Overview

Of

SF_6 Analyzer

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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

Scion Instruments Canada Limited (SICL)

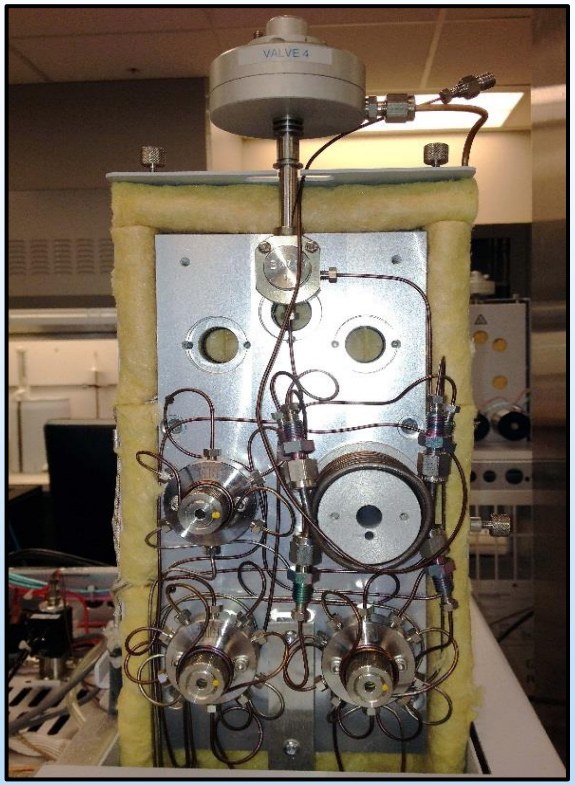
- Scion – A descendant from a notable family
- Our mission is to offer comprehensive and innovative solutions composed of high-quality products, services and parts.
- Support of existing legacy Varian/Bruker systems and provide a modern upgrade path.

Scion Instruments SF_6 Analyzer
Hardware Overview

456 SF_6 Analyzer Summary

- Ar/CH_4 or Ar carrier and ECD
- <3 mins analysis time!
- Pre-column and Analytical column located in separate heated zones to optimize application
- Backflush to Vent (Backflush H_2O, C_3+)
- Analytical column separates CO_2, N_2O, SF_6
- Automated on/off solenoid and integrated vacuum pump

Scion 456 GC – Separate Heated Zones



- Large isothermal valve oven
- Top Mounted
- Valves and Pre-column located here

- Large GC Oven
- Analytical Column will be located here

Sample IN port, Valves and Pre-Column are mounted in a Heated Oven.

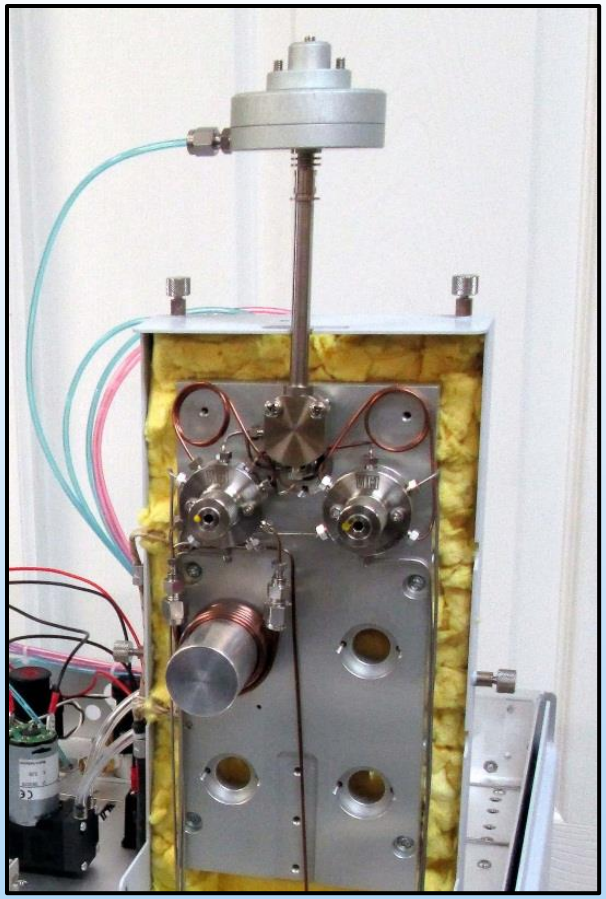
Temperature is optimized for Pre-Column and to prevent potential condensation of H_2O

