Addressing the World Shortage of Helium

Introducing the Programmable Helium Conservation Module

GPD Solutions

June 2013

The Measure of Confidence

Agilent Technologies

Market Situation

Unreliable supply of helium worldwide and increasing prices have customers seeking alternative carrier gas solutions

ODD SPENDING

Helium Prices Hit the Roof, Leaving Balloon Sales Deflated

By BRAD TUTTLE | @bradrtuttle

INFLATION

As price of helium ris

By David Knowles Wednesday,

BUSINESS

HELIUM SUPPLIES ARE SCANT, AGAIN

Global PRODUCTION SHORTFALL means the element will be scarce into 2013

MARC S. REISCH, C&EN NORTHEAST NEWS BUREAU

FOR THE SECOND TIME in five years uid helium consumers are having trou buying the inert and buoyant element situation is dire for some users, and he suppliers say it is going to get worse be it gets better.

Dean Olson, nuclear magnetic reso

C&EN

CHEMICAL & ENGINEERING NEWS

BUSINESS

WHY HELIUM IS IN SHORT SUPPLY

Maintenance disruptions, new PROJECT DELAYS mean shortages for at least two more years

CONFIRMED

U.S. Senate Committee on Energy and Natural Resources
"The Helium Stewardship Act of 2012"
Washington, D.C.
May 10, 2012

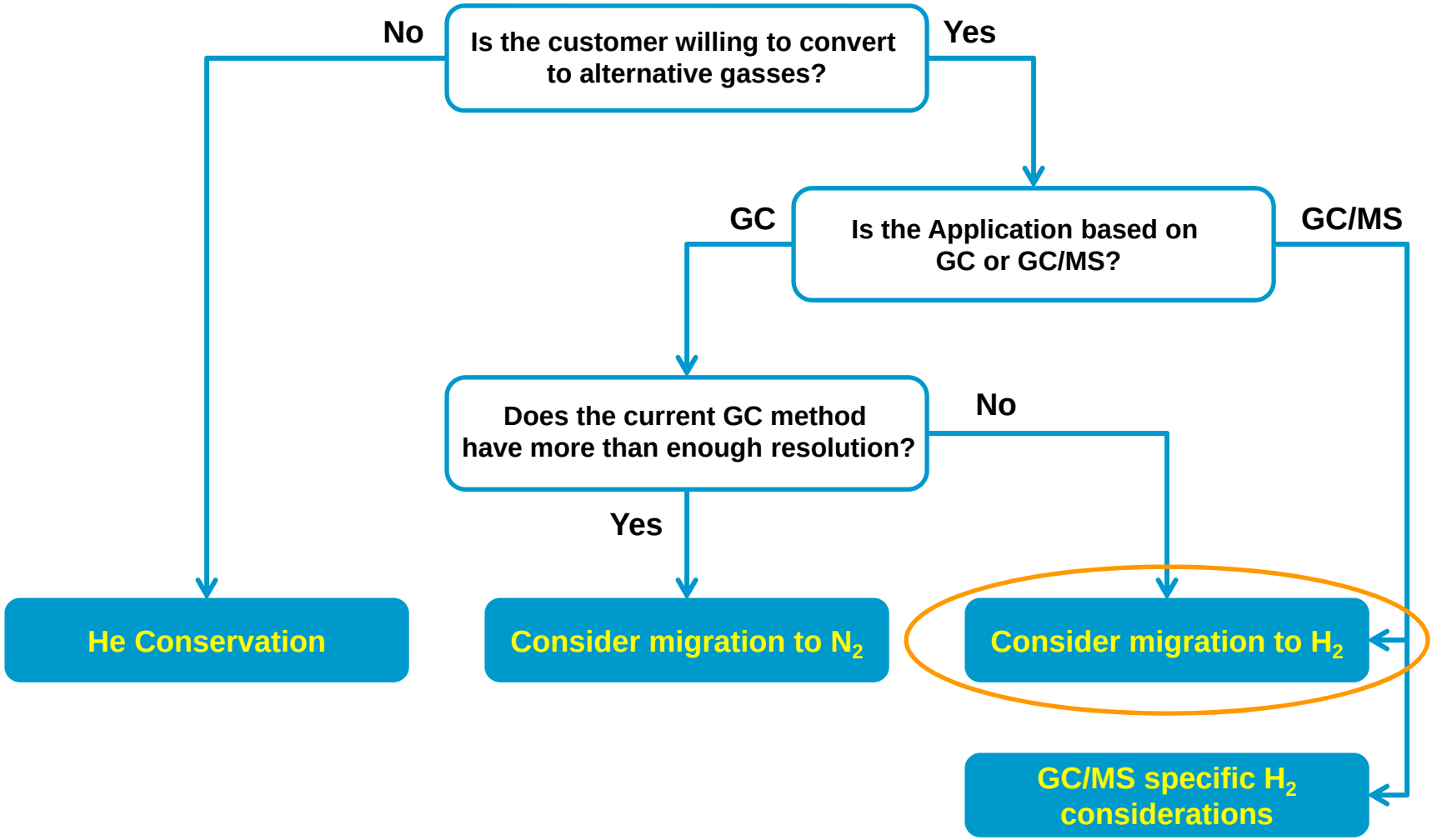
Statement Submitted for the Record
Airgas, Inc.

The U.S. is experiencing a significant helium shortage that is having an adverse effect on the nation's economy and ability to create jobs. A sufficient amount of helium is available in the U.S. to satisfy domestic demand, however, it is not fairly priced, nor is it reaching the U.S. businesses that need it. At issue is the U.S taxpayer-owned Federal Helium Reserve and the 1996 Helium Reserve Privatization Act.


