



Your local **gas generation** partner

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Lab Gas Safety and choosing the right generator

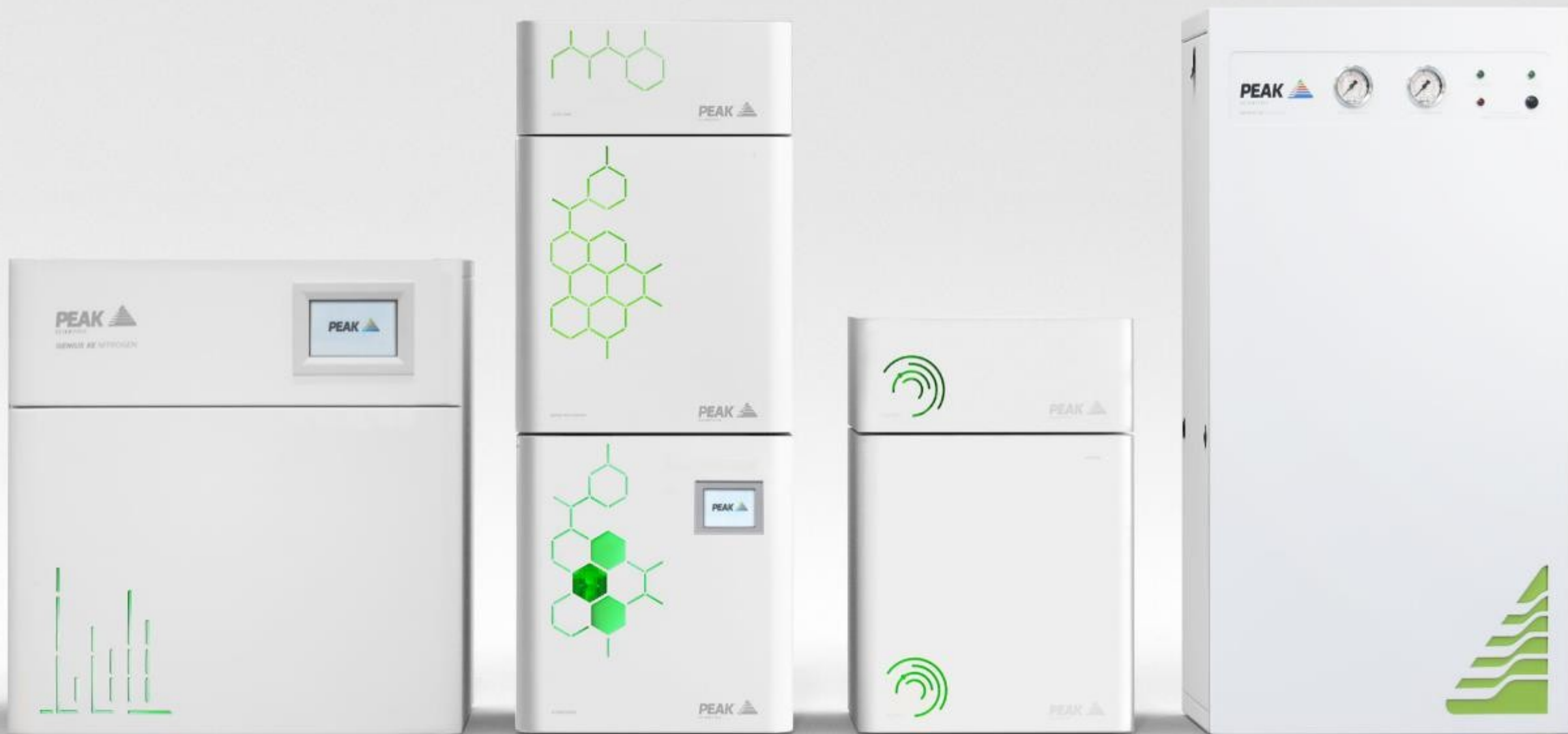


A **PEAK**  gas generation brand

# Today

- Introduction to Peak Scientific, our products & service
- Gas safety in the laboratory
- Covid-19 and gas safety
- LC-MS gas – key considerations
- GC gas – key considerations
- Useful links and further reading

