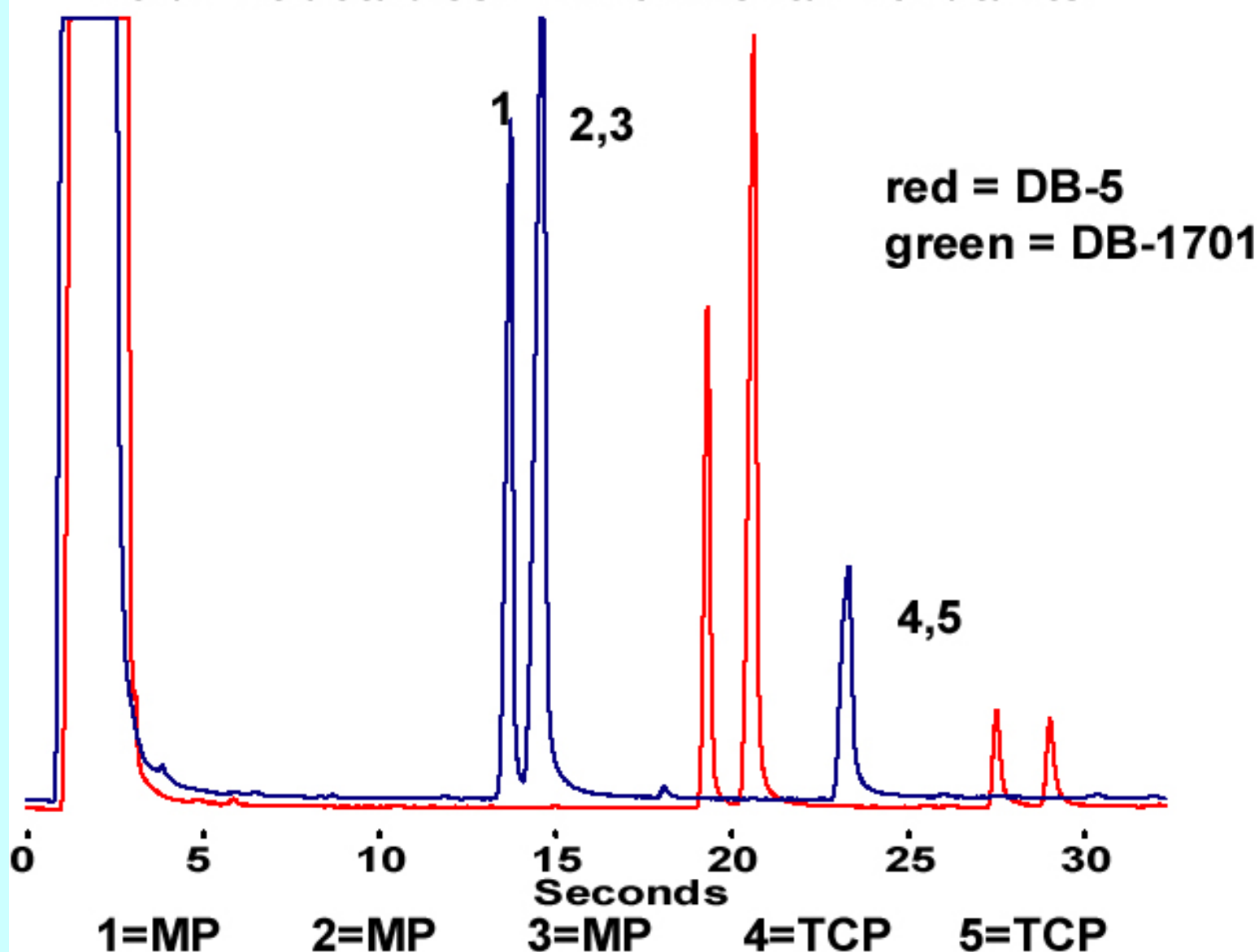
microFAST GC2: 40°C to 250°C @ 5°C/sec. Military Jet Fuel



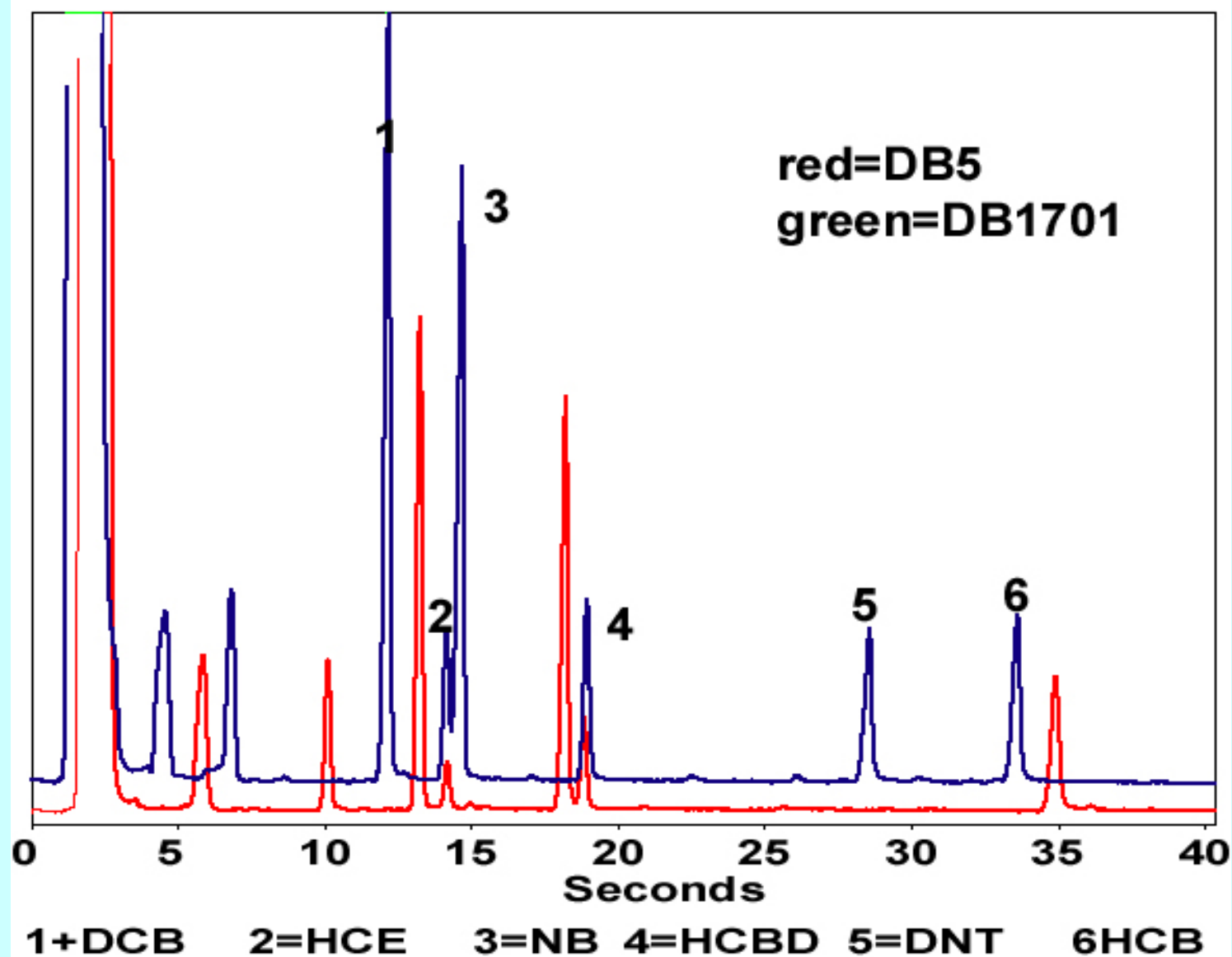
**microFAST GC2, 40°C to 290°C @ 5°C/sec.
PAH Standard**