RESOLVE
YOUR SEARCH
FOR VALUE

Agilent's COMPREHENSIVE Solutions

Carrier Gas Decision Tree



GC and GC/MS Migration to H_2 Carrier Gas

Helping Your Facility Address Issues Related to Helium

Summary of pre-recorded webinar: (September 11, 2012 C&E News)

- **System setup:**

  -- H_2 safety, H_2 source, gas connection, system clean up

- **Method Migration:**

  -- Method transfer SW, method migration consideration, revalidation

- **Analytical Performance Expectation:**

  -- Sensitivity impact, MS spectrum impact, analytes compatibility

- **For More Details:**

  -- Listen to recorded session at http://www.agilent.com/chem/heliumupdate

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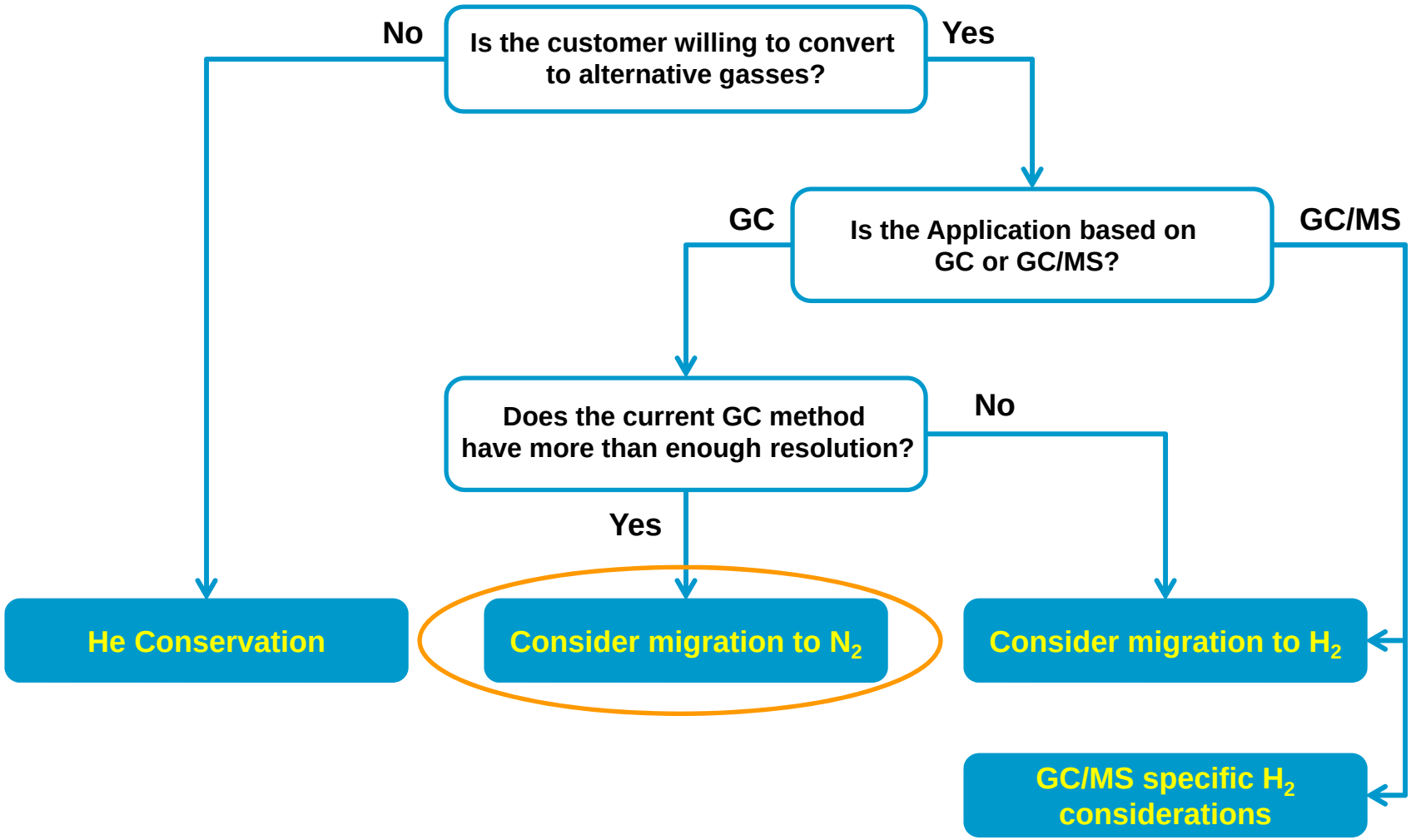
Carrier Gas Decision Tree



GC Method Migration to H_2 and N_2

Helping Your Facility Address Issues Related to Helium

Summary of pre-recorded webinar: (Feb 12th, 2013 C&E News)