# About Peak, our products & service



## Gas generators for scientific applications

*Business Focus*

**>500 Staff globally**

*Over 50% internationally, outside UK*

**>50,000 generators**

*Global install base*

**Established 1997**

*Over two decades experience in the laboratory gas market*





# Our Promise

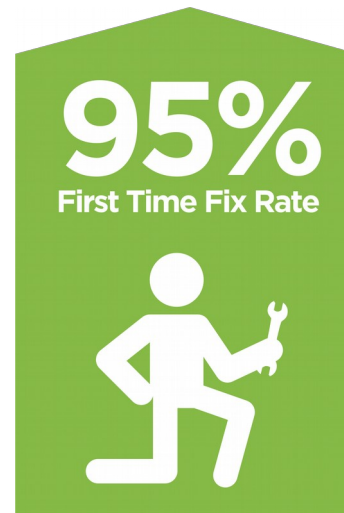
Our commitment is to provide laboratories with a reliable gas generation solution that delivers long term value. We achieve this through exceptional product design, and direct global on-site support that is unmatched in our industry.

We take a vested interest in customer outcomes and strive to be a valued partner in their success by delivering exceptional service over the life of our product.

# Our service – local to you EMEA

Directly supporting our customers in the field is central to our proposition.

**Rapid response** and **>95% First Time Fix Rate** (FTFR) ensures maximum uptime.



# Why a Peak gas generator?

# Gas generators provide a number of benefits



## **Convenience**

Gas on-demand, no cylinders to change or maintain supply stocks



## **Consistency**

Consistent gas quality and supply, no impurities or running out of gas



## **Safety**

No pressurized compressed gas cylinders in your lab



## **Green**

No repeated gas deliveries, energy efficient



## **Economy**

Eliminate on-going costs of cylinders, manage lifetime running costs



## **Independent**

Reduce reliance on third party suppliers for gas deliveries

# Certification



Evaluated and certified to ensure compliance with both EMC and electrical safety of the system in the laboratory environment.



Certified to ensure it can be safely operated, without risk of radiation frequencies causing interference/damage.



Peak gas generators meet the stringent demands of one of the world's most respected safety marks.

# Gas safety in the laboratory

# Gas safety in the laboratory

On-site gas storage has many risks:

- Handling heavy cylinders poses a risk to lab worker health
- Pressurized cylinders contain risk of potential explosion
- Inert gases pose a risk of asphyxiation following leaks from cylinders or dewars
- Hydrogen cylinders have potential to reach explosive limits if displacing air

**All of these dangers can be  
avoided by installing an  
on-site gas generator**



# Nitrogen safety

# Effects of decreasing O2 levels

O2 (Vol %)	Effects and Symptoms
18-21	<b>No discernible symptoms</b> can be detected by the individual. A risk assessment must be undertaken to understand the causes and determine whether it is safe to continue working
11-18	Reduction of physical and intellectual performance <b>without the sufferer being aware.</b>
8-11	Possibility of fainting withing a few minutes without prior warning. <b>Risk of death below 11%.</b>
6-8	Fainting occurs after a short time. <b>Resuscitation possible</b> if carried out immediately.
0-6	Fainting almost immediate. <b>Brain damage</b> , even if rescued.



# Effects of decreasing O<sub>2</sub> levels

- A lab measuring 5m x 5m x 3m has an air volume of 75000L
  - O<sub>2</sub> content would normally be 21% (15,750L)
  - 11% O<sub>2</sub> content is 8250L
- If we displace 7500L, there is a serious risk of death

7500L = <11L LN<sub>2</sub>

7500L = <1 tank of N<sub>2</sub>



**Nitrogen gas generators** only temporarily separate Nitrogen and Oxygen, meaning that they **pose no risk to lab personnel**

# Nitrogen in the lab

Both Nitrogen dewars and cylinders store enough liquid or gaseous nitrogen to pose a significant risk of asphyxiation in the event of a leak.



