Overview

Of

Green House Gas (GHG) Analyzer

Darren Johnston
Chromatography Specialist
Scion Instruments Canada Limited

Scion Instruments Canada Limited (SICL)

- Scion – A descendant from a notable family
- Our mission is to offer comprehensive and innovative solutions composed of high quality products, services and parts.
- Support of existing legacy Varian/Bruker systems and provide a modern upgrade path.

History of Scion Instruments GC Product Line

SCION INSTRUMENTS CANADA

"Aerograph"

3700 GC

3400/3600 GC

Star WS

3800, CP-84x0

Galaxie™

450/430-GC

Bruker 400-GC series

Scion Instruments 400 GC Series

50-60's | 70-80's | 1990's | 2000's | 2010's | 2014+

Wilkins Instruments 1956

22b 767 326 V 2997 VARIAN associates

VARIAN

VARIAN Now a part of Agilent Technologies

BRUKER

Techcomp

SCION INSTRUMENTS

History of SCION GHG analysis

SCION INSTRUMENTS CANADA

1. 1991 - Original GC GHG design
   - Ambient N_2O, manual injection

2. Single oven, modern GHG triple detector with backflush to vent
   - Ambient CO_2, CH_4, N_2O < 3mins
   - Automated with Exetainers vials and CombiPAL
   - SF_6 < 5mins

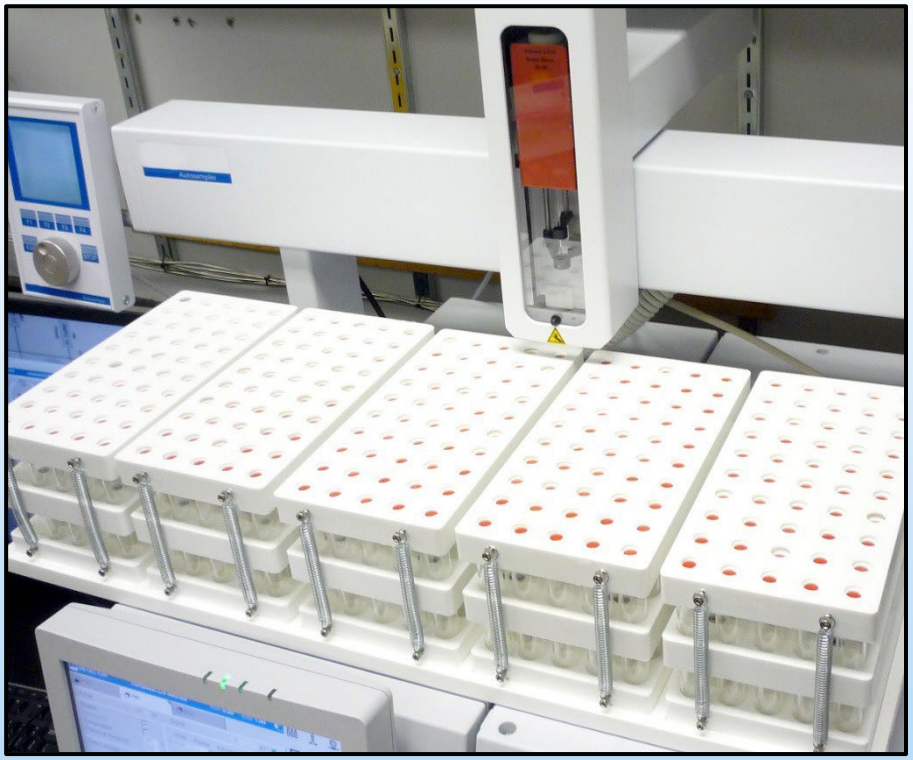
3. Dual ovens, extended applications capabilities
   - H_2, O_2, N_2 with series bypass
   - C_2H_4, C_2H_6, C_2H_2

4. 2017 – Faster analysis, lower cost of operation
   - H_2 and Ar optional replacements for He and Ar/CH_4
   - Automated purged sampling system
   - <2 mins Run2Run!

Scion Instruments GHG Analyzer Overview

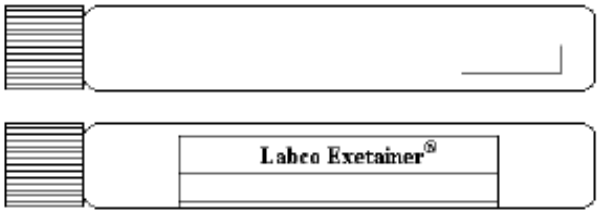
Automated Gas Autosampler for Labco Exetainer Vials

SCION INSTRUMENTS CANADA



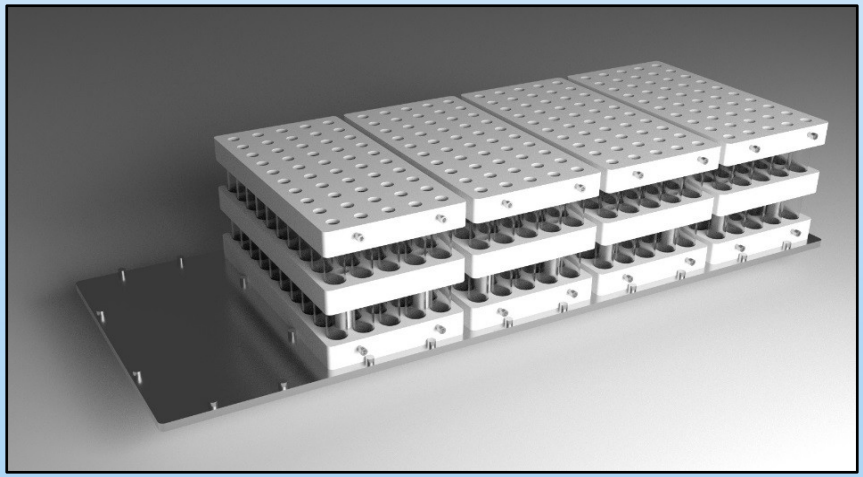
- Capacity 5 x 50 Exetainers
- Rigid high density plastic trays
- Aluminum trayholder
- Three level trays with spring locking mechanism
- Fits Historical Varian Trays