- **Many HPI GC Methods Suited to Nitrogen:**

  -- No safety issue, chromatographic resolution suitable for N_2 carrier

- **Method Migration:**

  -- Method transfer SW, method migration consideration, revalidation

- **Regulatory Compliance:**

  -- ASTM method trends, Agilent's leadership position

- **For More Details:**

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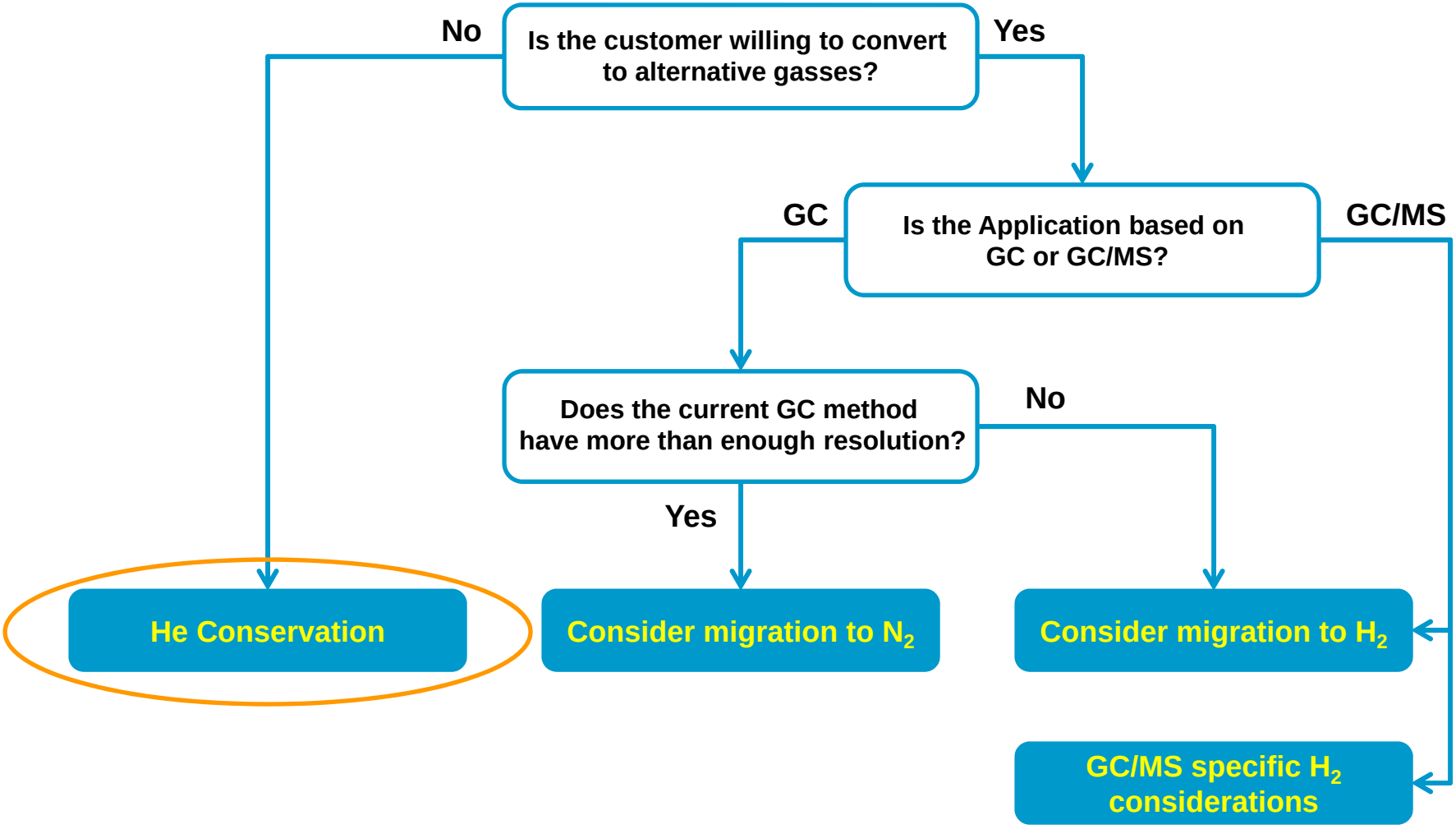
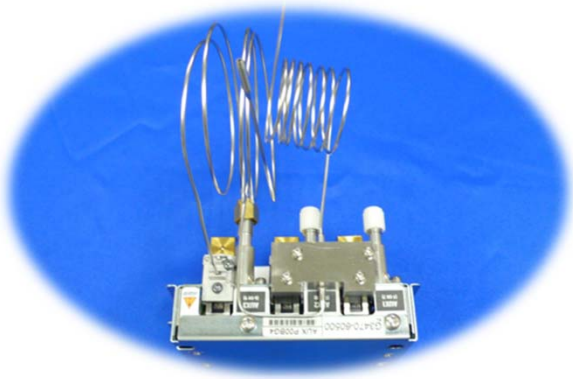
Carrier Gas Decision Tree