**LN2 Dewars**

1L of LN2 = 698 L N<sub>2</sub> gas  
50L dewar contains 34,800L gas



**Gas Cylinders**

A 50L cylinder contains 9000L  
gas at 200bar pressure

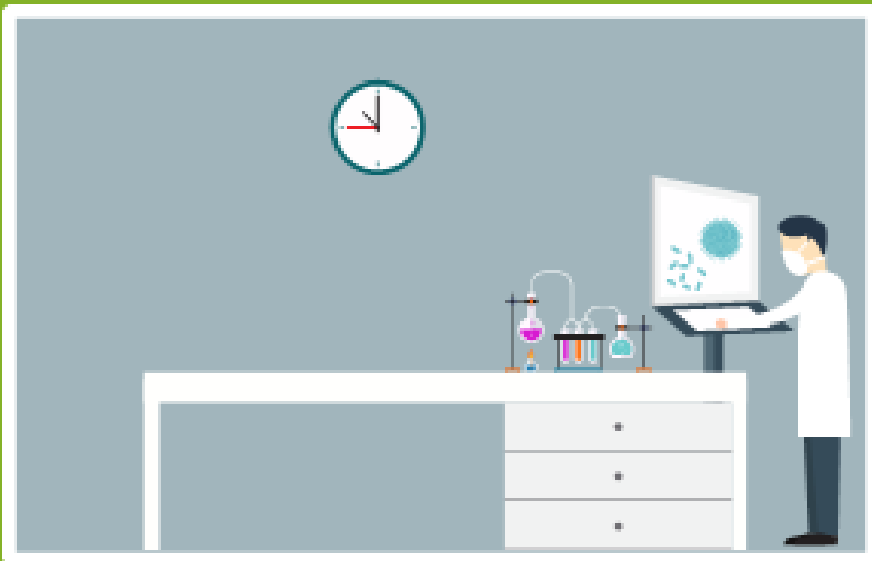


**Gas generators**

Contain <50L gas at <8.5  
bar pressure

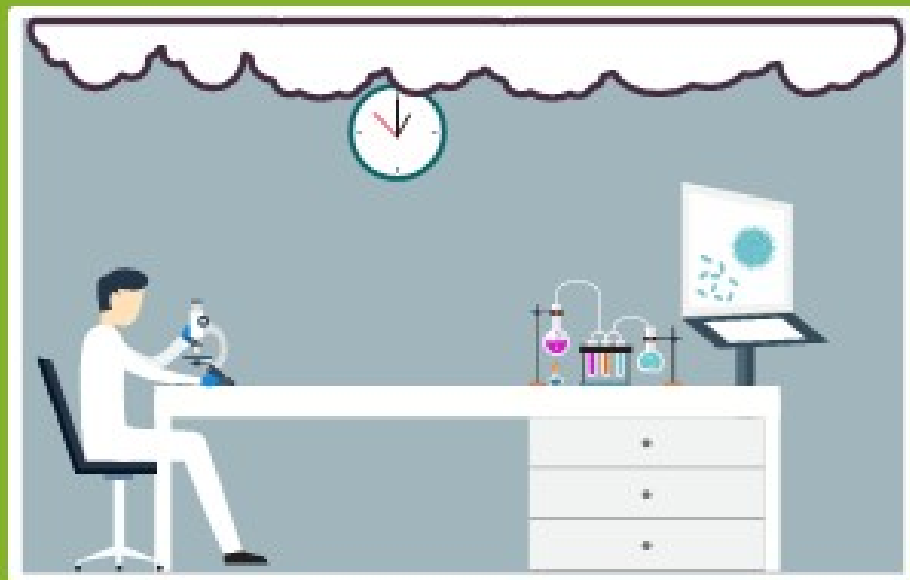
# Hydrogen safety

# Safety - Hydrogen Cylinder vs Hydrogen Generator

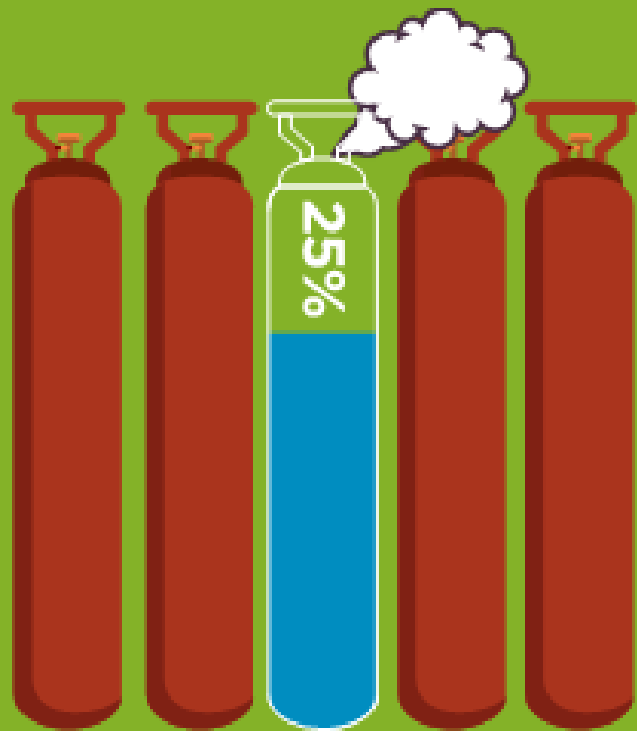


A laboratory measuring 5m x 4m x 2.5m  
has a volume of 50m<sup>3</sup>, or **50,000 litres**

The lower explosive level  
(LEL) of H<sub>2</sub> is only 4.1%

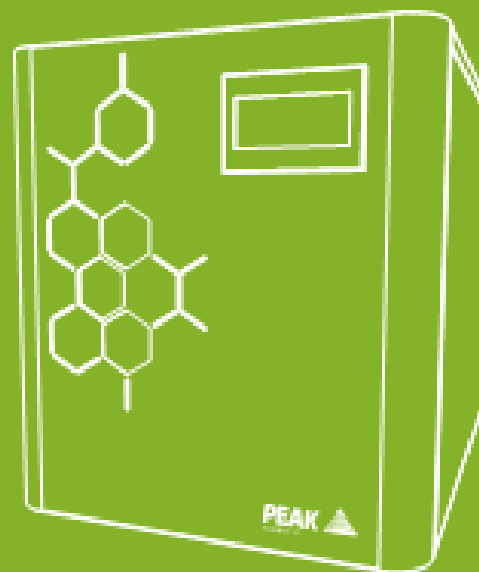


We would only need 2050 litres of H<sub>2</sub>  
to reach the lower limit of LEL



A **50L gas cylinder** contains around **9000 litres** of hydrogen. Therefore releasing **25%** of the contents would reach **LEL**

A Precision **H<sub>2</sub> generator** produces up to **500 cc/min** and would take **almost 3 days** to reach the LEL (and this assumes no escape of hydrogen during this time)





# Hydrogen Generators A Safer Option for You, Your Colleagues, Your Workplace and the Environment

**“there’s no need for us to have helium cylinders on site and no need to change air or helium cylinders at all, so that reduces instrument down time and cylinder manual handling risks.”**