12ml Soda Glass Vials - Flat Bottomed



Case Quantity: 1000 Vials - Minimum Order: 1 Case

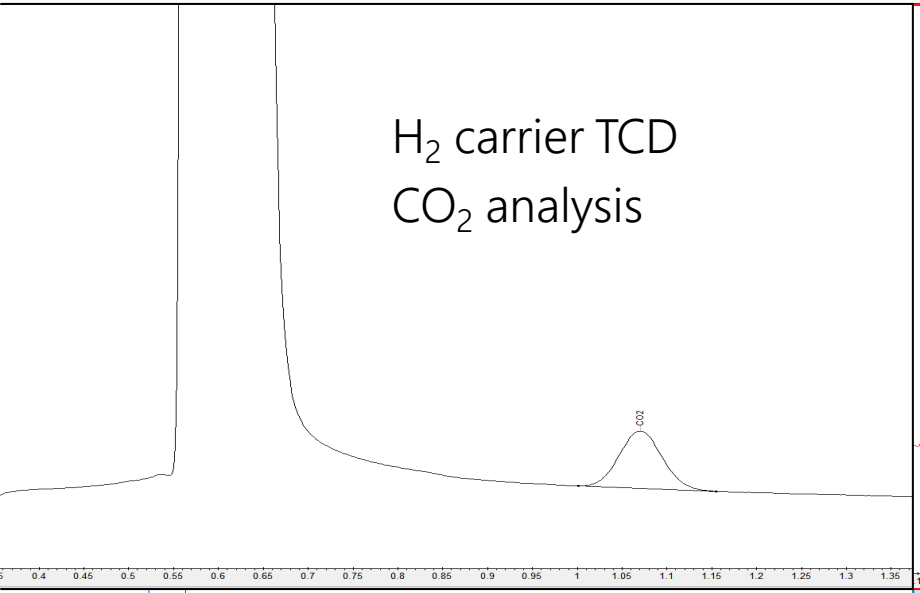
Order Code	Description
738W	Non - Evacuated, No Label, White Cap
739W	Non - Evacuated, Labelled, White Cap
838W	Evacuated, No Label, White Cap
839W	Evacuated, Labelled, White Cap