Reducing Helium Use With Conservation

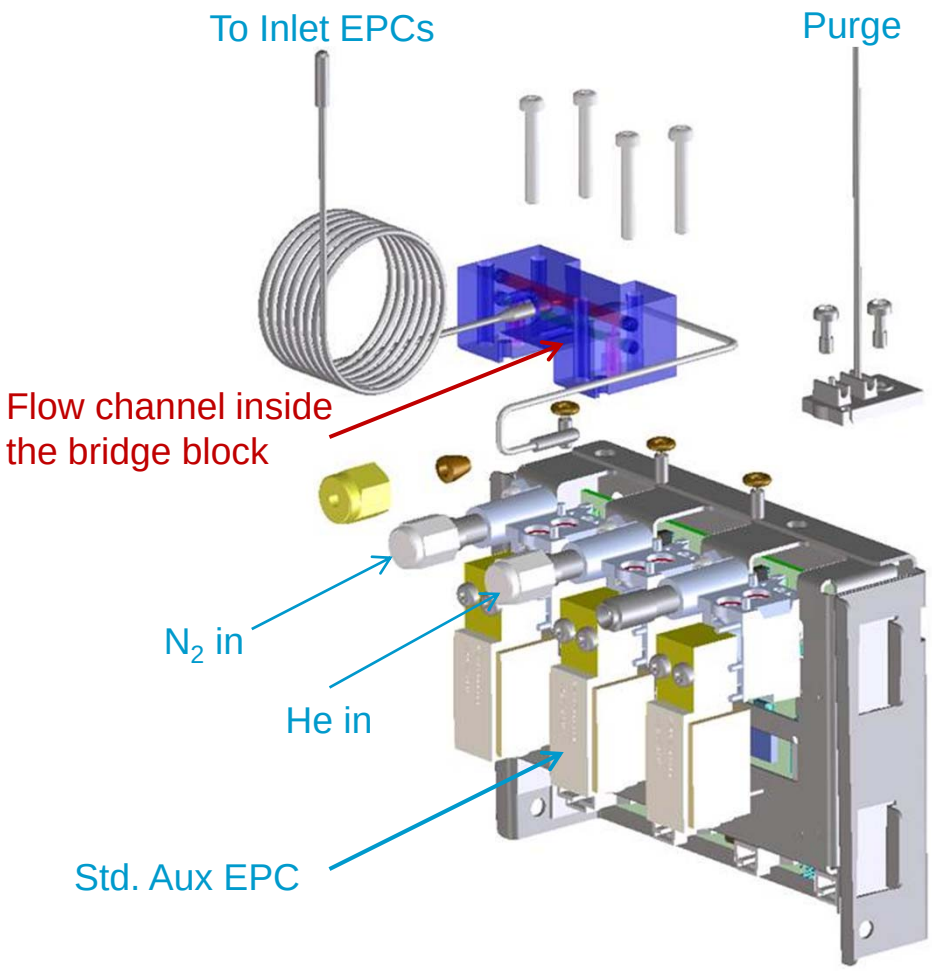
New 7890B Helium Conservation Module

- Automatically switches carrier gas supply to N_2 Standby during idle time
- Integrates into the new 7890B Sleep and Wake function
- Combined with Helium Gas Saver to *GREATLY* reduce helium consumption
- Better alternative to just “shutting off the GC”
  - No system contamination with ambient air exposure
  - Faster re-start of heated zones



Carrier Gas Switch EPC Module

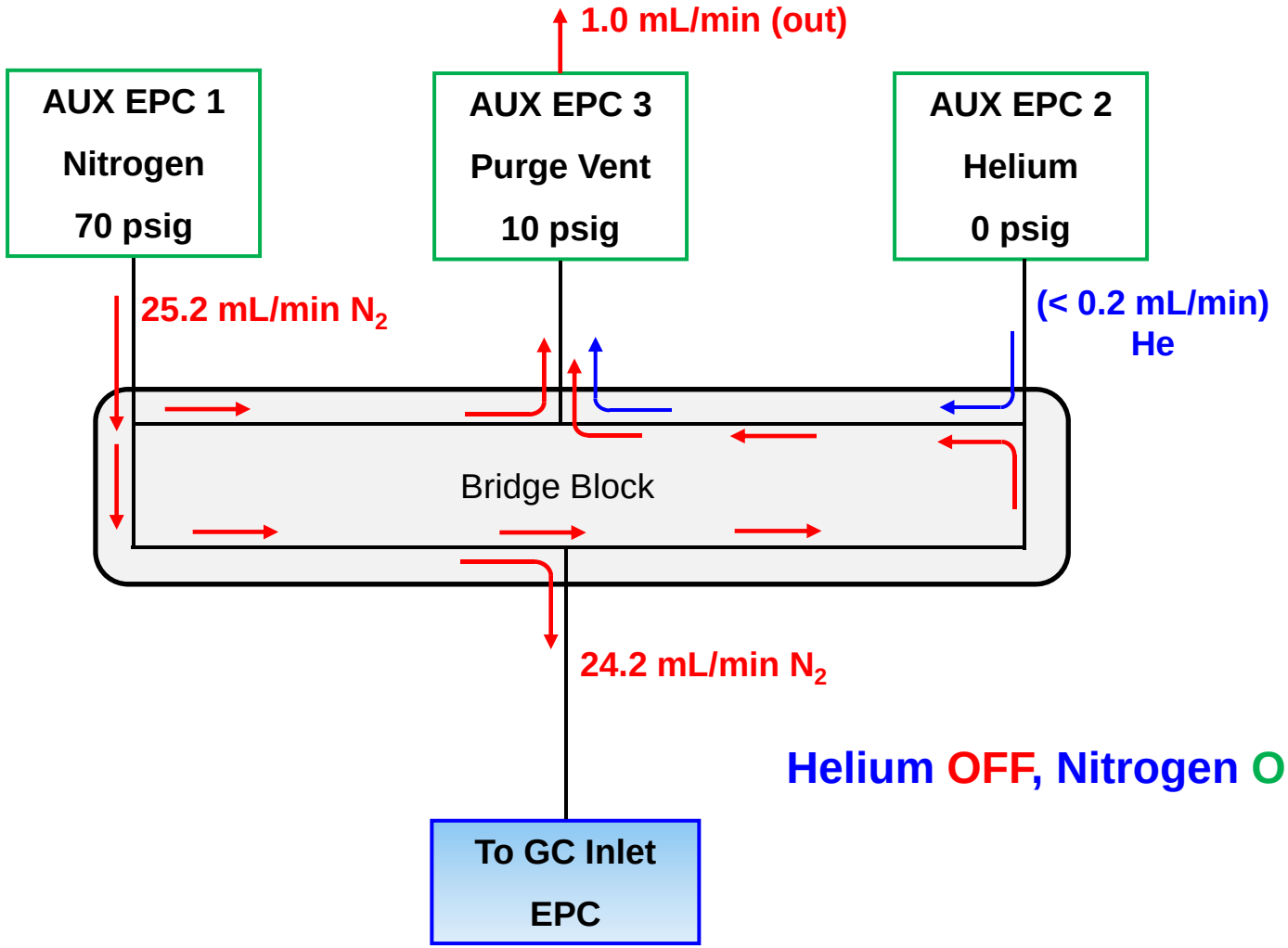
Ensures Business Continuity



- Built on 5th generation EPC
- Fully integrated and controlled by OpenLAB CDS
- Purge channel prevents cross contamination of gases
- Precise pressure control between tank and GC
- In AWAKE mode, switches between gases within 15-30 min for most detectors including MSD

How Does It Work ?