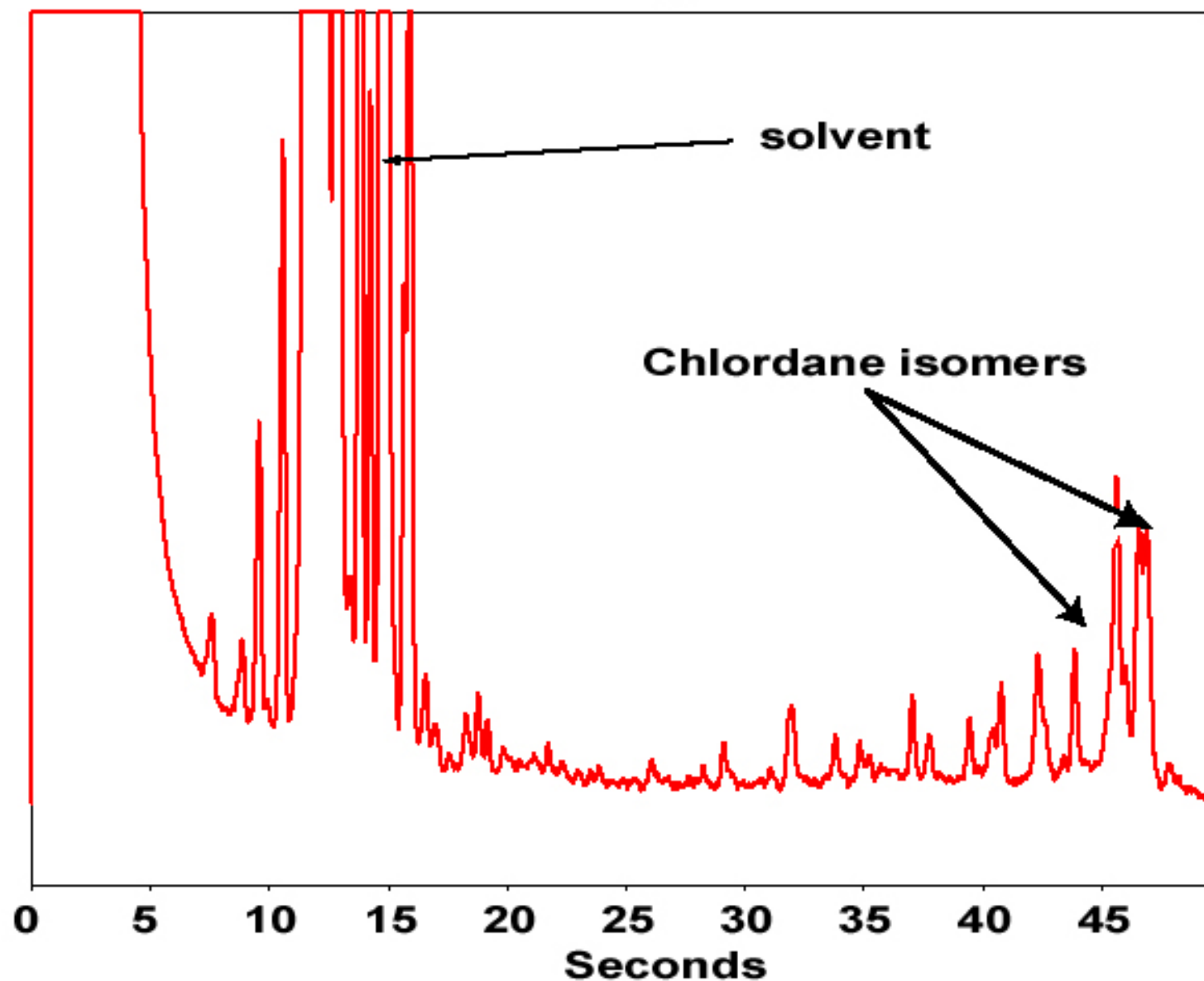
microFAST GC2 Analysis, 40°C to 250°C @ 5°C/sec
Acid Extractables Environmental Pollutants



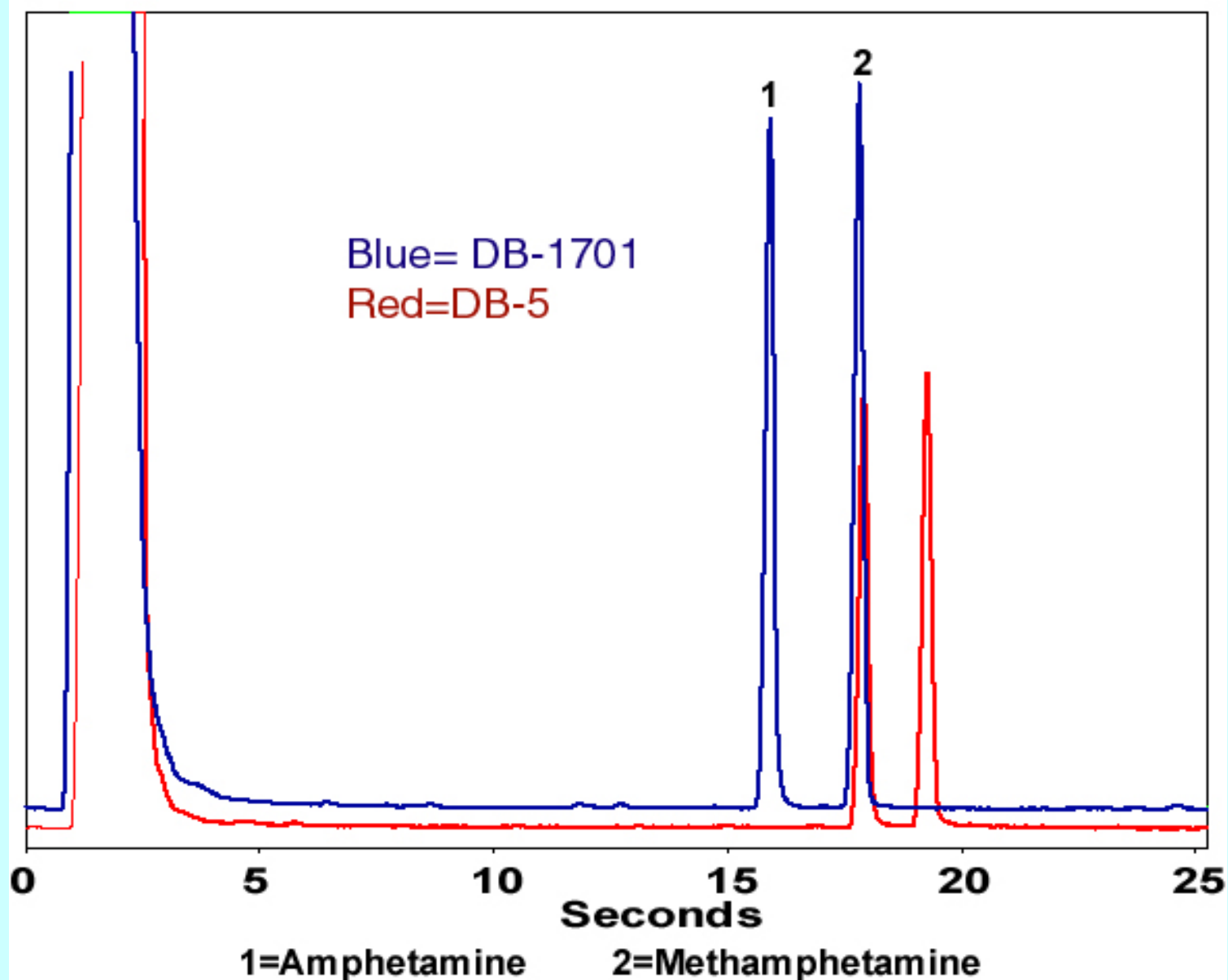
**microFAST GC2 Analysis, 40°C to 250°C @ 5°C/sec
of Base Neutral Standards**



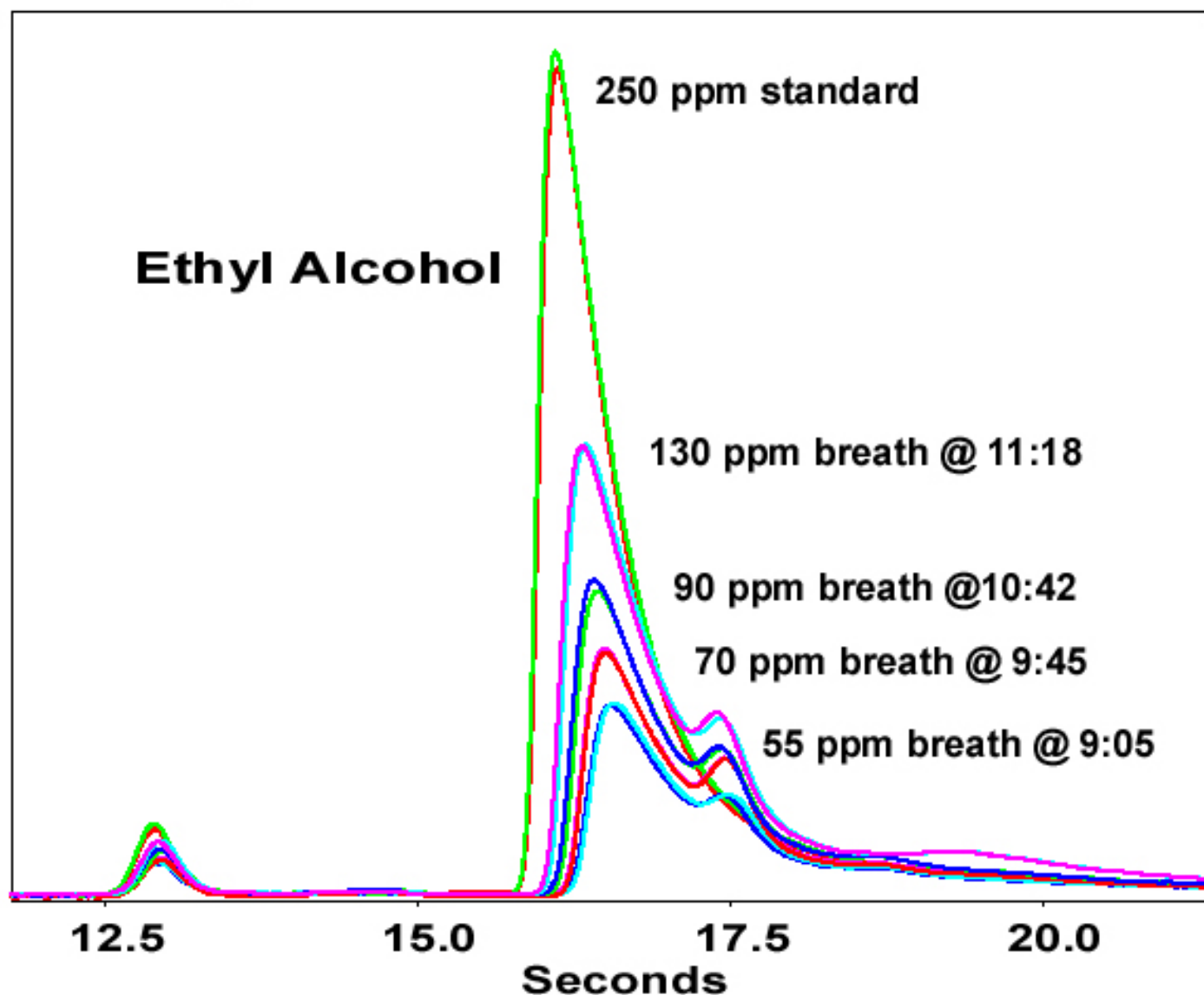
microFAST GC Analysis of Technical Grade Chlordane
40°C to 250°C @ 5°C/sec.