Analytical column is mounted in the Large GC Oven. Independent Temperature is optimized for N_2O and S_F6 separation

Scion 456 GC – High Pressure Automation

On/off Sampling Solenoid

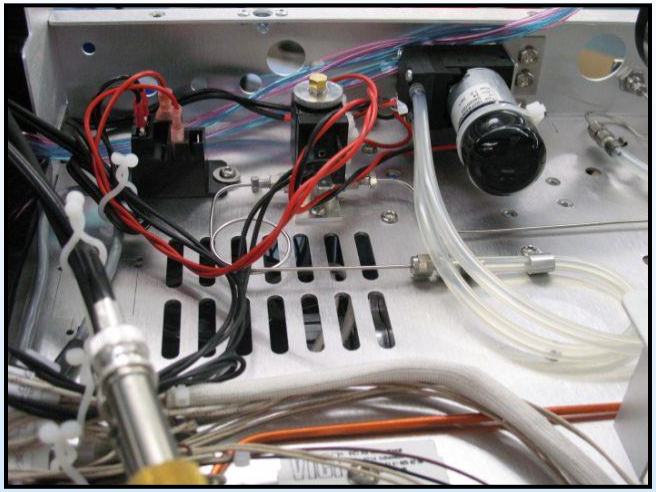
- 10-3000psi, up to 300°C
- Controlled & Automated by GC
- Mounted directly into Large Valve oven
- Easy switch between high & low pressure samples
- Option for Electrically actuated

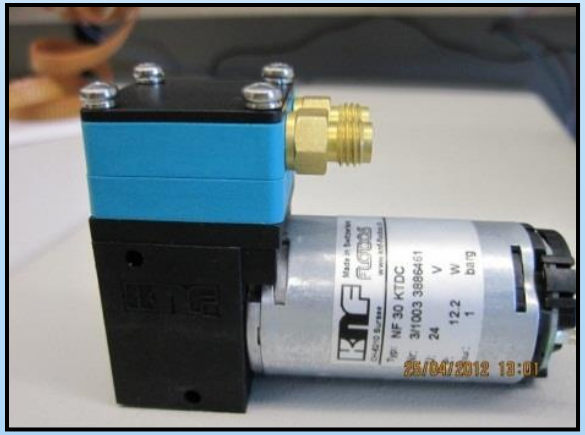


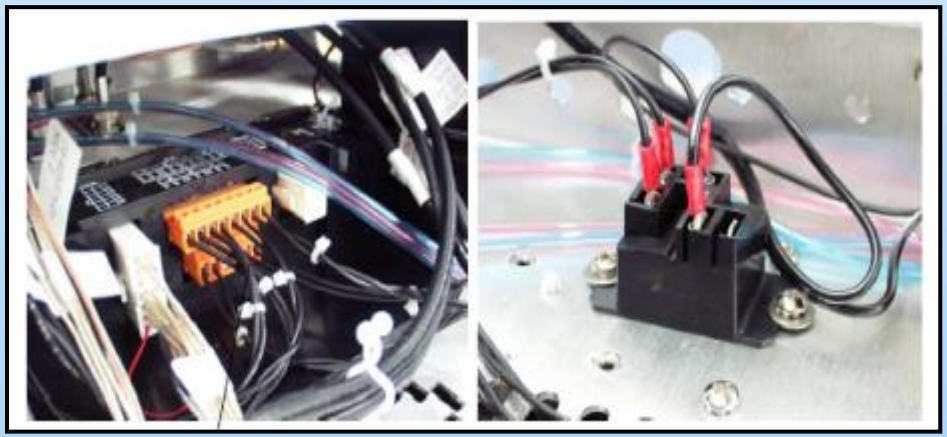
Scion 456 GC – Low Pressure Automation

3/2 solenoid & sample pump

- 0-10psi – Tedlar Bags
- Controlled & Automated by GC
- Mounted under top GC cover
- Automated switching between high & low pressure samples