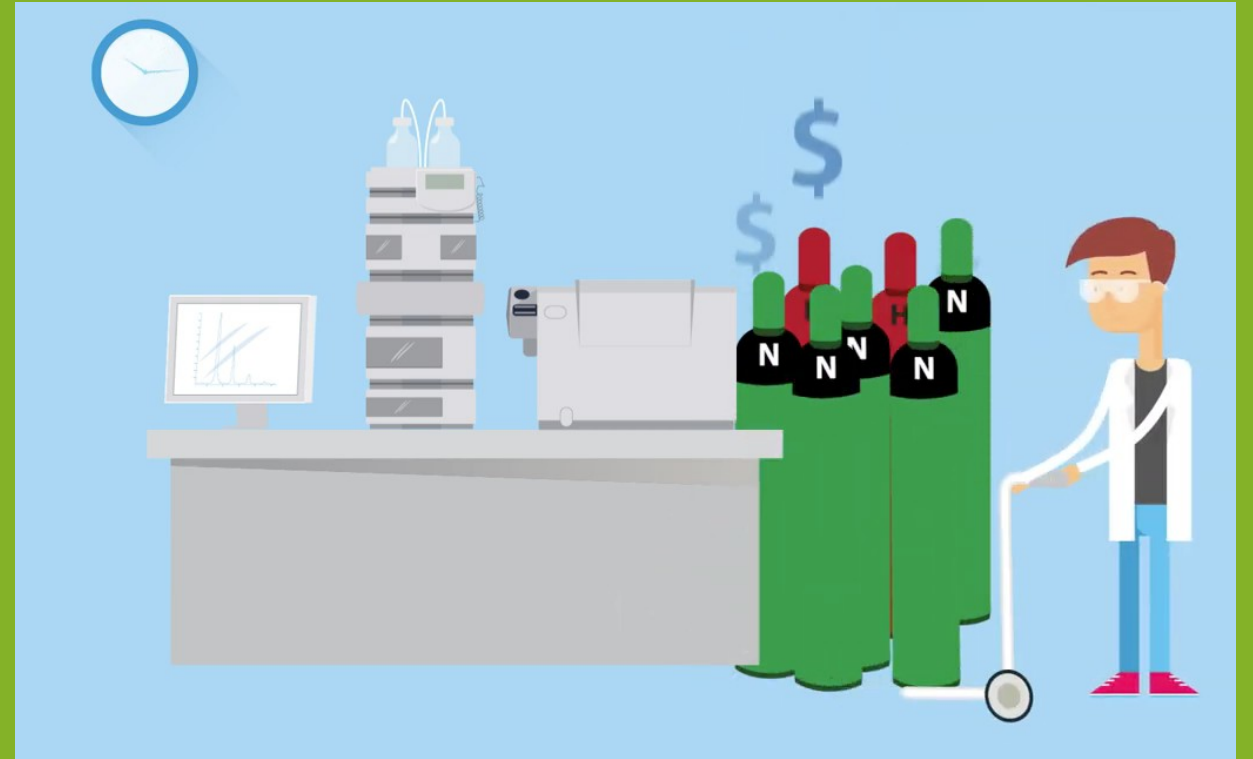
Ian Bennington, Senior Analyst, [Nerudia](#), UK