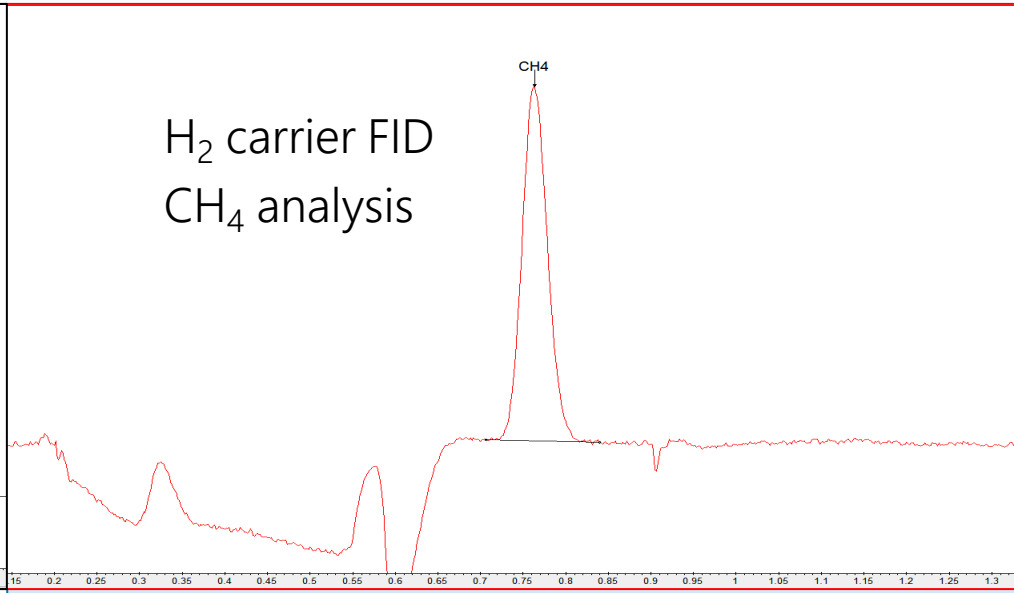


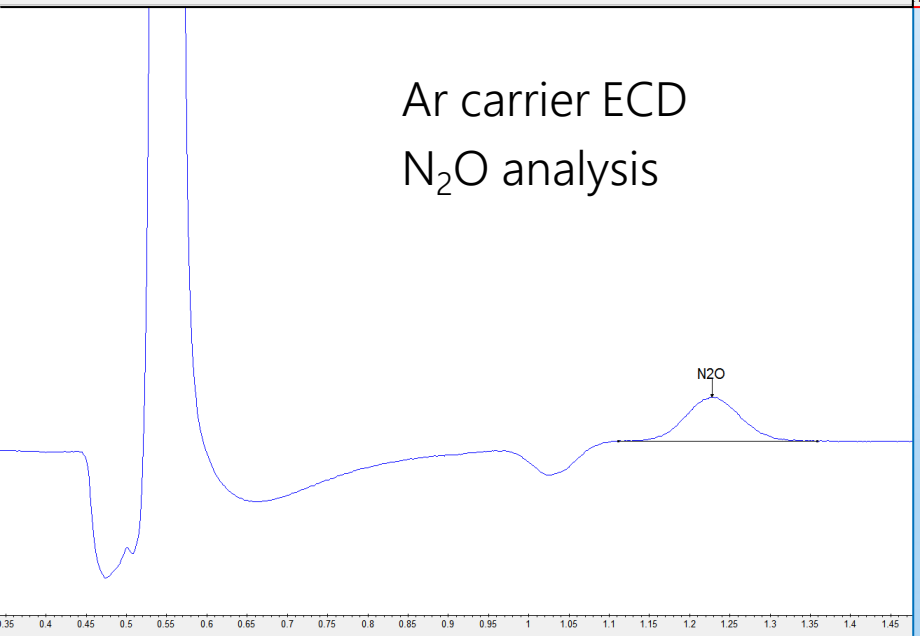
Specifications:

- Integrated Design compatible with Scion Model 8500 Gas Chromatograph
- Software Control Driver for Compass CDS (Version 4.1) Chromatography Data handling Software
- Compatible with 12ml or 6ml Labco Exetainer Vials
- Maximum Injection Volume capable to 2.5mL of headspace.
- Syringe only concept – no transfer lines
- Mounting Hardware, Interface Cabling for Scion Bruker, Varian Gas Chromatographs
- (Optional) - 1ml, 2.5 ml and 5 ml Syringe
- (Optional) - Magnetic Vial Transport System
- 120V – 60 Hz (CSA Approved)