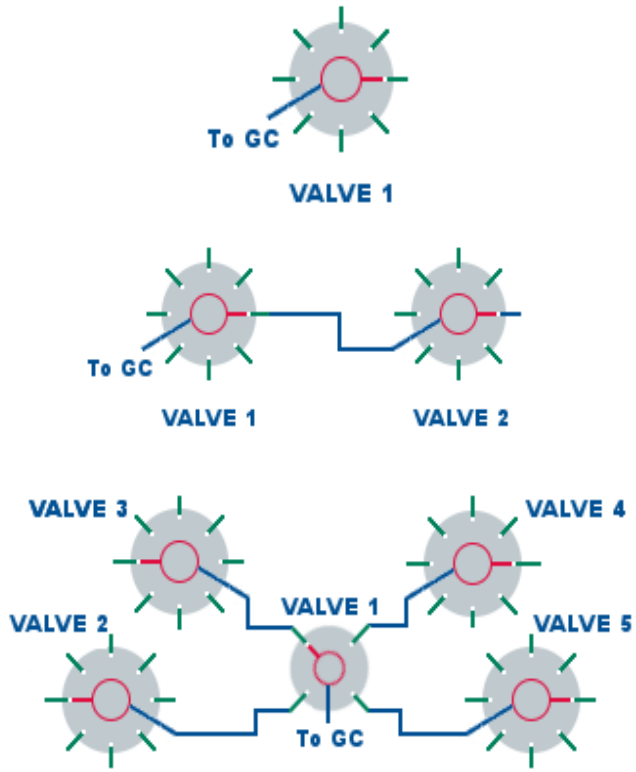


Scion GC SSV Automation

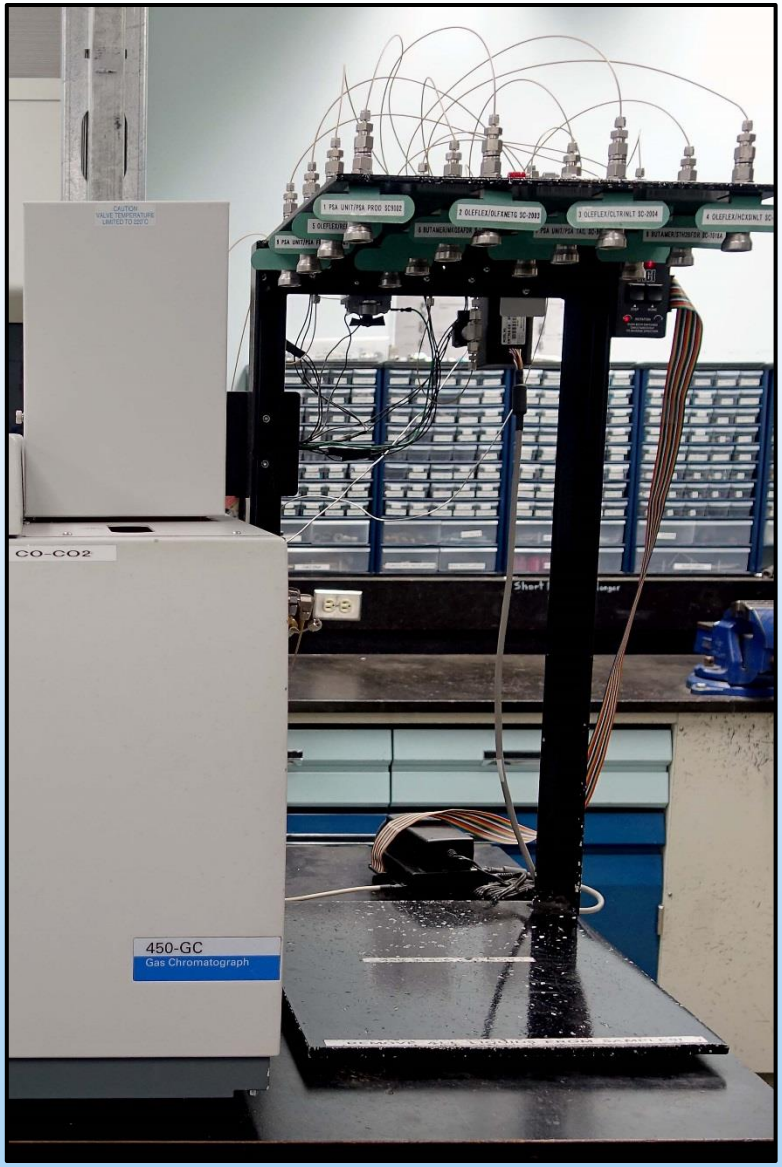
Valco Stream Selection Valves

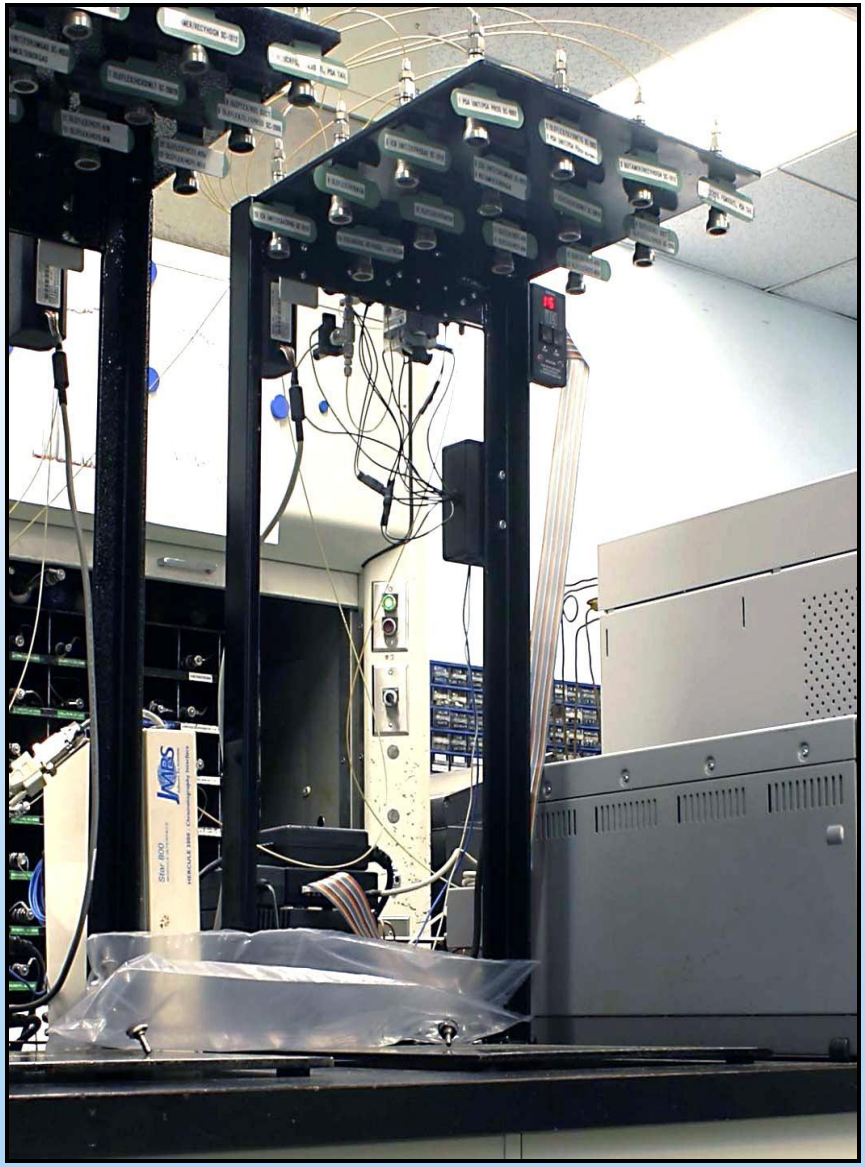
- SSVs in Single, Chained or Networked configurations
- Valve Position is entered directly into the Compass sequence table
- Configurations support up to 64 streams

SSV Control is the key to automation of gases or compressed liquids!