microFAST GC2 Analysis, 40°C to 250°C @ 5°C/sec

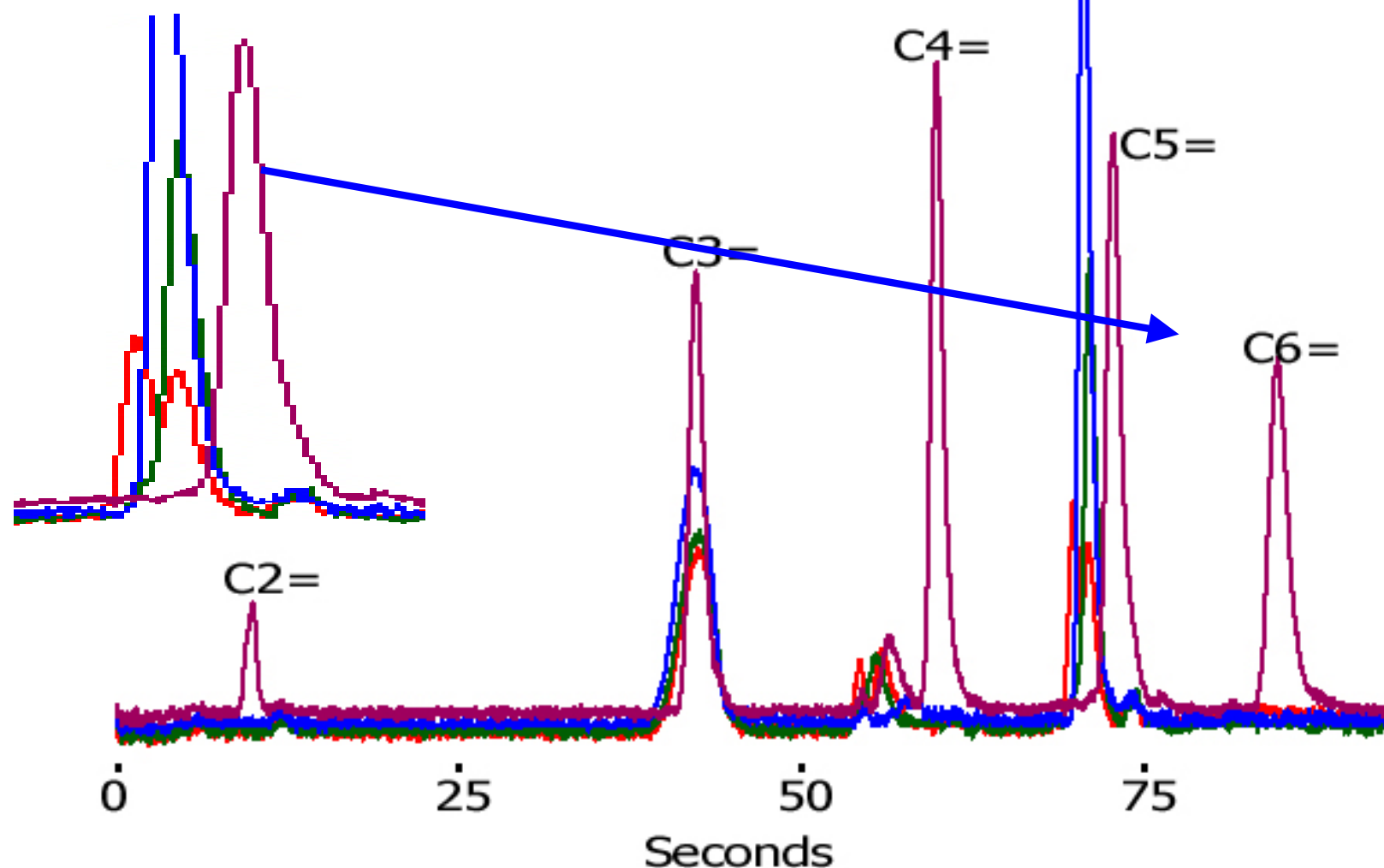


microFAST GC Analysis of Breath Alcohol Samples
30°C to 150°C @ 10°C/sec, 1m, 350 micron GSQ Column