# Lab Gas Safety & Covid-19

# Reducing contact transmissions with a gas generator

## Deliveries:

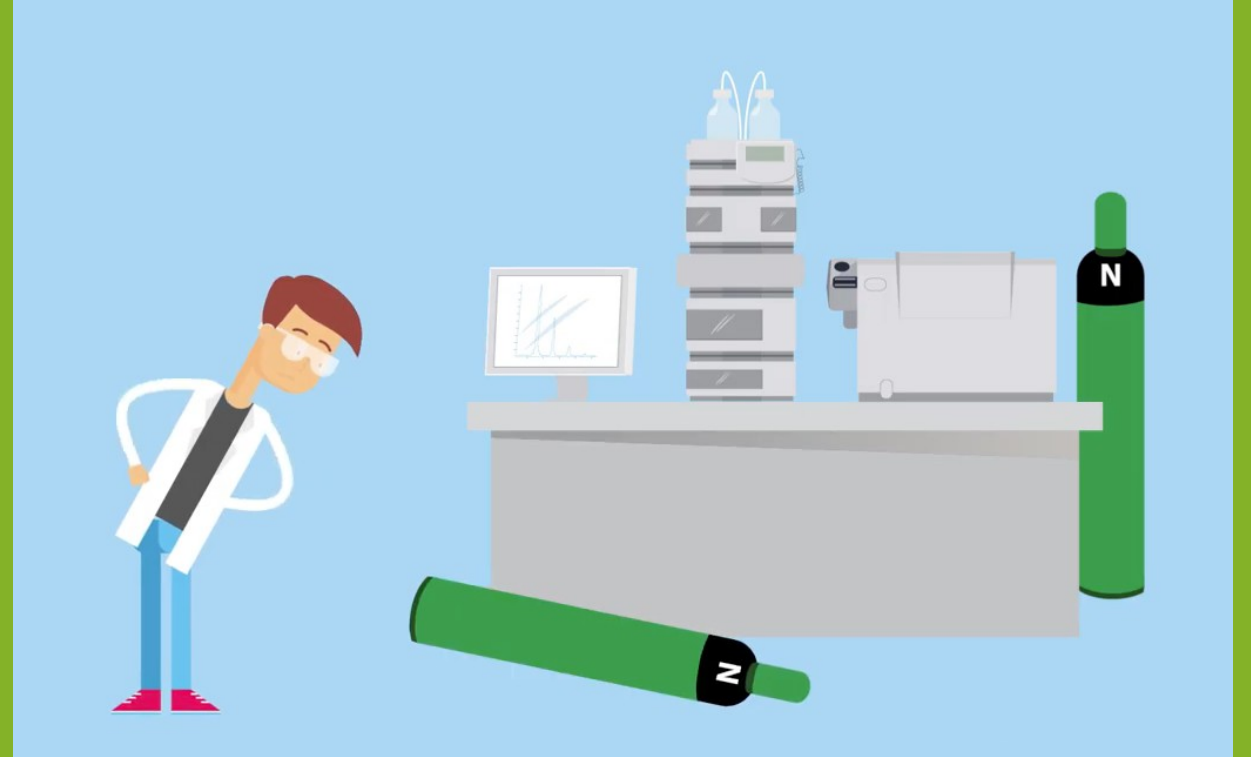
- Consider the number of deliveries to your lab and facility of bottled or liquid gas
- With a gas generator these deliveries can be removed as gas is generated on demand



# Reducing contact transmissions with a gas generator

## Manual Handling

- When changing over cylinders and dewars contact needs to be made with the cylinder and it can be awkward to maneuver
- A gas generator offers simple maneuverability and easy to clean buttons and surfaces to reduce the spread of covid 19 in your facility



# LC-MS gas – key considerations

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## **What do you need to know to find out the best gas solution for your LC-MS?**

- What is your instrument make and model?
- Number of instruments to supply?
- Gas solution validated by instrument manufacturer?
- Is there a suitable compressed air supply in the lab already?
- What level of product support & reliability is needed?

Contact your local Peak Scientific sales representative to find out more or contact Peak Scientific at [www.peakscientific.com/contact](http://www.peakscientific.com/contact)



**Multi-Stage Purification™**  
producing analytical grade N2

**ECO (Electronic Compressor  
Optimization™) Technology**  
for low energy consumption

**Advanced Polymer Hollow Fiber**  
nitrogen membrane technology

**Non-Methane Hydrocarbon (NMHC)**





# Compressor vs compressor free units

## Compressor-based

Plug and play with internal compressor, ready to supply gas



## Compressor-free

Requires a supply of air to operate, either house-air or independent compressor

# GC gas – key considerations

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## What do you need to know to find out the best gas solution for your GC?

- Do you need carrier and/or detector supply?
- Number of GCs/detectors to supply?
- What flow rate/purity is required?
- What level of product support & reliability is needed?