8500 GHG Analyzer Data Overview



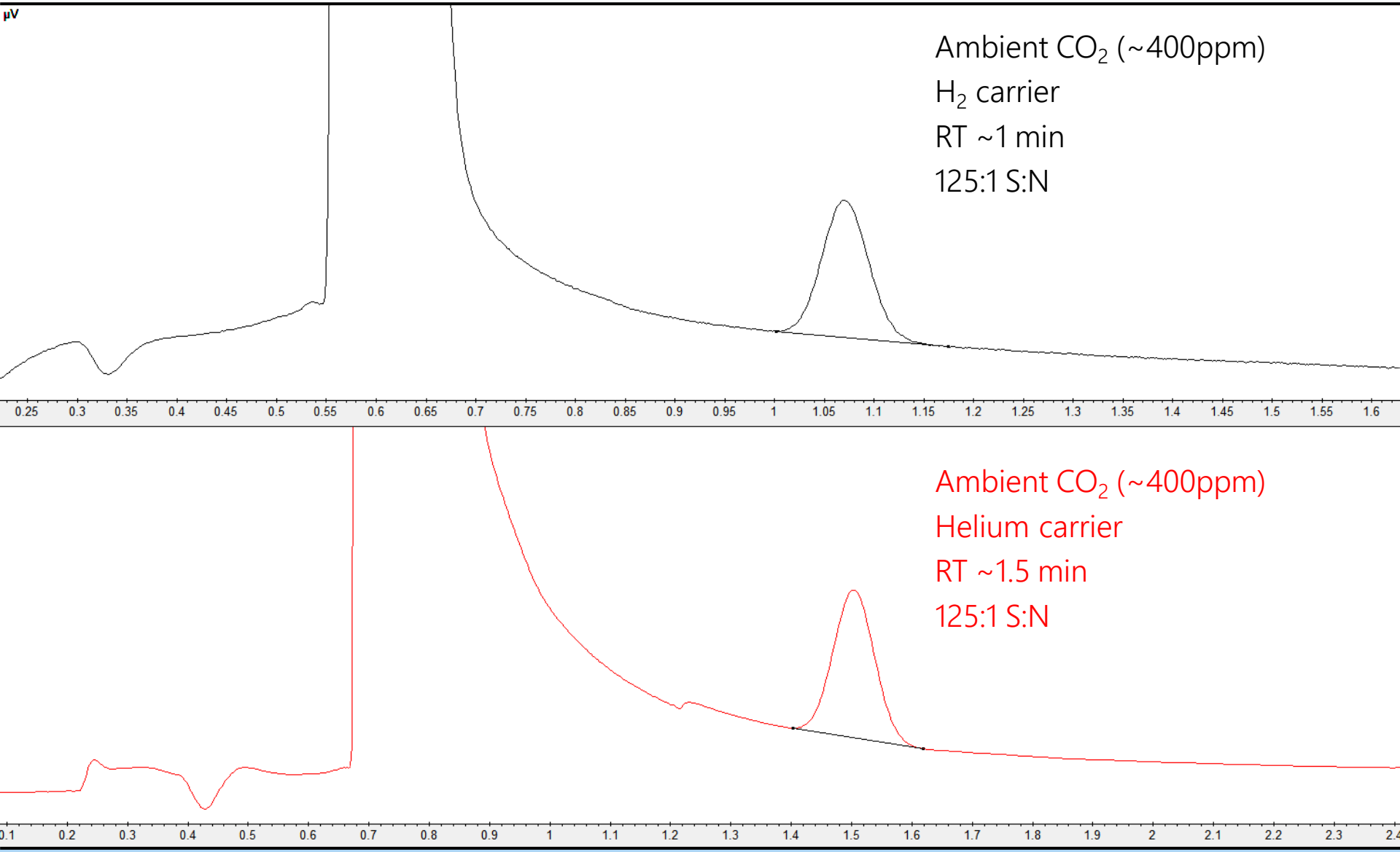




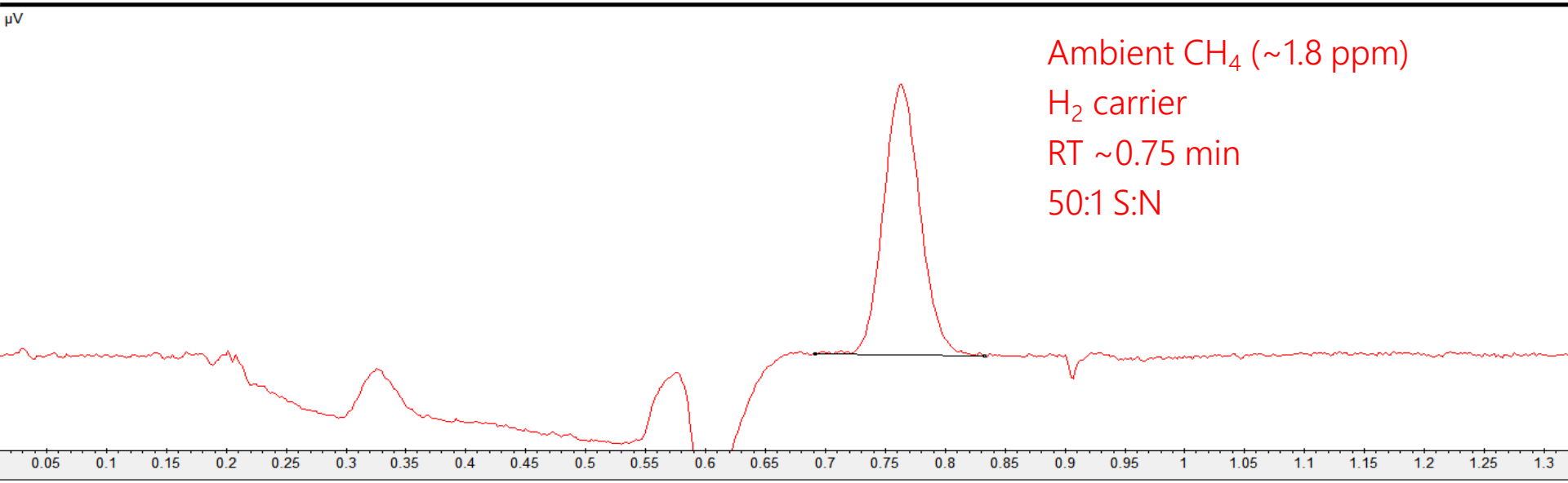
- Automation with Exetainers
- H_2 & Argon Carriers
- Easily Achieve 10X below Ambient concentrations
- Automated 3 channel batch report
- Printed or export to LIMS

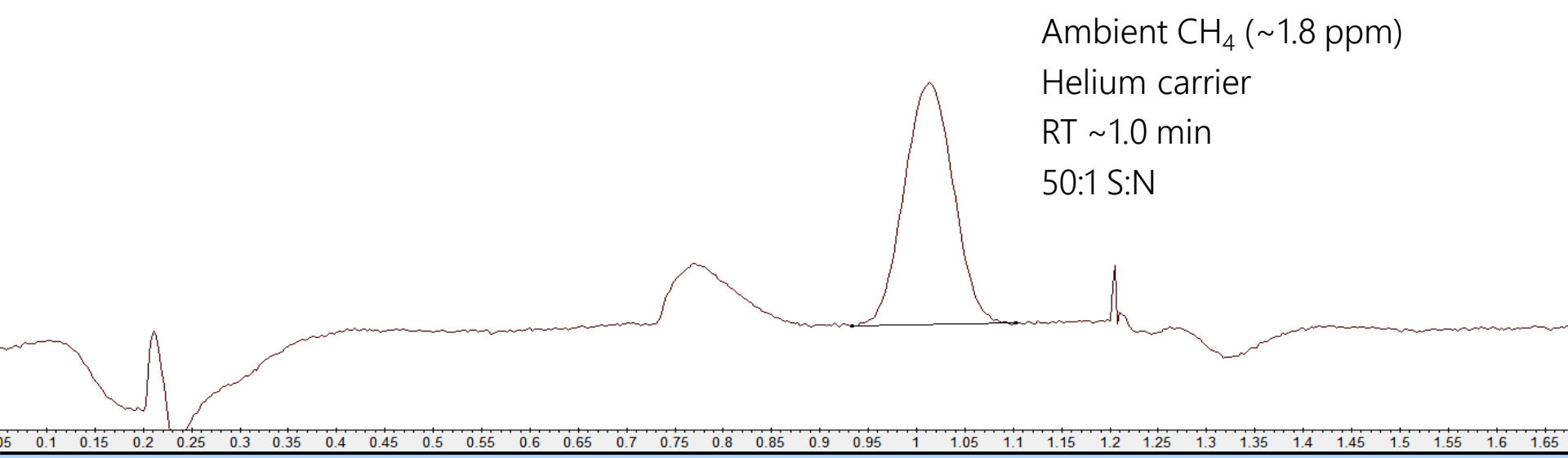
All 3 peaks elute in <1.6 mins!