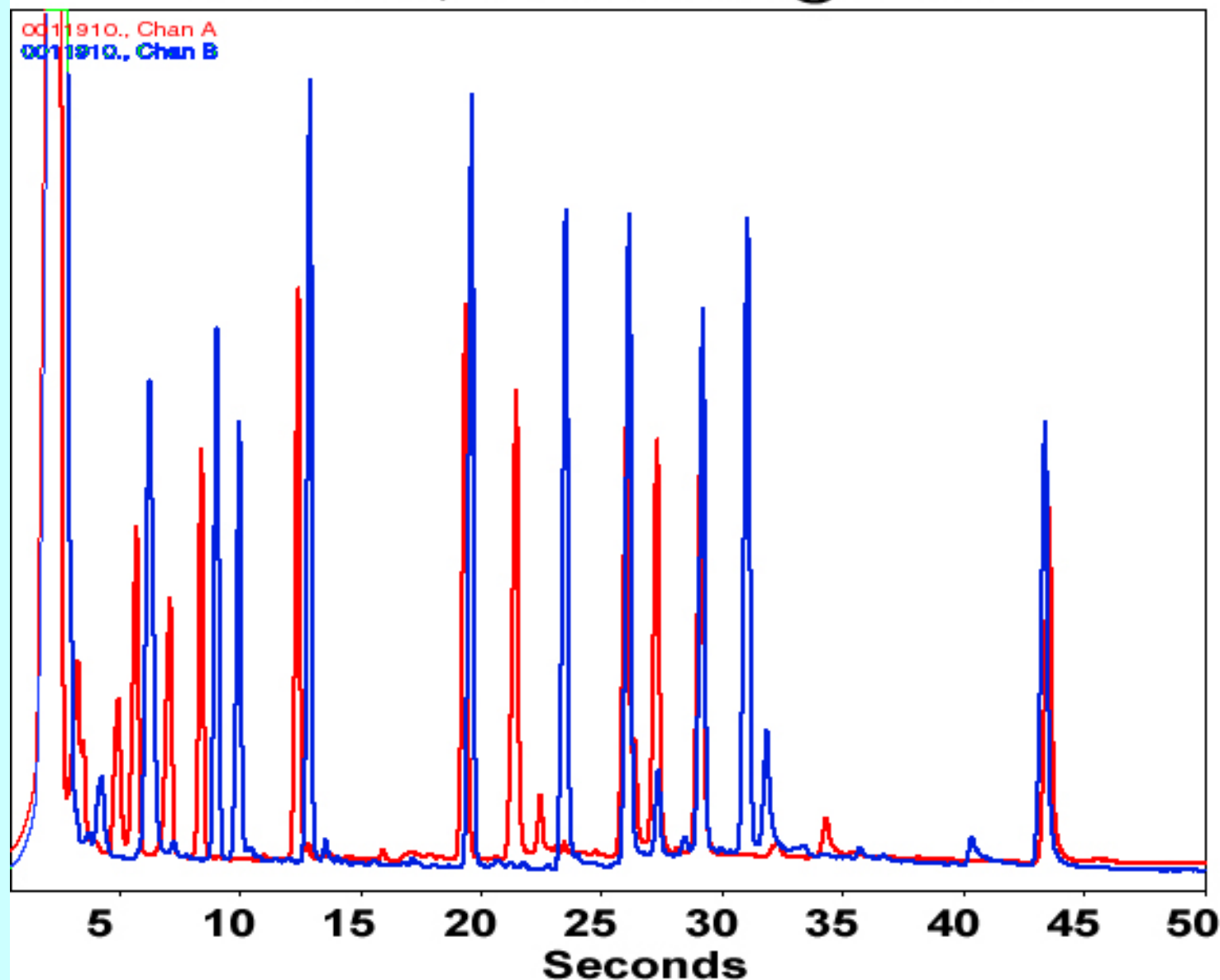


microFAST GC Analysis

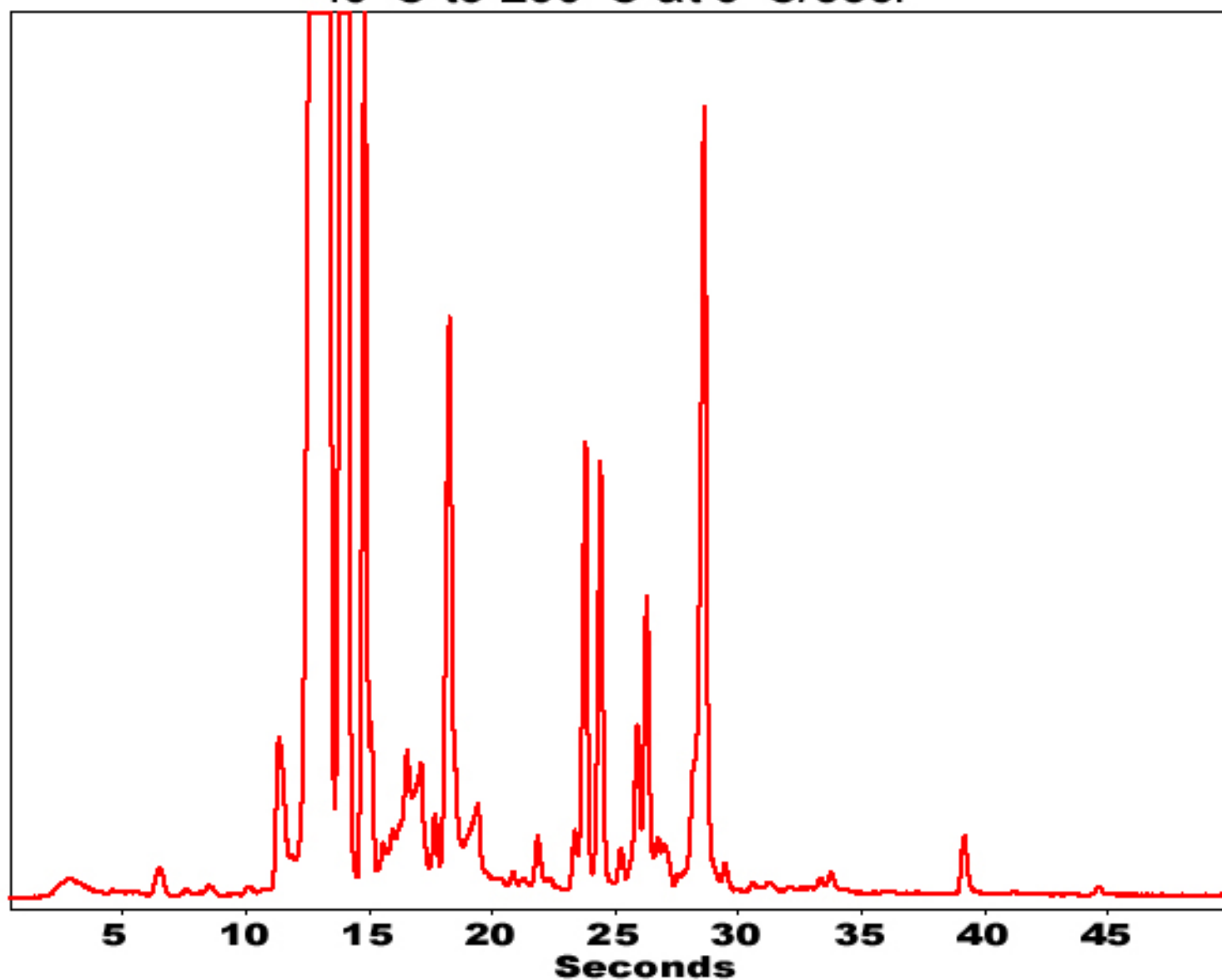
of 10 ml Alkene 250 ppb Std. (C2 to C6)
and 10ml Deep Breath Samples
taken from 3 Different Males



microFAST GC Analysis of Flavor Extract Std. 2 Columns, 40°C to 250C @ 5°C/sec



microFAST GC Analysis of SPME from Nestea Headspace
40°C to 250°C at 5°C/sec.