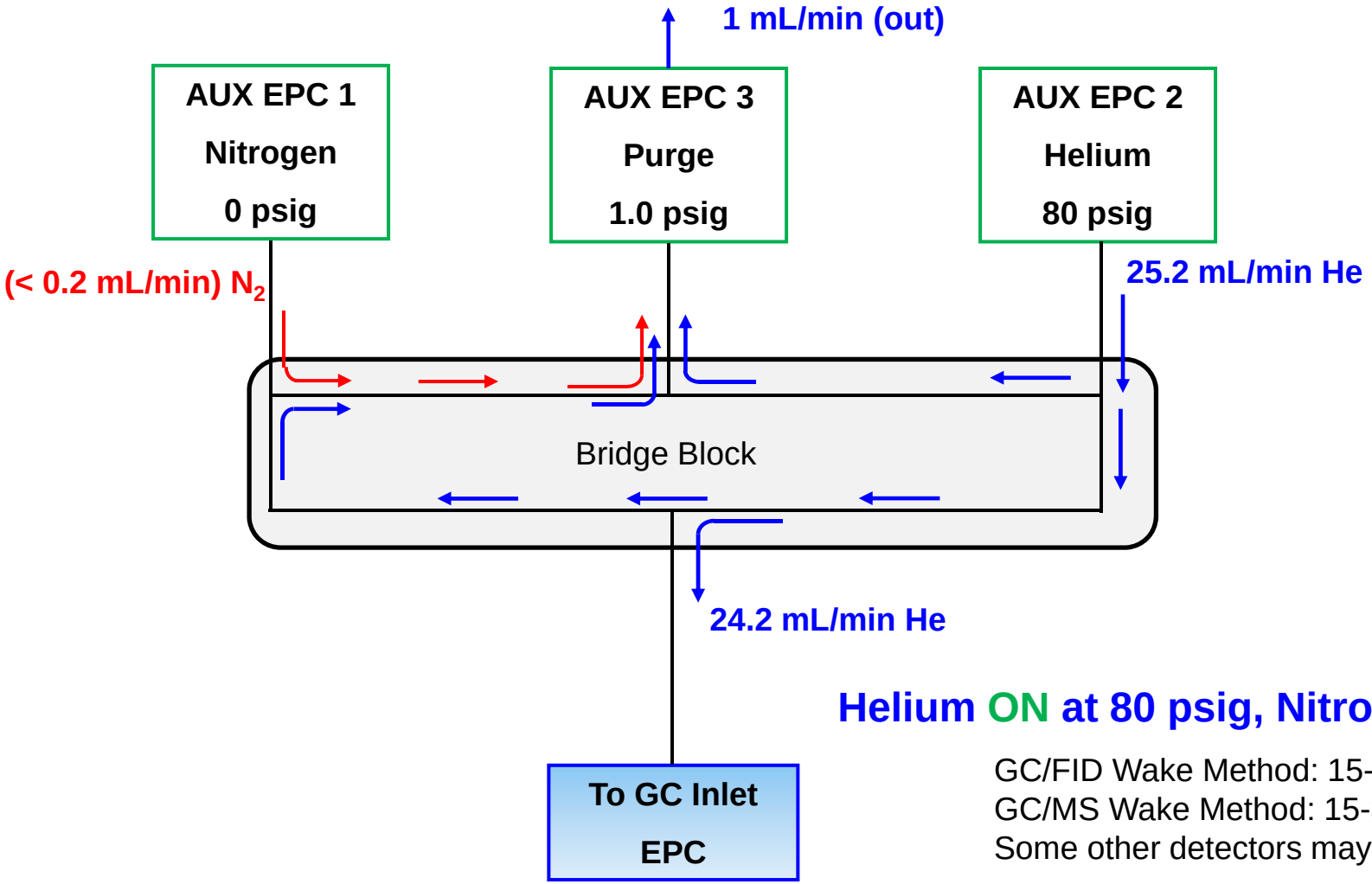
Helium Conservation Mode (Sleep Mode with Nitrogen Carrier)



Helium OFF, Nitrogen ON at 70 psig

How Does It Works ?

Normal Operation Mode (Wake Mode with Helium Carrier)