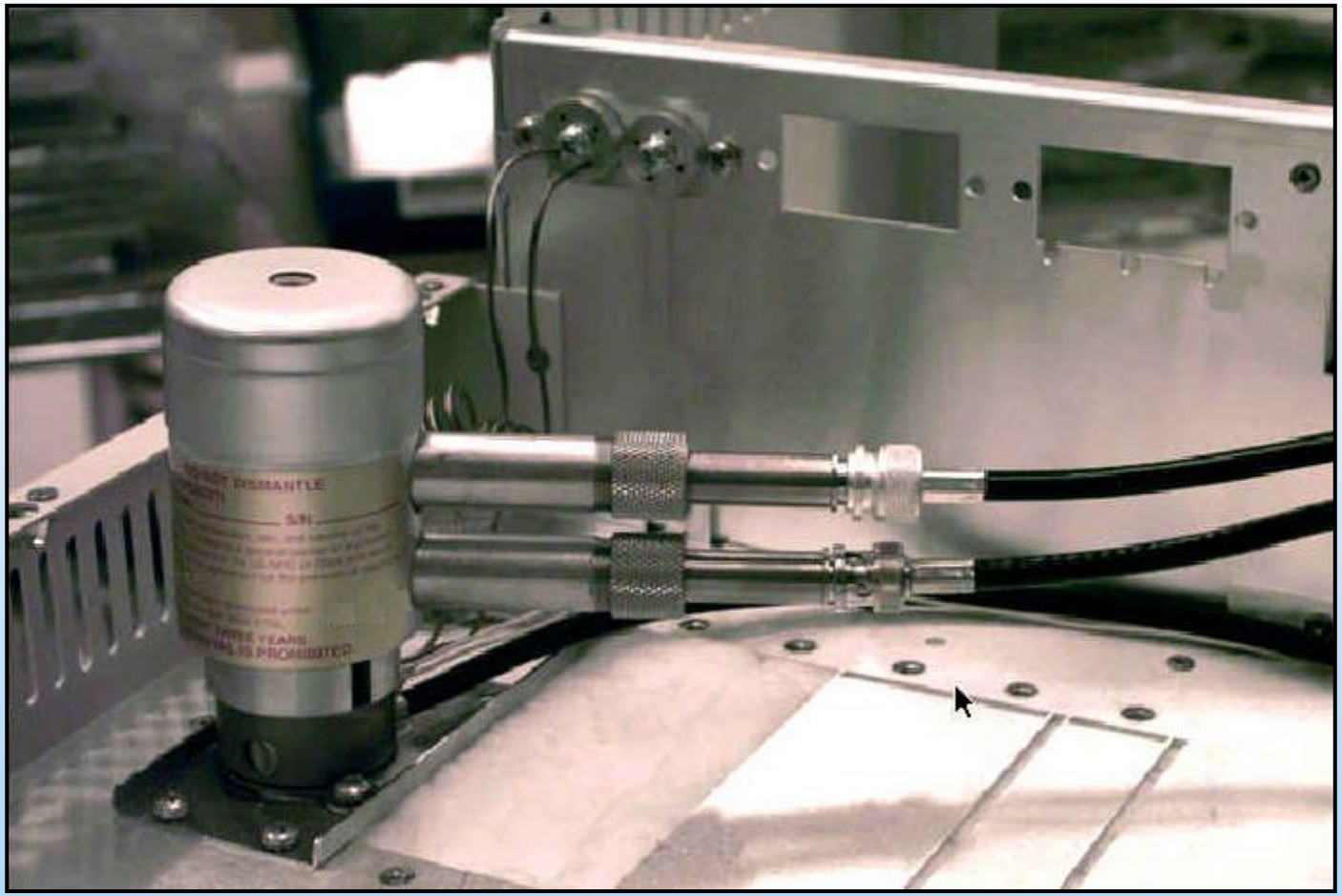


SSV Gas Autosamplers – High & Low Pressure





Electron Capture Detector



ECD Details

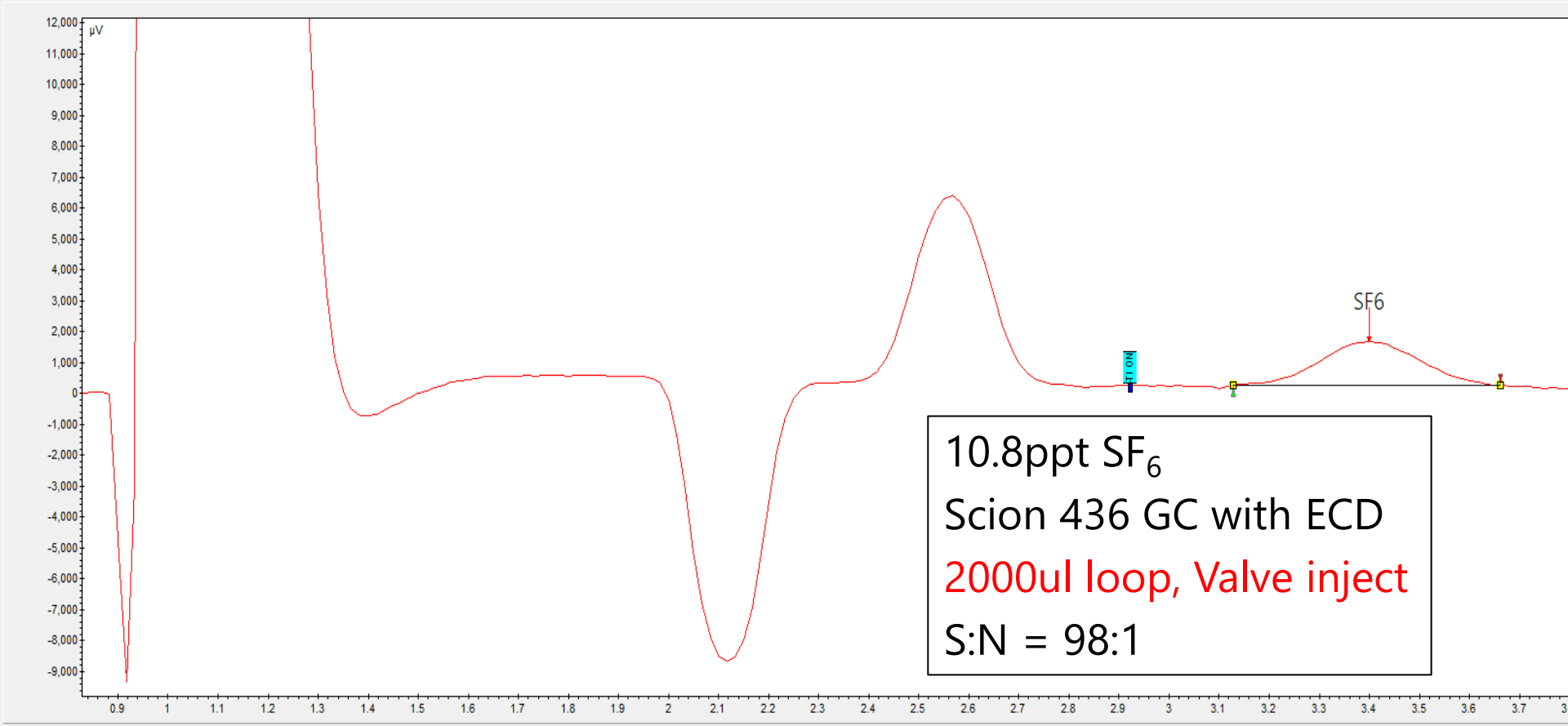
- Very selective for components with high electronegativity
- Uses 63Ni foil as beta particle emitter
- Electrons accelerate towards anode – generates current
- Electronegative sample passes through current, reduces current
- Analyte concentration is proportional to degree of electron capture

Applications:

- Pesticides in Food and Drinking Water
- Greenhouse Gas – N2O
- Analysis of PCBs in water and soil
- Forensic Analysis of High Explosive Residues
- Analysis of CFCs