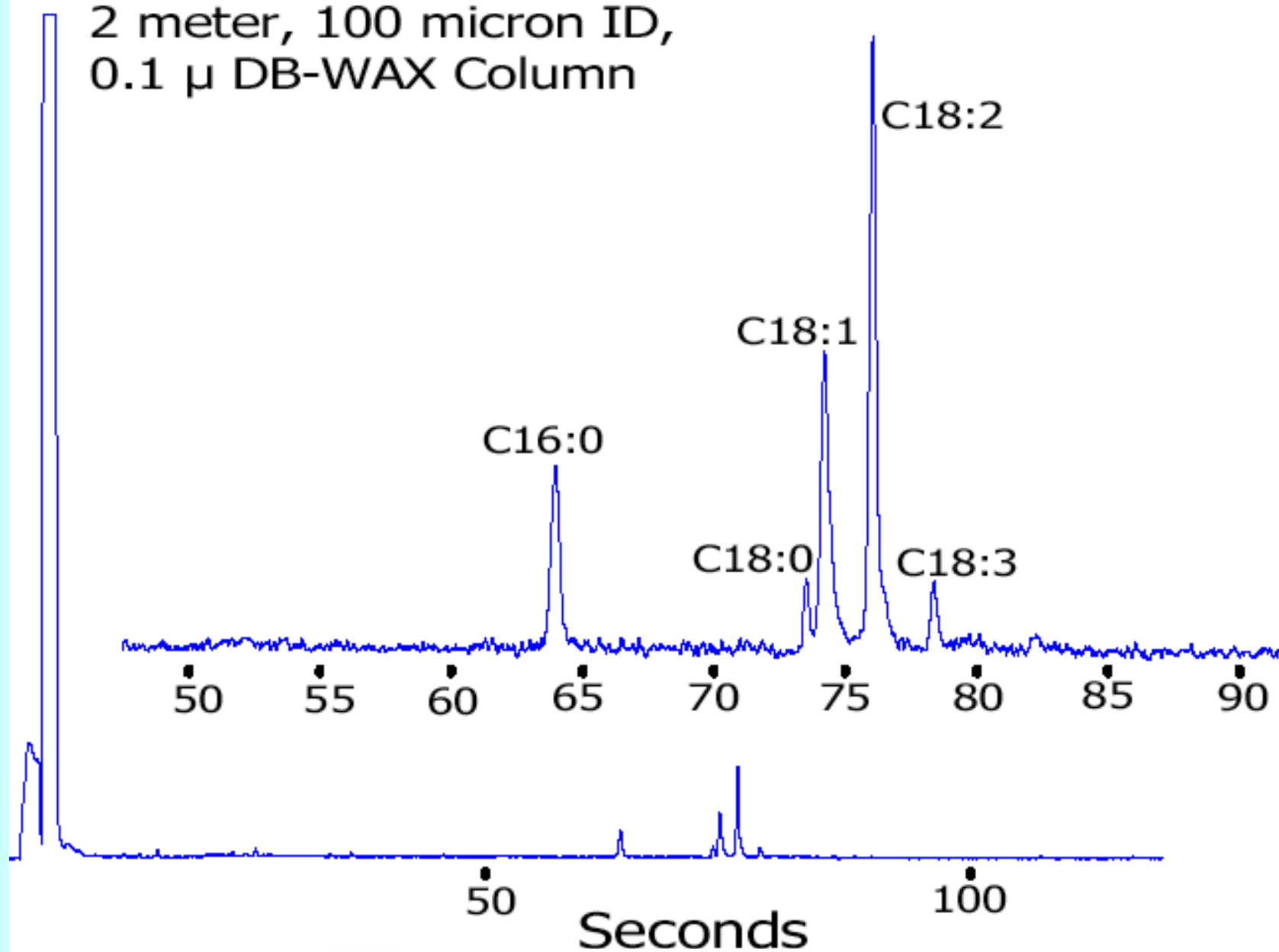


microFAST GC Analysis of FAME Standards

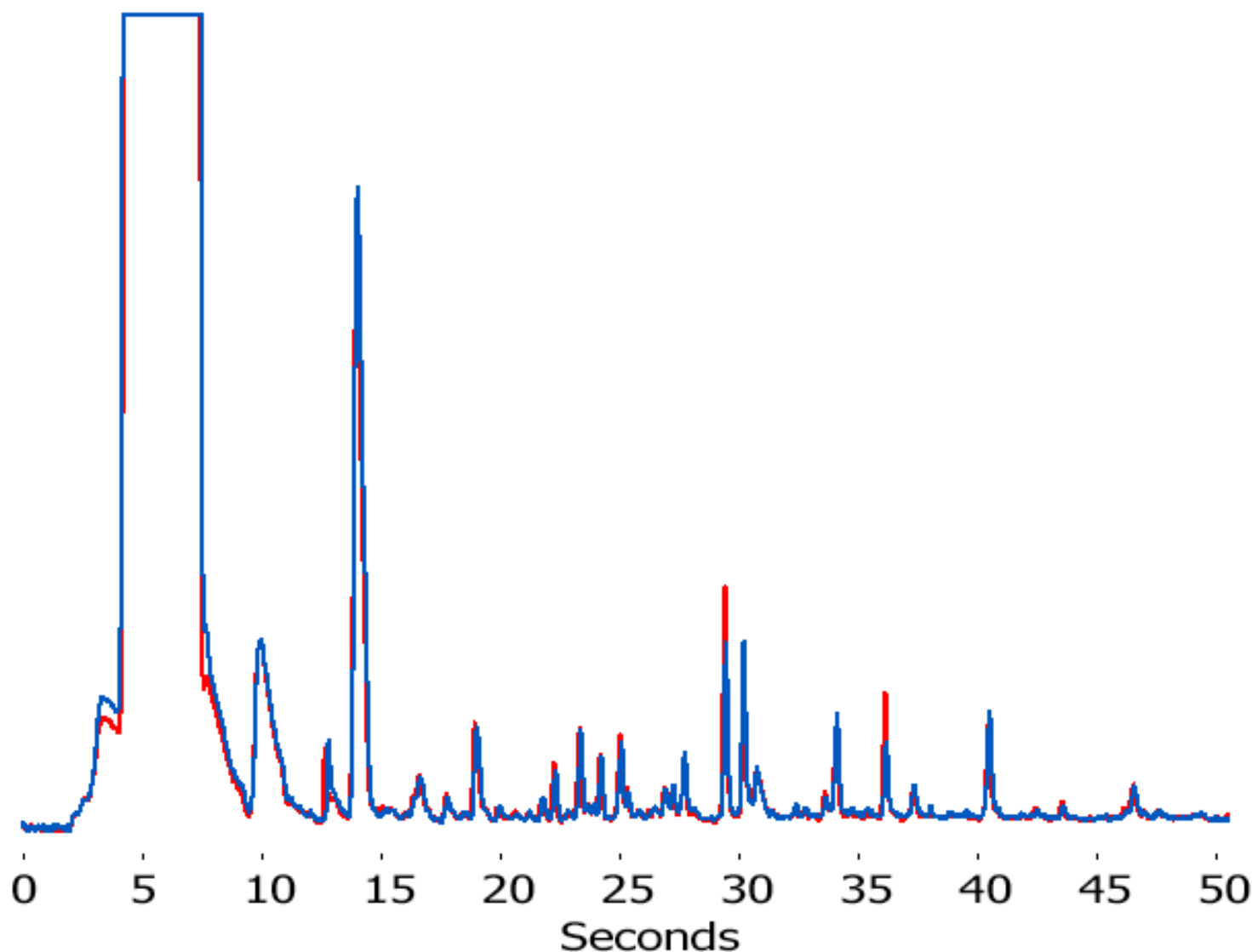
35°C to 250°C @ 5°C/sec., FID

2 meter, 100 micron ID,

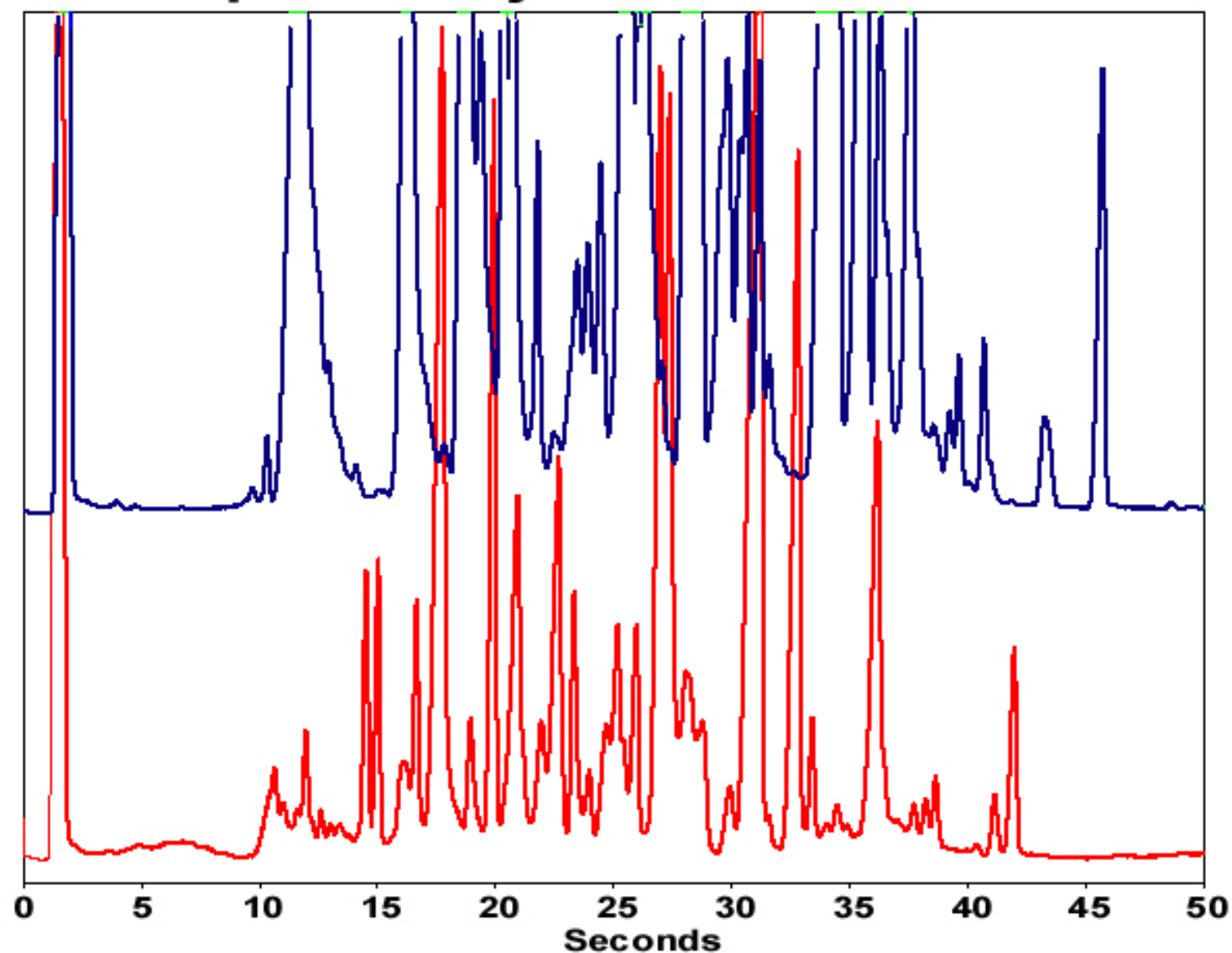
0.1 µm DB-WAX Column



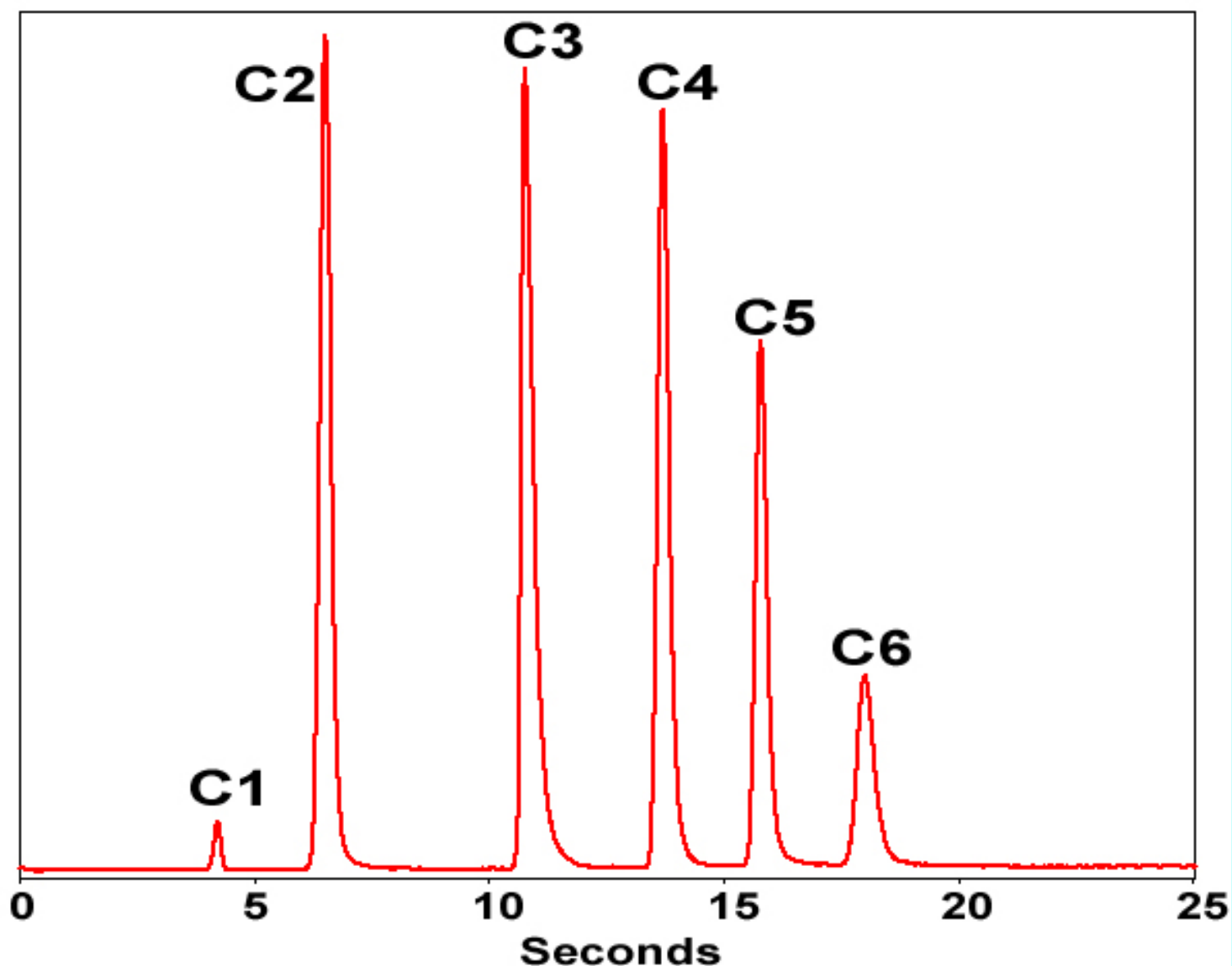
microFAST GC Analysis of Two .8 μ l neat Johnny Walker Red Samples
35°C to 260°C @ 5°C/ second, 2 meter, 100 micron OV1701 Column