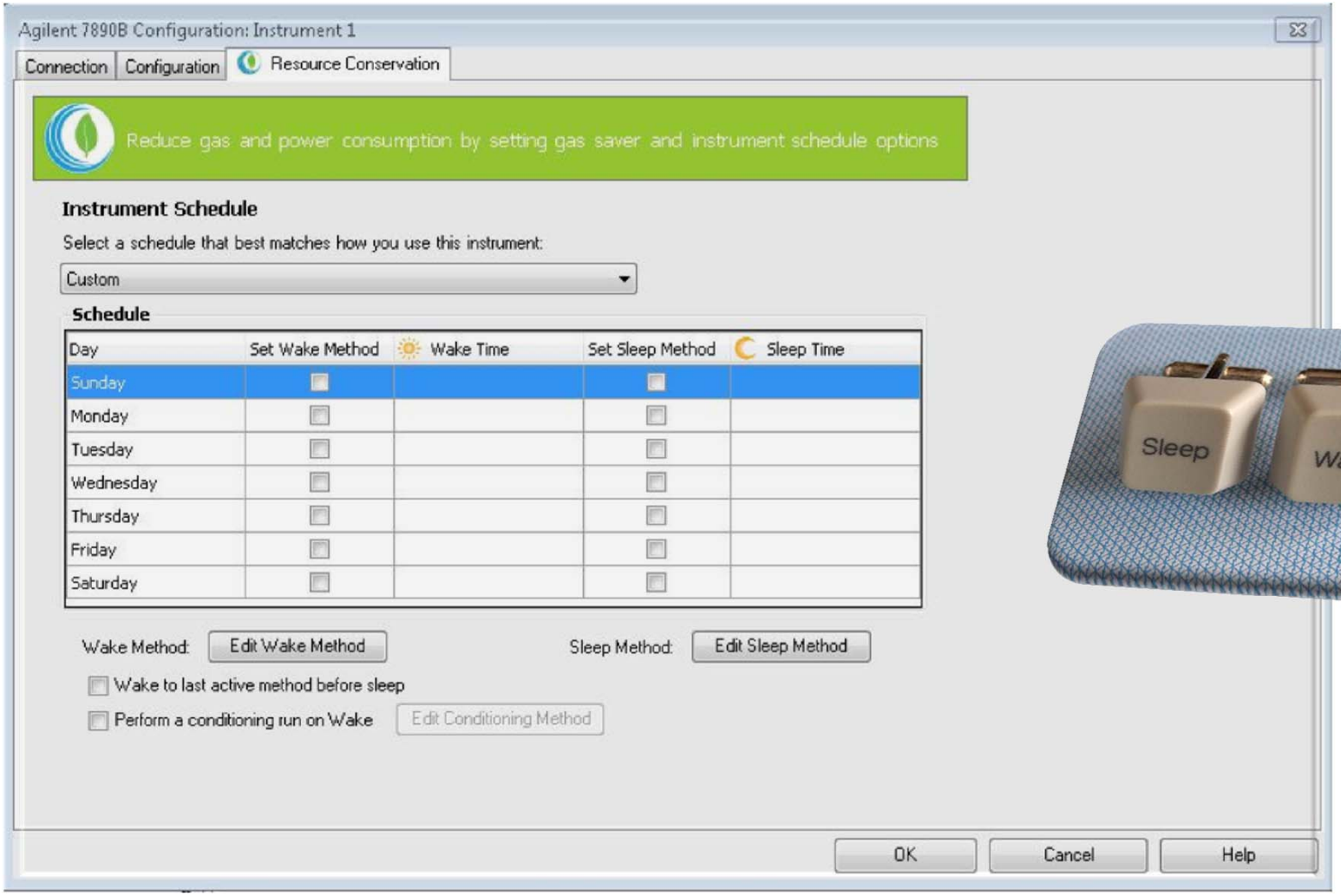


Helium ON at 80 psig, Nitrogen OFF

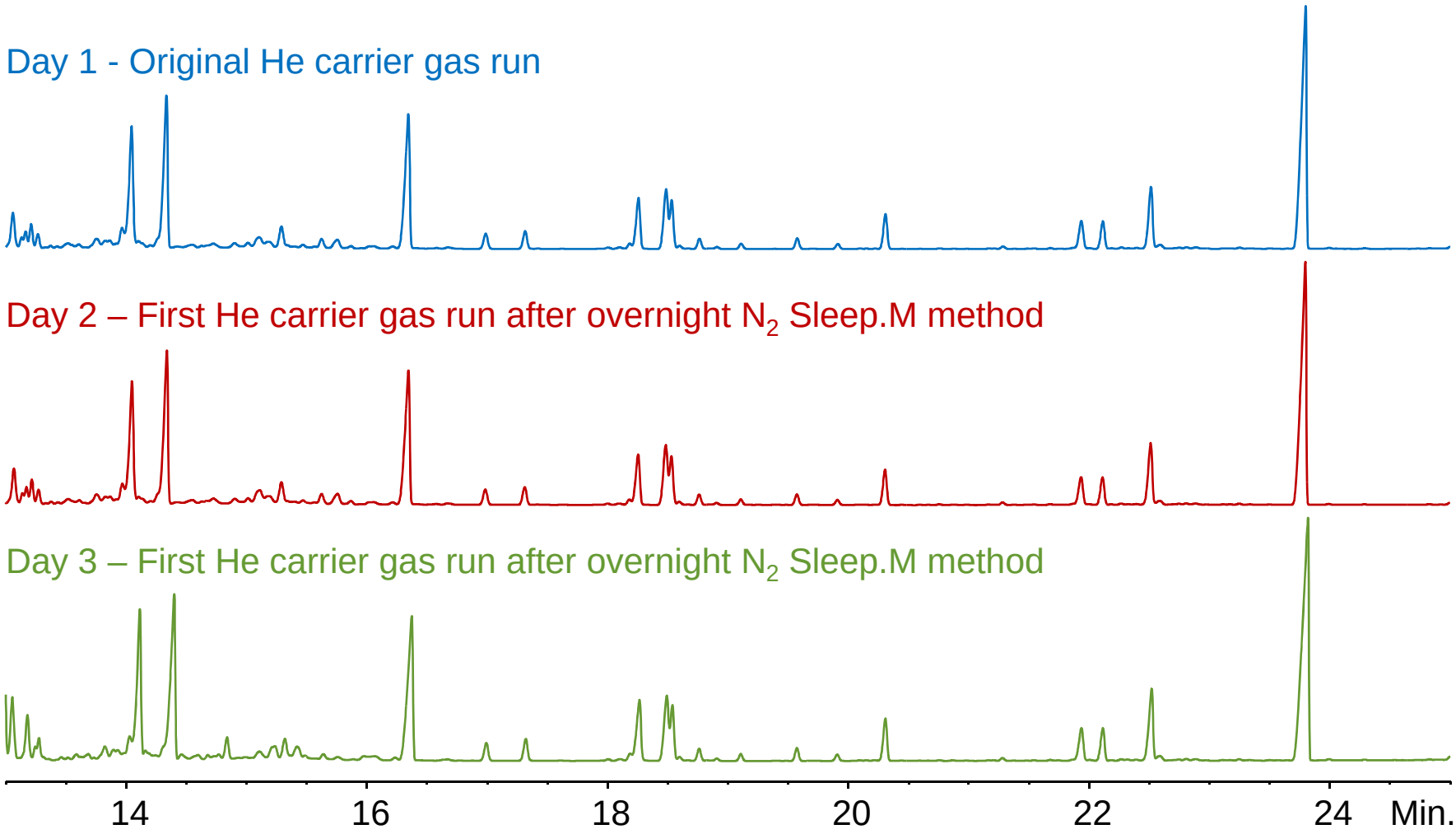
GC/FID Wake Method: 15-30 Min
GC/MS Wake Method: 15-30 Min
Some other detectors may need longer