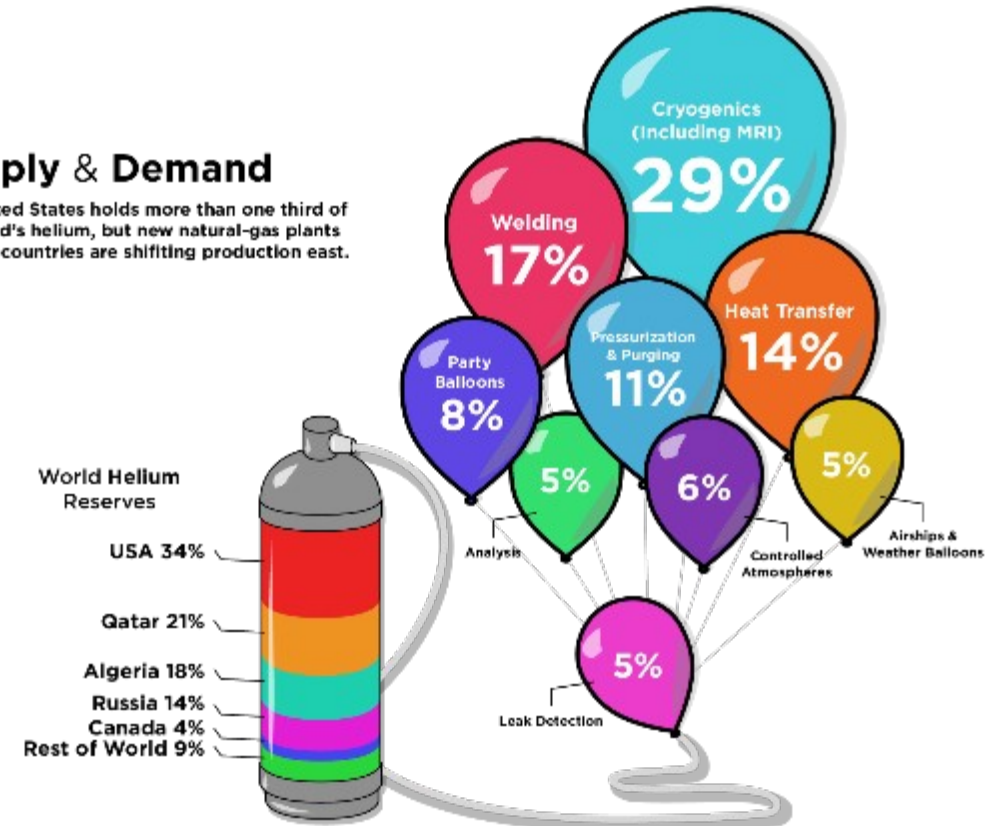
Contact your local Peak Scientific sales representative to find out more or contact Peak Scientific at [www.peakscientific.com/contact](http://www.peakscientific.com/contact)

# Helium shortage

- Helium prices continue to increase
  - >50% increase over the past 10 years
- Supply in many regions is greatly reduced
  - Limited availability for some labs
  - Restrictions on number of cylinders
- Alternative carrier gases can be used for many GC methods
  - Precision H<sub>2</sub> Trace & N<sub>2</sub> Trace
  - Labs having developed their own methods
  - Simple analyses focusing on a small number of analytes

## Supply & Demand

The United States holds more than one third of the world's helium, but new natural-gas plants in other countries are shifting production east.



# Changing carrier gas

- Check that your GC method can use an alternative carrier gas
- Read information on what is involved in [changing carrier gas](#)
- Discuss the best generator options for your lab setup with Peak or input your requirements using the [GC calculator](#)