**microFAST GC2: 40°C to 250°C @ 5°C/sec.
Direct Aqueous Injection of Oscar de Renta**

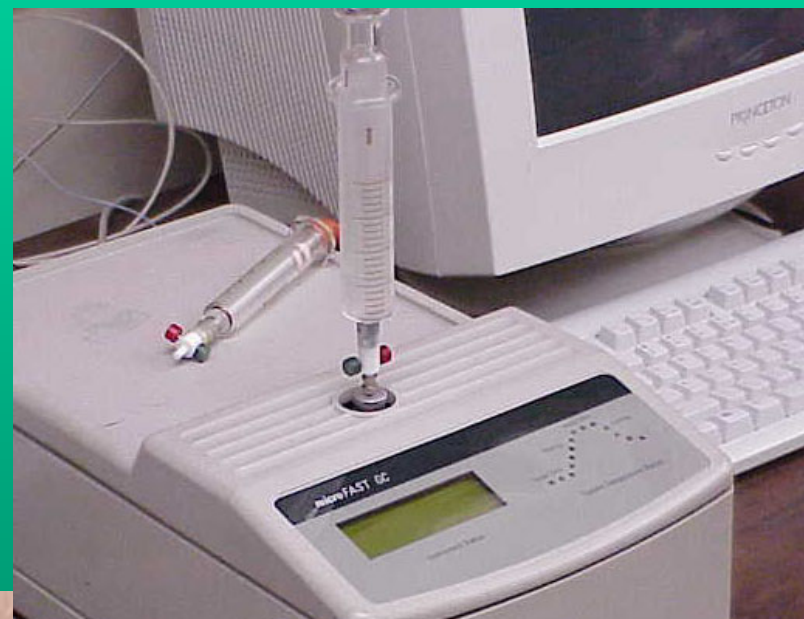


microFAST GC2 Analysis, 60°C to 240°C @ 20°C/sec.
PLOT Column., C1 to C6 Standard @ 100 ppm



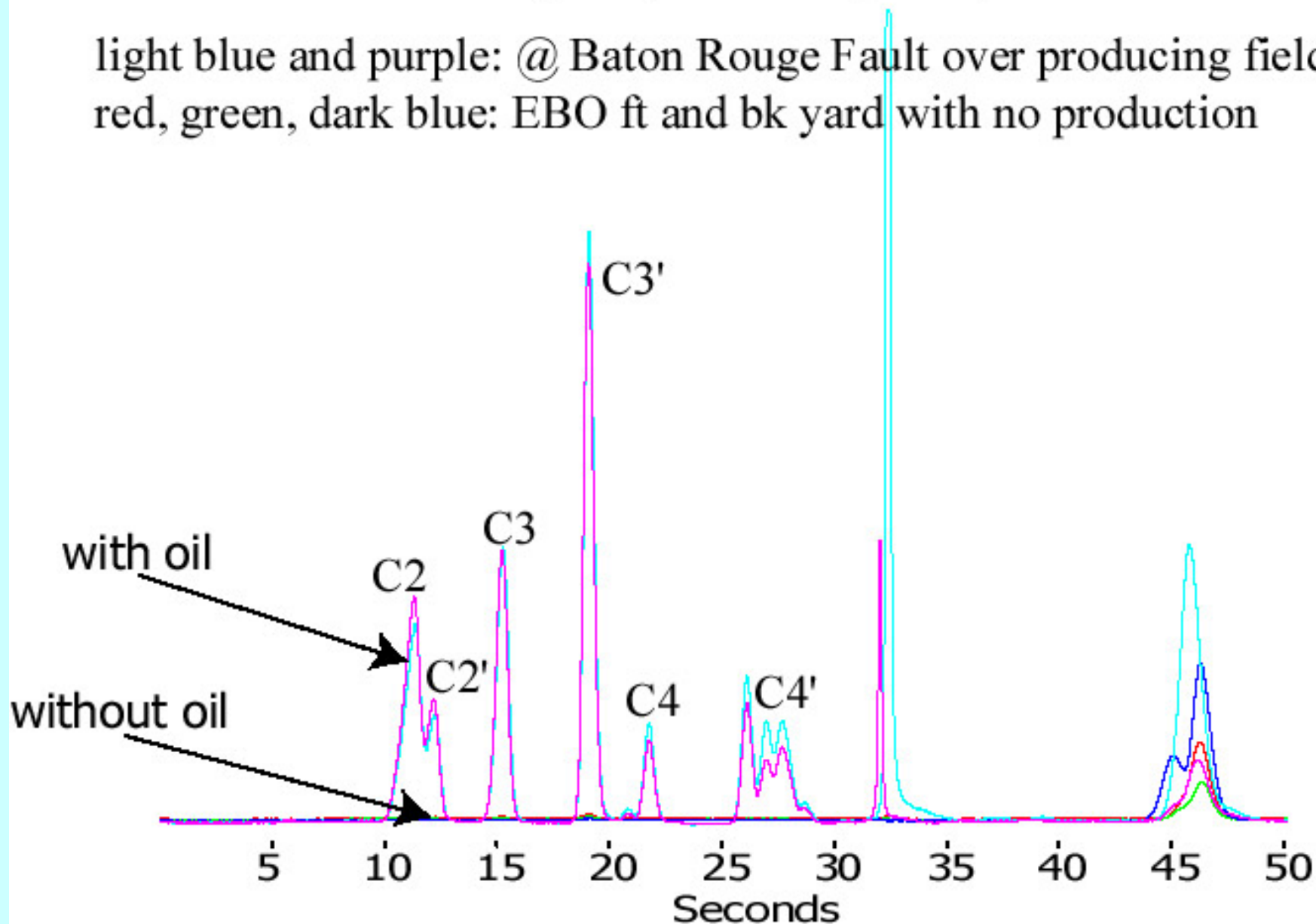
Soil Gas Sampling and Analysis

In
15 minutes
or less



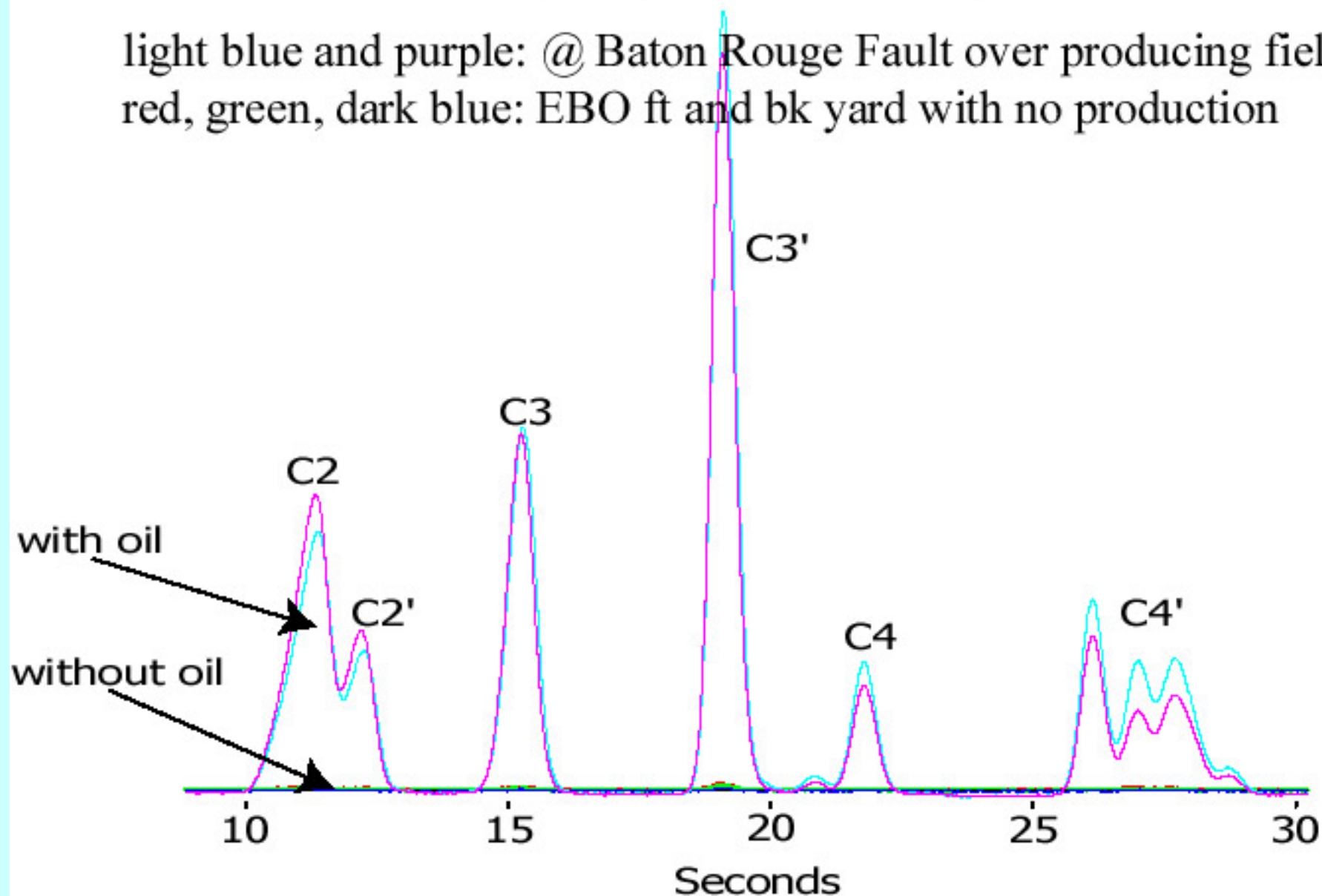
microFAST GC Analysis of 10 ml Shallow Soil Gas Samples 35°C to 260°C @ 5°C/sec, 1 meter, 320µ Gas Pro Column

light blue and purple: @ Baton Rouge Fault over producing field
red, green, dark blue: EBO ft and bk yard with no production