OpenLAB CDS: Configuring Sleep/Wake Operation

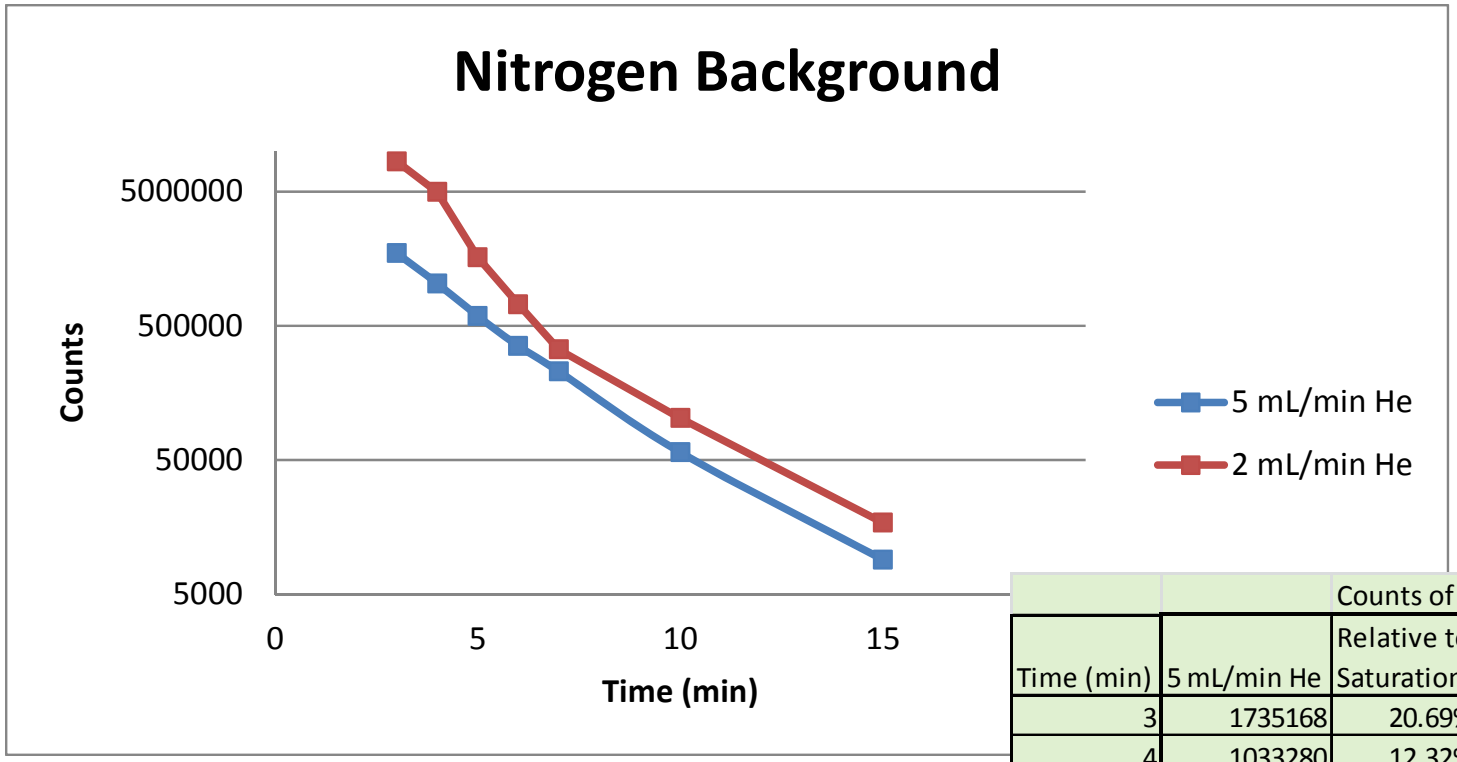
Simple, Straight Forward Setup



Performance: No Change in Chromatography After N_2 Carrier Sleep Method (GC/FID)