## Gas Chromatography Method List

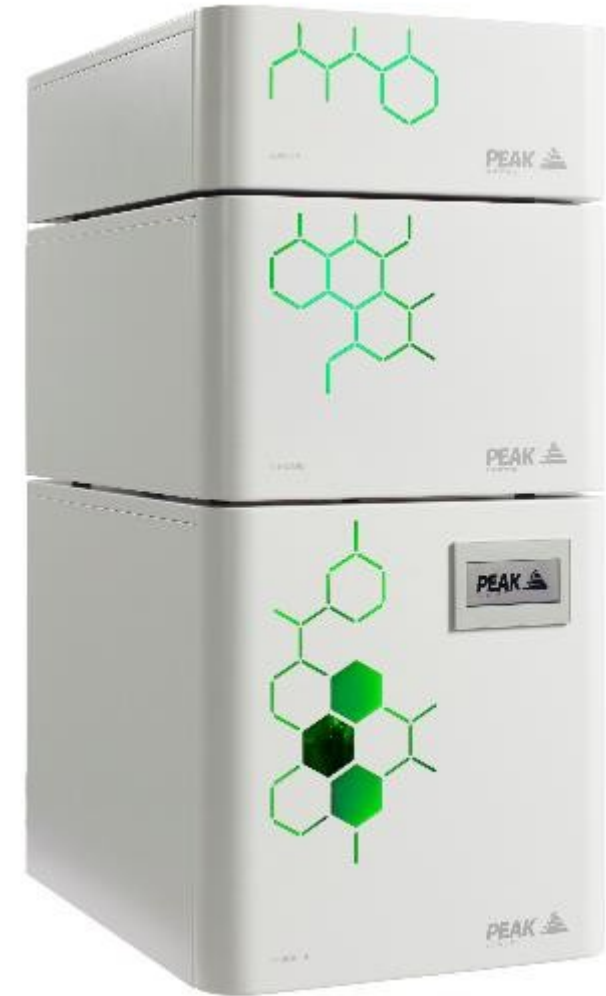


The list below shows methods which have been rewritten to use Hydrogen or Nitrogen carrier gas for GC as an alternative to Helium. This list is correct as of the date at the foot, however, these methods are being rewritten regularly so if you cannot find your customer method below please contact [pmsupport@peakscientific.com](mailto:pmsupport@peakscientific.com). Please note that customers using methods which need helium can also use Precision gas generators for detector or make-up gas.

ASTM Methods				
ASTM Method	Method Title	He	H <sub>2</sub>	N <sub>2</sub>
D2549	Standard Test Method for Separation of Representative Aromatics and Nonaromatics Fractions of High-Boiling Oils by Elution Chromatography	✓		
D2267	Standard Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography/L 2	✓	✓	✓
D4815	Standard Test Method for Determination of MTBE, ETBE, TAME, DiPE, tertiary-Butyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography	✓	✓	✓
D6352	Standard Test Method for Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 °C to 700 °C by Gas Chromatography	✓	✓	✓
D6729	Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Metre Capillary High Resolution Gas Chromatography	✓	✓	
D7096	Standard Test Method for Determination of the Boiling Range Distribution of Gasoline by Wide-Bore Capillary Gas Chromatography	✓		
D7213	Standard Test Method for Boiling Range Distribution of Petroleum Distillates in the Boiling Range from 100 °C to 615 °C by Gas Chromatography	✓	✓	✓
D7398	Standard Test Method for Boiling Range Distribution of Fatty Acid Methyl Esters (FAME) in the Boiling Range from 100 to 615 °C by Gas Chromatography	✓		
D7500	Standard Test Method for Determination of Boiling Range Distribution of Distillates and Lubricating Base Oils—in Boiling Range from 100 °C to 735 °C by Gas Chromatography	✓	✓	✓
D7798	Standard Test Method for Boiling Range Distribution of Petroleum Distillates with Peak Boiling Points up to 538 °C by Ultra Fast Gas Chromatography (UF GC)	✓		
D7607	Standard Test Method for Determination of Boiling Range Distribution of Hydrocarbon and Sulfur Components of Petroleum Distillates by Gas Chromatography and Chemiluminescence Detection	✓		
D5501	Standard Test Method for Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography	✓	✓	

# Precision Series

- **Continuous and consistent supply** of laboratory-grade gas
- **Safer and more convenient** than cylinders or dewars
- Compact, modular, stackable system
- Complete **GC gas solution** from a single generator stack
- **Hydrogen, nitrogen** and **zero air** to supply gas for carrier, detector, reference, flame support and sample preparation
- **Low lifetime maintenance**
- **12 month warranty** across the range, 3 year PEM cell warranty on hydrogen models





# Useful links & further reading

Peak Website: [www.peakscientific.com](http://www.peakscientific.com)

- Product support
- Application notes
- FAQ

Peak ResourceSpace: <http://resources.peakscientific.com>

- User manuals
- Data sheets
- Useful information