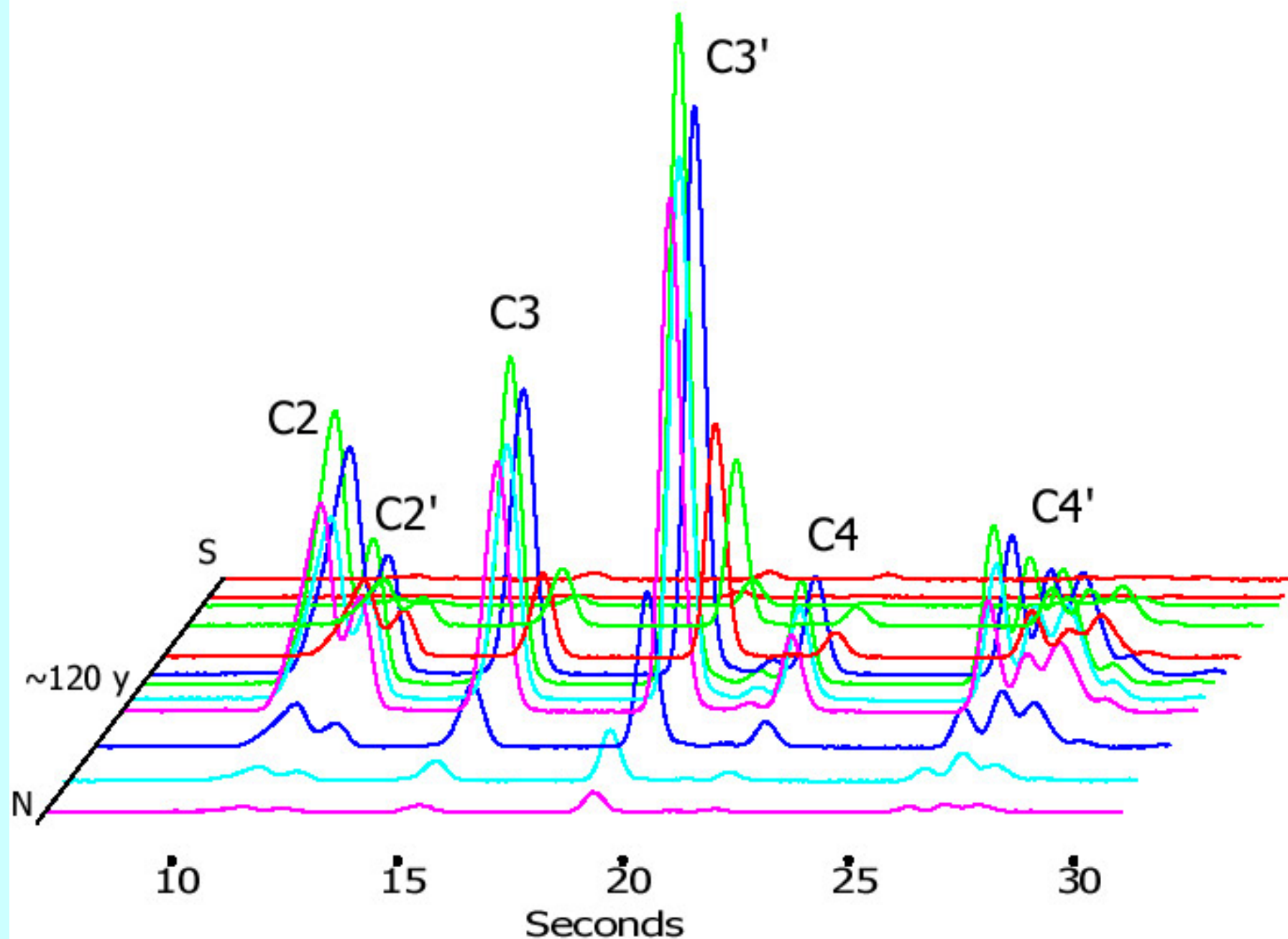


microFAST GC Analysis of 10 ml Shallow Soil Gas Samples 35°C to 260°C @ 5°C/sec, 1 meter, 320µ Gas Pro Column

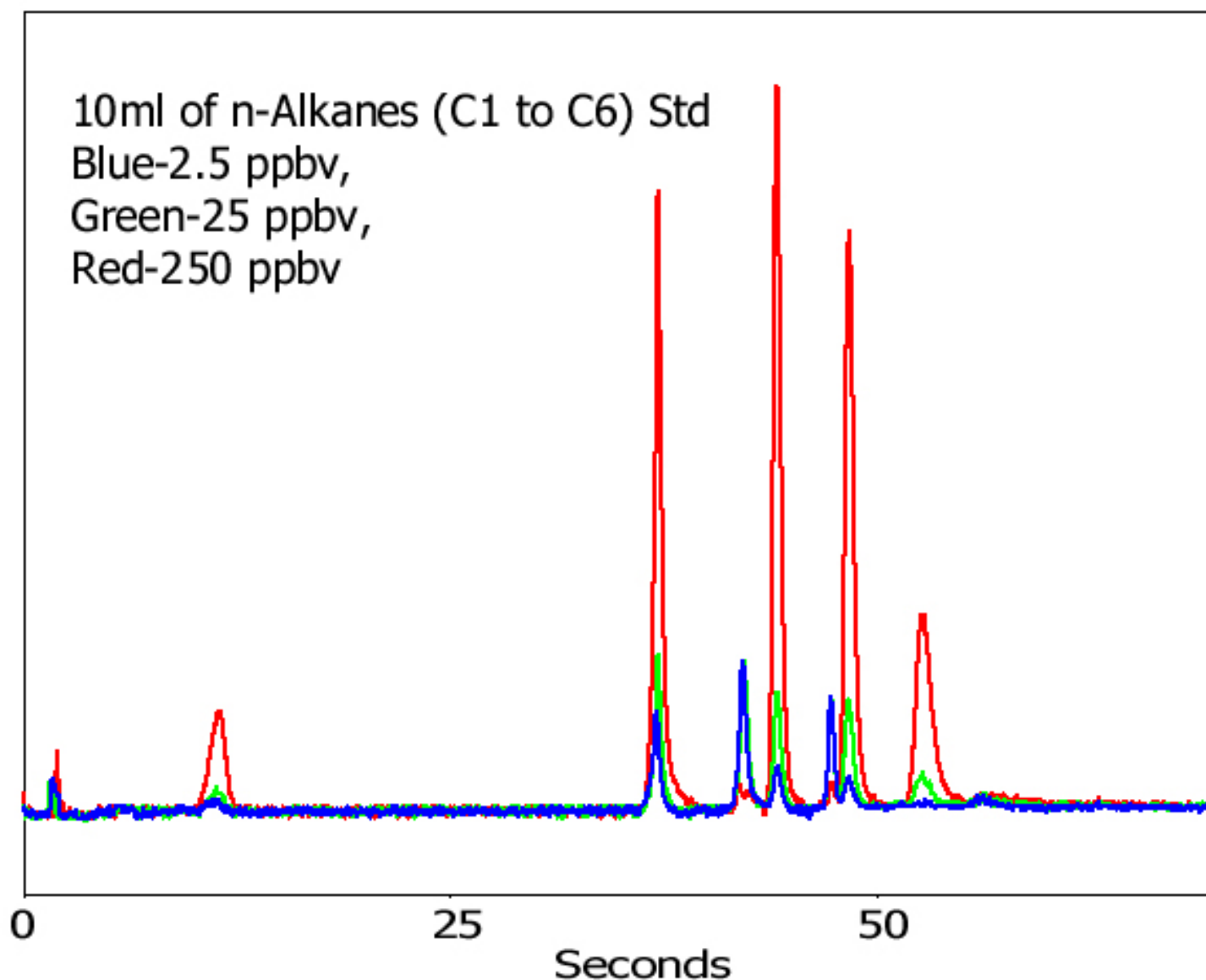
light blue and purple: @ Baton Rouge Fault over producing field
red, green, dark blue: EBO ft and bk yard with no production