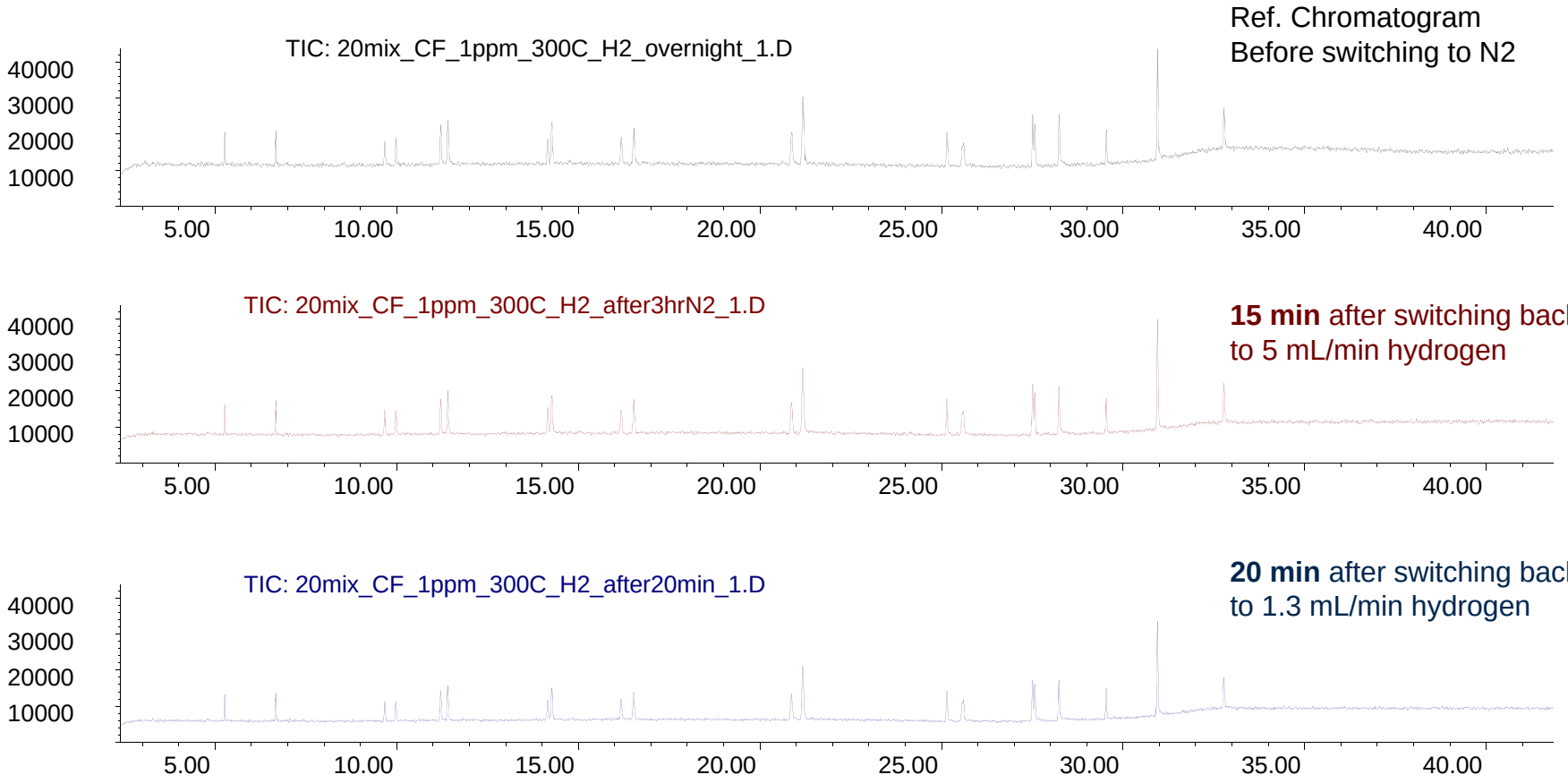


Performance: Pass MS Tune within 15 min after Switching from N_2 to He Carrier (GC/MSD)



		Counts of Nitrogen Ion		
Time (min)	5 mL/min He	Relative to Saturation	2 mL/min He	Relative to Saturation
3	1735168	20.69%	8388096	100.00%
4	1033280	12.32%	4959232	59.12%
5	590080	7.03%	1618944	19.30%
6	354112	4.22%	722944	8.62%
7	228480	2.72%	333696	3.98%
10	56984	0.68%	102576	1.22%
15	9052	0.11%	17080	0.20%

Performance: Switch between H_2 and N_2 Reduces Safety Concerns During Idle Time



Result: MSD system performance **restored quickly** (within 15-20 min) after switching back to hydrogen from overnight nitrogen carrier flow.

Helium Savings Calculator – Single GC Channel

Extend helium supply and lower cost using conservation techniques

Agilent Technologies

Method: ASTM D4815 - Ethanol in Gasoline

Column: PDMS 30m x 0.53mm x 2.65um

GC Flow Conditions

He Carrier Flow (mL/min):	8
He Split flow (mL/min):	70
Gas Saver Flow (mL/min):	20
Gas Saver On (min):	3
Run Time(min.):	20
Gas Volume in Cylinder (L):	8000
Runs per Day:	30
He Cylinder Cost ($):	300
N2 Cylinder Cost ($):	60

Parameter	No Conservation	Helium Conservation
Daily He Usage (L)	112	21
He Cylinder Life (days)	**71**	**376**
Daily N_2 Usage (L)	0	24
N_2 Cylinder Life (days)	0	340
Yearly He Cost ($)	$1,537	$292
Yearly N2 Cost ($)	$0	$64
Yearly Total Gas Cost ($)	**$1,537**	**$356**

Example

- ASTM Method D4815
  - Widely used to measure ethanol in gasoline
  - Helium cylinder last 2 months under normal operation
- Helium Conservation
  - Helium cylinder life extended to 12 months
  - 4x yearly gas costs per year

Benefits of Helium Conservation

User Programmable for Automated Control

- **Seamless integration**
  - Fully integrated with 7890B and CDS (OpenLAB, Mustang, Mass Hunter)
  - Method includes carrier gas ID and set points for compliance and transfer
  - Easily implemented using new OpenLAB Sleep/Awake functions

- **Greater reliability**
  - Based on proven 5th generation AUX EPC
  - Warning from 7890 if set points are not reached
  - For hydrogen users, nitrogen substitution when GC idle

- **Greater performance**
  - Purge channel prevents cross contamination of gases
  - Acts as an intermediate pressure regulator from the tank to inlet EPC to ensure greater analytical precision

Reduce concerns about He availability!
No change to method eliminates need for revalidation!

Programmable Helium Conservation Module

Ensuring Business Continuity

- Reduces Risk from Helium Shortage
- Seamless Integration into 7890B
- Performance Reliability
- Safe Operation
- Reduced Operating Costs
- Ensures Business Continuity


Thank You!