TCD channel – H_2 vs He carrier

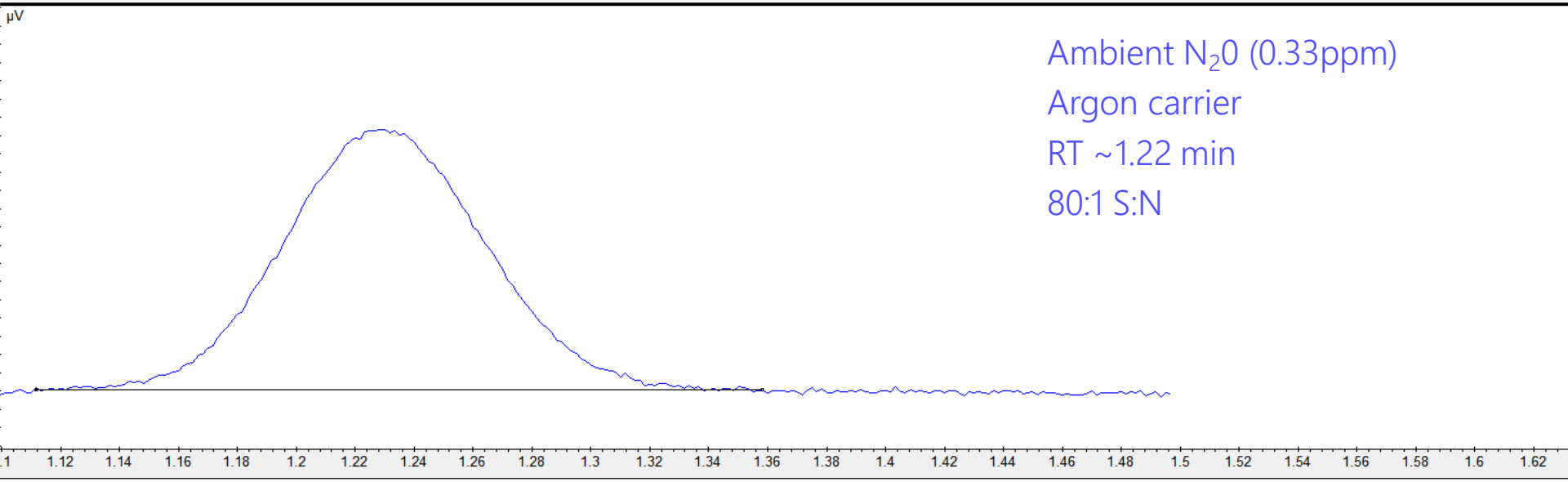


FID channel – H_2 vs He carrier

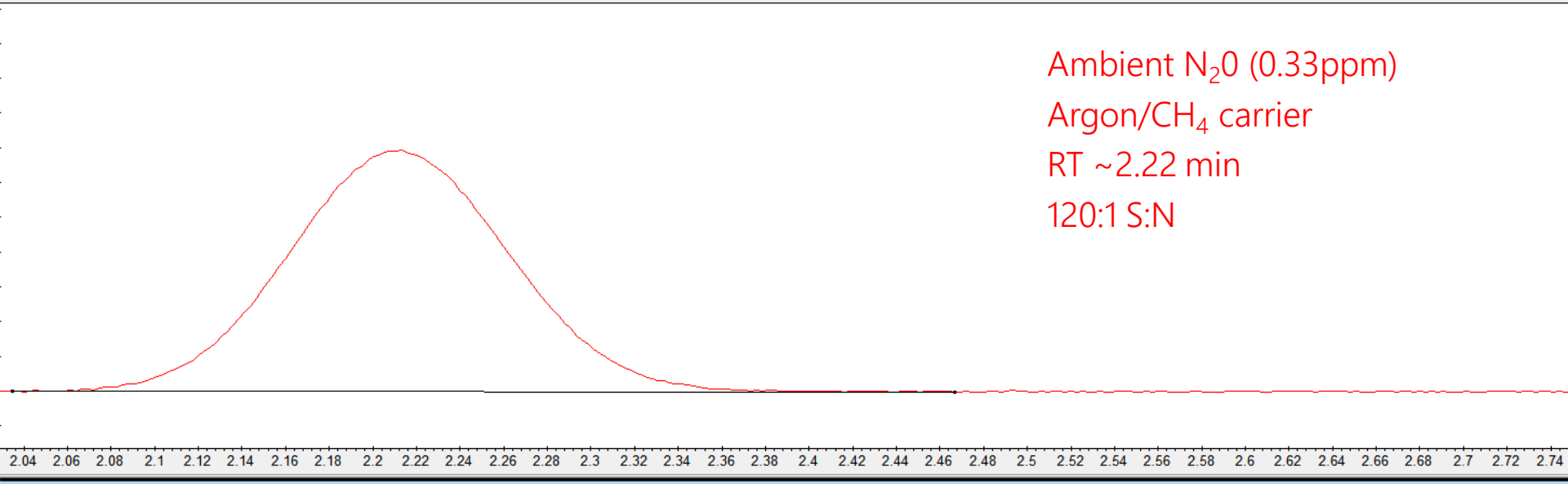