Scion Instruments SF_6 Analyzer Chromatography and LOD

SF_6 Analysis in Ambient Air



#	Name	Time [Min]	Height [µV]	Peak Noise (RMS) [uV]	Signal to Noise	Area [µV.Min]	Width 50% [Min]	Res. HW	Quantity [ppt]	Limit of Detection (ppt)
0	CO2	2.13	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
0	N2O	2.60	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
1	SF6	3.40	1398.1	14	98	321.2	0.22	0.00	10.7420	0.3426
Total			1398.1			321.2			10.7420	

SF_6 Analysis LOD Calculation

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LOD = (3*C*N)/Area * Width

C = Concentration (ppb)

N = Noise (peak2peak, uV)

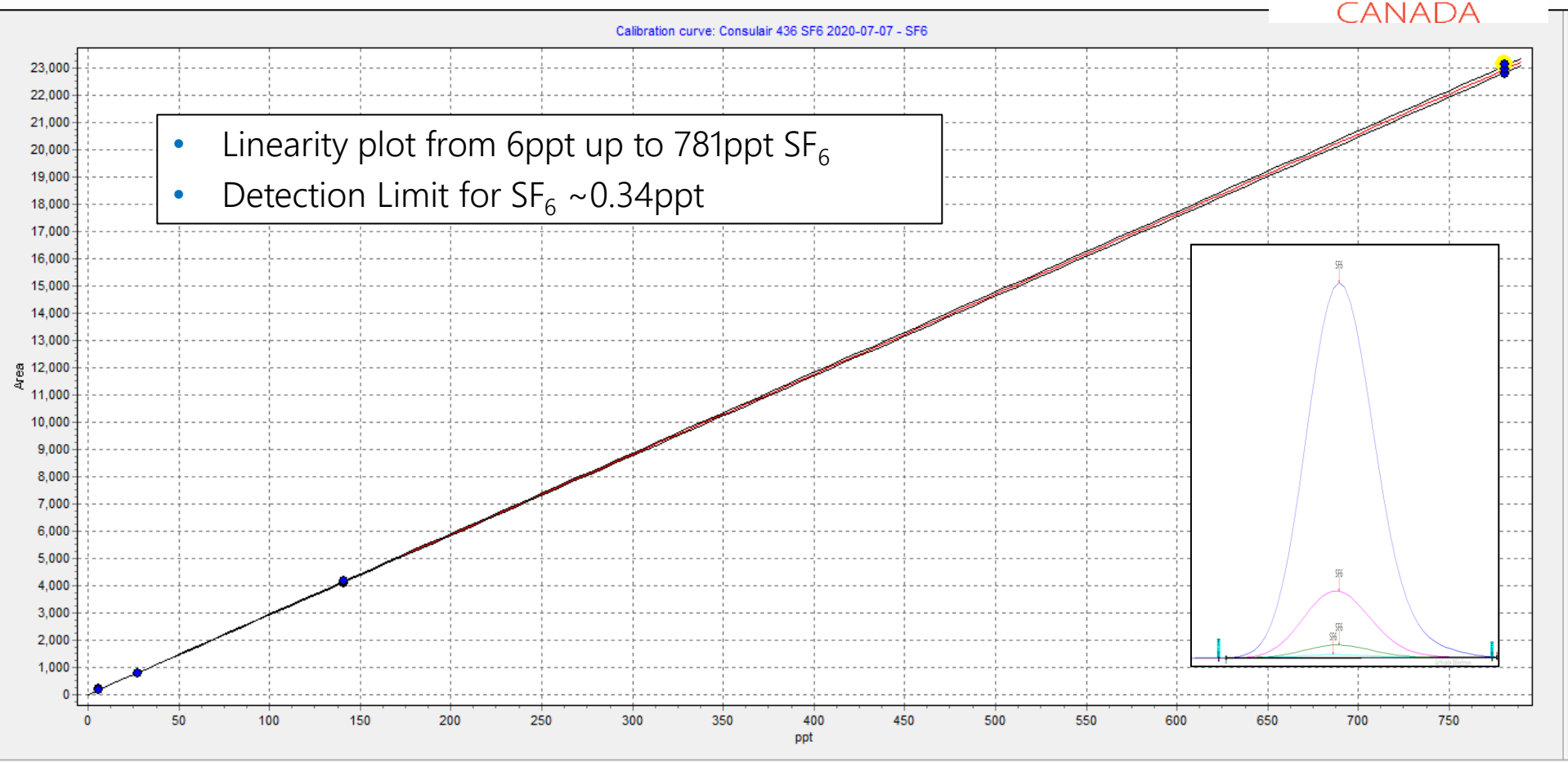
A = Area of Peak (uV*s)