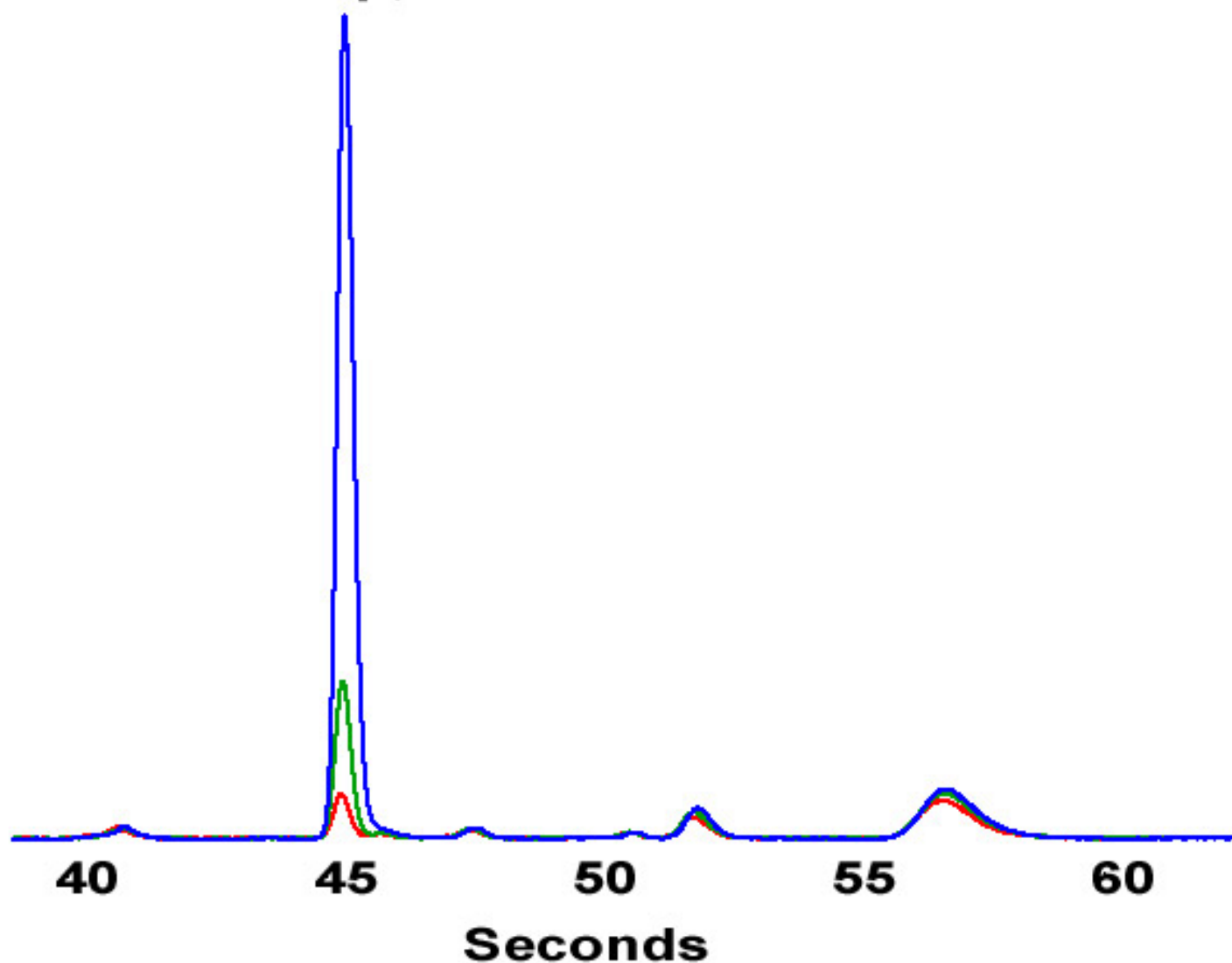
microFAST GC Analysis of Soil Gas Across Baton Rouge Fault



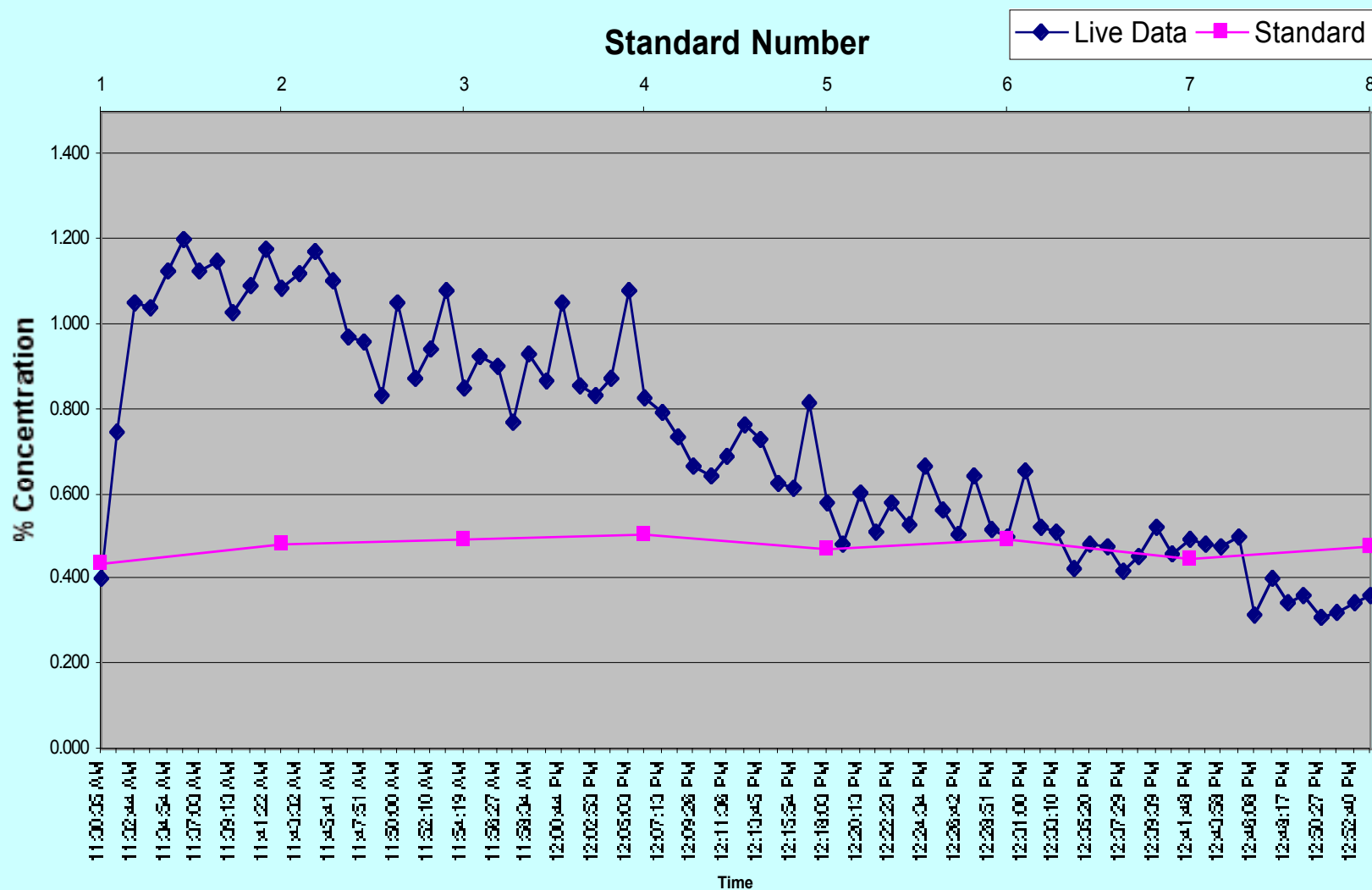
microFAST GC Analysis of Light Hydrocarbons



**microFAST GC Analysis of Vinyl Chloride in 5ml of air
@ 1000 (blue), 100 (green), & 10 (red) ppb
Sphercarb trap, 1m 320 micron GSQ Column**



Methane Time Series



microFAST™ GC

Used On-Site During
Benzene Pipeline Spill
July '01, Geismar LA





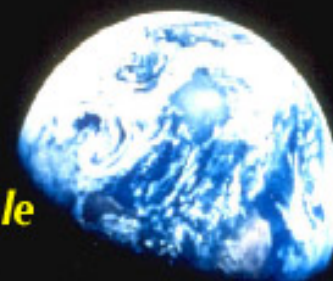
microFAST™ GC
Used On-Site During
Oil Pipeline Spill
June '01, Mosquito Bay LA

μF^{TM} GC

rapid, low ppb level analysis
used on-site to assess office air quality
in downtown Washington DC Building
January '02



- * *up to 25°C / sec. temp. prog. rate*
- * *fast volatile and semivolatile analyses*
- * *versatile sorbent trap based injection system*
- * *small footprint with low power & carrier gas consumption*
- * *for field or laboratory use, unattended operation, autosampler available*



microFASTGC

by Analytical Specialists Inc.

fast

small

versatile

the
"can do" GC



anytime anyplace anything

Houston: 'problem solved'

the **microFAST GC**
by ASI



**small
fast
versatile**



- **volatiles and semivolatiles**
- **fast temperature programming ($>20^{\circ}\text{C/s}$)**
- **multifunctional sorbent based trap injector**

fastest, most versatile GC available today

microFAST GC

**use anywhere
at anytime
for anything**



- fast temperature programming (1° to 25° C/ second)
- analyze both volatile and semivolatile compounds
- versatile sample inlet for gases and liquids
- small size, low power and gas usage
- dual column with flame ionization detection
- analysis at point of sample collection

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