ECD channel – Argon vs Argon/CH_4 carrier

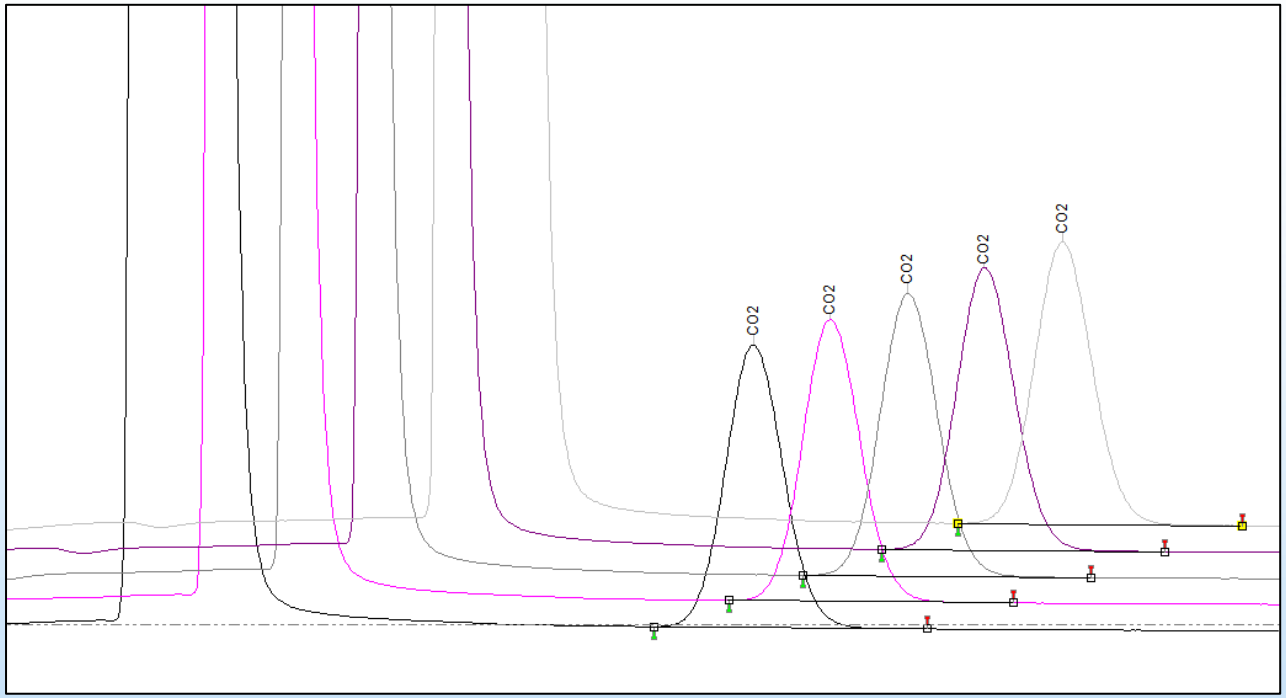


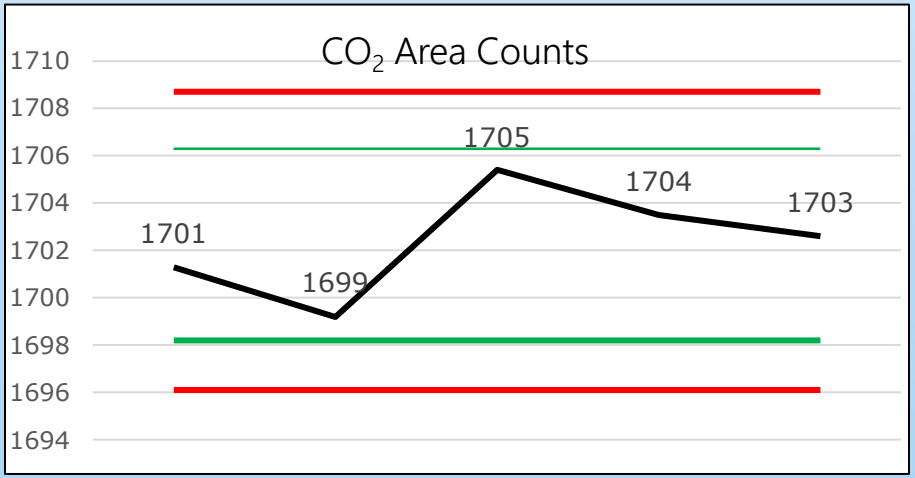
Ambient N_20 (0.33ppm)
Argon carrier
RT ~1.22 min
80:1 S:N