W = Peak width at half height (s)

Component	Noise(uV)	Area (uV*s)	Conc.(ppt)	Width(s)	LOD(ppt)
SF6	14	19260	10.8	13.2	0.31

0.34ppt LOD with 2000uL loop and direct Valve injection

ECD channel – Calibration Curve



- Linearity plot from 6ppt up to 781ppt SF_6
- Detection Limit for SF_6 ~0.34ppt

ibration Points

Panel10

#	Used	Name	ppt	Area	RF	Chromatogram	Date	Area (recalc	Res %	time [Min]	Level	Username
1	☑	Point 1	781.00	23137.48	0.033755	2020-07-05 15_06_04_Consulair SF6 Analysis_781 ppt S	2020-07-07 14:34:	22964.23	0.75	3.45	1	Lab
2	☑	Point 2	781.00	22953.37	0.034026	2020-07-05 15_11_00_Consulair SF6 Analysis_781 ppt S	2020-07-07 14:34:	22964.23	0.05	3.45	1	Lab
3	☑	Point 3	781.00	22801.97	0.034251	2020-07-05 15_15_53_Consulair SF6 Analysis_781 ppt S	2020-07-07 14:34:	22964.23	0.71	3.43	1	Lab
4	☑	Point 4	140.90	4182.85	0.033685	2020-07-05 15_29_13_Consulair SF6 Analysis_140.9 pp	2020-07-07 14:34:	4142.97	0.95	3.45	2	Lab
5	☑	Point 5	140.90	4114.24	0.034247	2020-07-05 15_34_07_Consulair SF6 Analysis_140.9 pp	2020-07-07 14:34:	4142.97	0.70	3.45	2	Lab
6	☑	Point 6	140.90	4107.80	0.034301	2020-07-05 15_39_00_Consulair SF6 Analysis_140.9 pp	2020-07-07 14:34:	4142.97	0.86	3.45	2	Lab
7	☑	Point 7	27.14	800.96	0.033884	2020-07-05 15_55_58_Consulair SF6 Analysis_27.14 pp	2020-07-07 14:34:	798.01	0.37	3.45	3	Lab
8	☑	Point 8	27.14	797.00	0.034053	2020-07-05 16_00_54_Consulair SF6 Analysis_27.14 pp	2020-07-07 14:34:	798.01	0.13	3.45	3	Lab
9	☑	Point 9	27.14	801.63	0.033856	2020-07-05 16_05_47_Consulair SF6 Analysis_27.14 pp	2020-07-07 14:34:	798.01	0.45	3.43	3	Lab
10	☑	Point 10	6.11	191.07	0.031989	2020-07-05 16_29_55_Consulair SF6 Analysis_6.112 pp	2020-07-07 14:34:	179.71	5.94	3.43	4	Lab
11	☑	Point 11	6.11	197.99	0.030870	2020-07-05 16_34_51_Consulair SF6 Analysis_6.112 pp	2020-07-07 14:34:	179.71	9.23	3.43	4	Lab
12	☑	Point 12	6.11	186.22	0.032822	2020-07-05 16_39_47_Consulair SF6 Analysis_6.112 pp	2020-07-07 14:34:	179.71	3.49	3.43	4	Lab

Summary

- Scion Instruments – Continuing a tradition of excellence from Varian / Bruker
- 50+ year legacy of successfully providing solutions not just boxes
- A global team of highly accessible GC specialists in place to help you
- Extremely flexible GC hardware and software platform
- A full line of high-performance application tuned columns

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