Ambient N_20 (0.33ppm)
Argon/CH_4 carrier
RT ~2.22 min
120:1 S:N

TCD channel – Repeatability

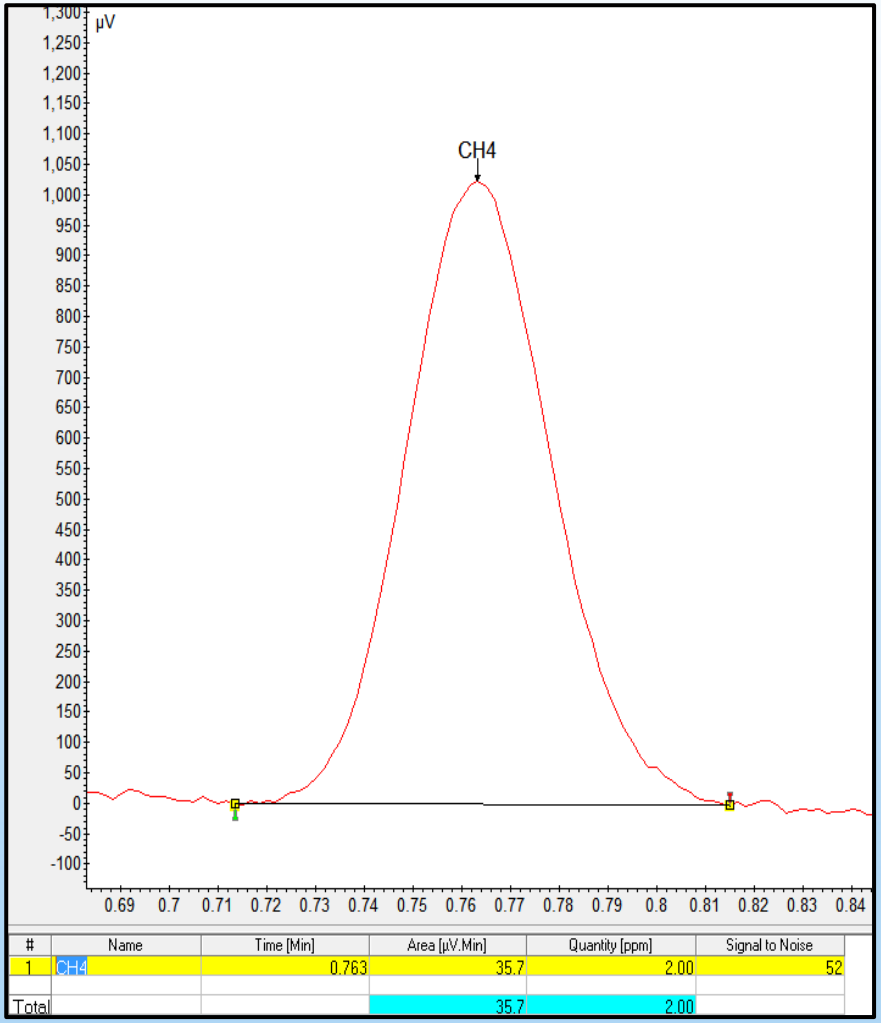




- 5000ppm CO_2 std
- Repeat Injections from same Exetainer

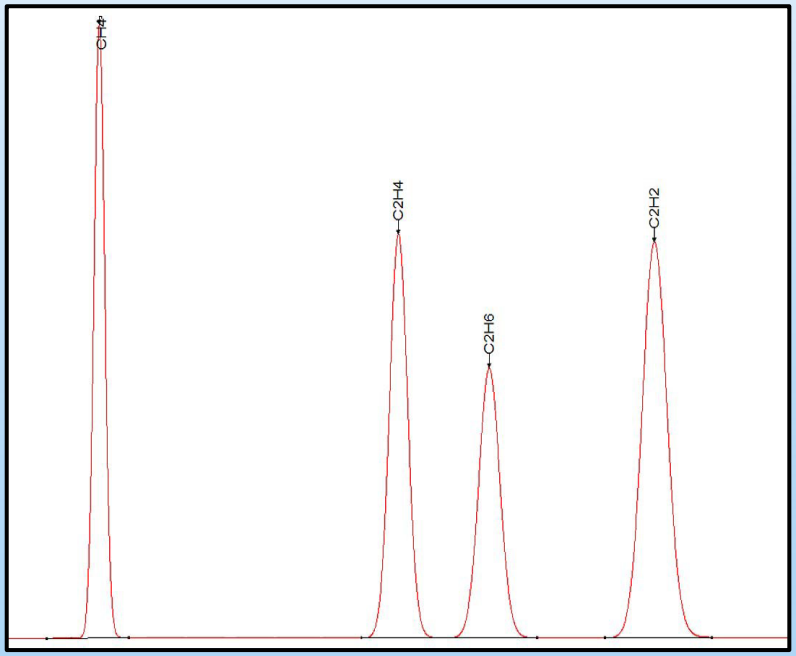
RSD = 0.1%

FID channel – Speed and Flexibility

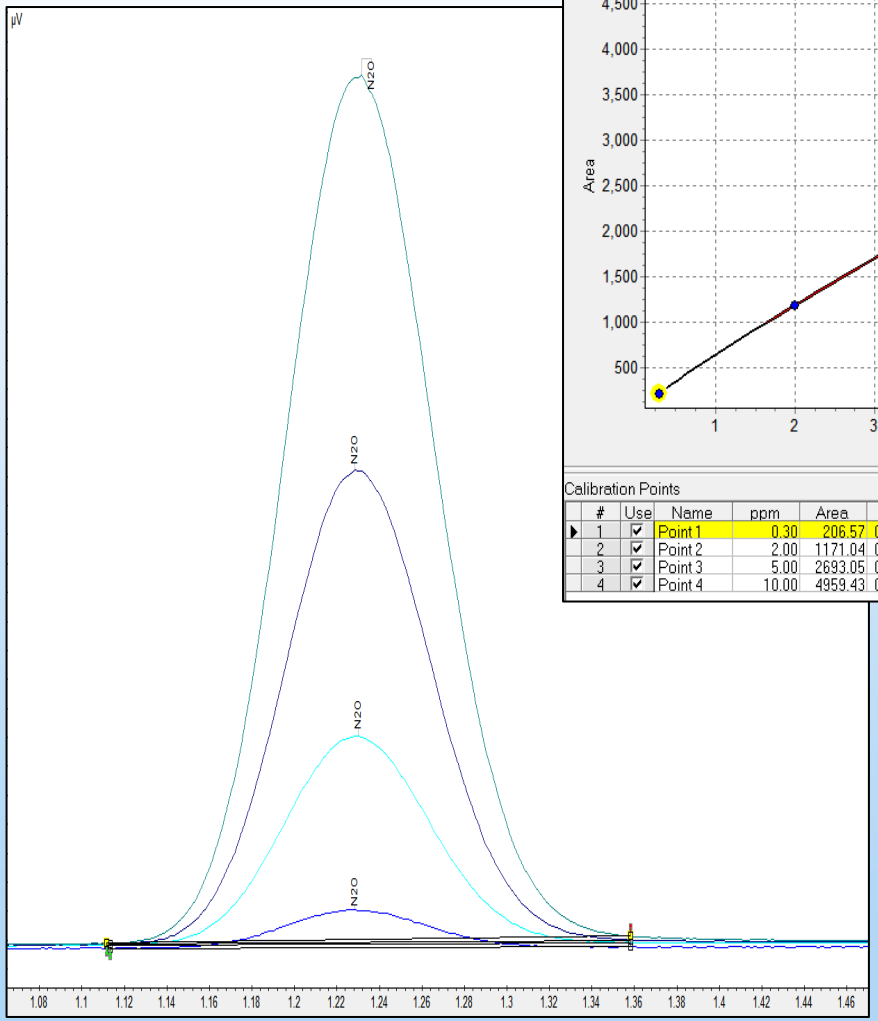


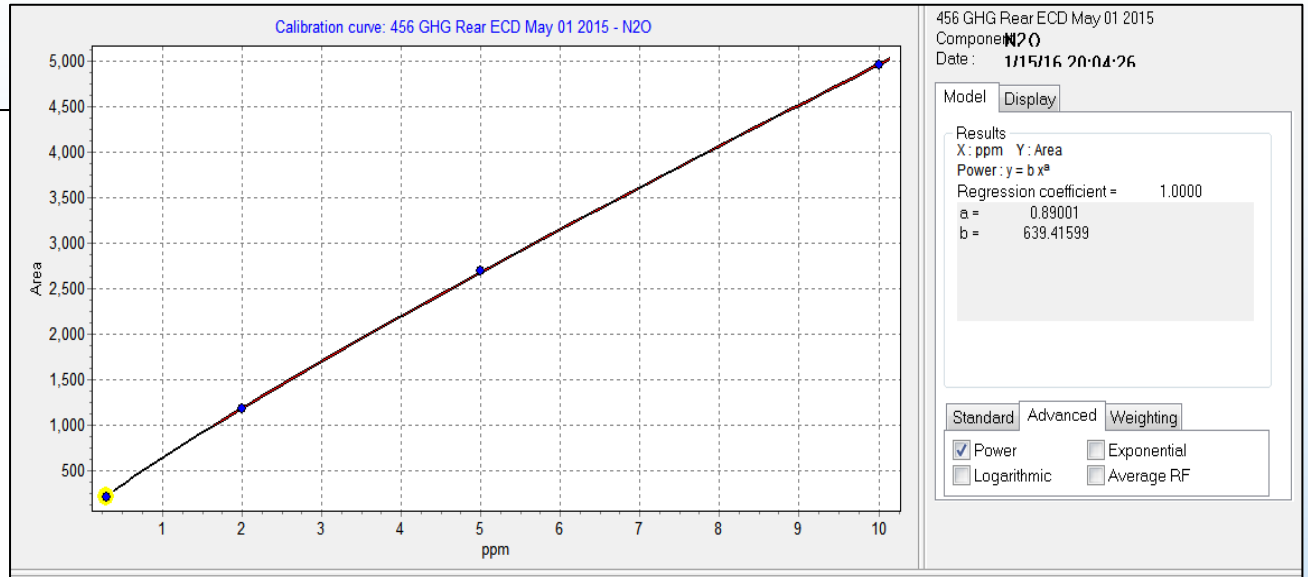
#	Name	Time [Min]	Area [µV.Min]	Quantity [ppm]	Signal to Noise
1	CH4	0.763	35.7	2.00	52
Total			35.7	2.00	

- Ambient CH_4 – 52:1 S:N
- H_2 carrier – 0.76 min RT
- Argon for makeup
- Adjust backflush for optional C_2 elution or higher!



ECD channel - Linearity





Calibration Points — Panel10

#	Use	Name	ppm	Area	RF	Chromatogram	Date	Area (rec	Res %	time [Min]	Level	Username
1	✓	Point 1	0.30	206.57	0.001452	01_05_2015 11_28_40 AM	1/15/16 20:04:2	218.99	6.01	1.23	1	Administrator
2	✓	Point 2	2.00	1171.04	0.001708	01_05_2015 11_46_43 AM	1/15/16 20:04:3	1184.96	1.19	1.23	3	Administrator
3	✓	Point 3	5.00	2693.05	0.001857	01_05_2015 11_51_50 AM	1/15/16 20:04:4	2678.40	0.54	1.23	4	Administrator
4	✓	Point 4	10.00	4959.43	0.002016	01_05_2015 11_56_57 AM	1/15/16 20:04:5	4963.59	0.08	1.23	5	Administrator

- 0.3ppm to 15ppm N_2O standards
- Detection Limit for N_2O ~0.03ppm
- Ar for carrier and makeup
- Reduced operational cost vs Ar/CH_4

Summary

SCION INSTRUMENTS CANADA

- Less than 2 minutes sample to sample
- Reduced cost of ownership with use of Ar and H_2 (replacing Ar/CH_4 and He)
- Automation with Exetainer tubes and CombiPal autosampler
- Automated export of combined results from three detectors in Excel format
- Optional capabilities (H_2, O_2, N_2 C_2H_4, C_2H_6, C_2H_2, SF_6)
- Flexible sensitivity range
- Repeatability <0.5%

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