

H<sub>2</sub>



It is time to switch from helium to  
hydrogen!

**R** Evolution  
in Gas Generators  
and Calibrators

# What happens with helium?

Helium is running out, prices are rising

**Helium is becoming rare**



Of course, when stocks reach lower levels, prices rise steadily. This is the case with Helium, especially in the last decade.

In just 1 year (2012/2013) the increase in prices was equal to the first decade of 2000.

Also according to the BLM, in 2019, helium prices have increased by about 135%!

Even if Helium is the second most abundant element in the Universe, it's relatively rare on earth, trapped underground with natural gas and mined by the natural gas industry.

Since decades it has been used for many high-tech applications without consideration regarding the fact that it is a non-renewable resource. The Bureau of Land Management – which controls the National Helium Reserve (NHR) – estimates that 0,45 billion m<sup>3</sup>, or around 60% of the U.S. national reserves, have been now sold, many scientists are predicting that a possible

critical shortage of helium could happen in approximately 25 years!

**He prices are rising**

# Hydrogen, the alternative

Helium is essential and cannot be substituted in the largest laboratory use. But today there is an interesting alternative as a carrier gas for gas chromatography: **hydrogen**.

Today, the following gases are used more frequently for chromatography: nitrogen, hydrogen and helium. But **Hydrogen** is more and more preferred: nitrogen is very efficient but as a carrier gas it is very slow while helium, as seen, has higher and higher costs and less availability.



# H2 benefits

Hydrogen has numerous advantages, covering technical and economic aspects:

- **Costs savings:** Hydrogen as carrier gas is less expensive.
- **Security:** in supply, hydrogen is an abundant and renewable resource
- **Speed:** hydrogen is faster than helium. Hydrogen has the lowest viscosity at any temperature.
- **Productivity:** the reduction of noise and analysis times compared to HE and N2 has a positive impact on laboratory productivity
- **Less spares:** Hydrogen use allows to decrease the temperature for separation, improving the column longevity
- **Availability:** it can be generated with water everywhere

# H2 gas generators

Practitioners looking to switch to **Hydrogen** can get numerous guides and software packages to facilitate the process and speed up the transition.

Today the benefits of using hydrogen for **GC** and **GC / MS** applications are supported by on-site hydrogen generators. **H2** can be generated anywhere with water electrolysis and on request.



# Hydrogen is safe!

A main argument against hydrogen is about safety because it can form an explosive mixture with air. But for many reasons, a growing number of laboratory analysts are using Hydrogen generators as strong safety improvements are being generated. Furthermore, in laboratories, it is now very difficult to reach the explosion limits because all are equipped with with regular air recycling.





# Hydrogen is safe!

Hydrogen generators are safer than gas cylinders.

## Less quantity

Gas cylinders: roughly 2000 liters, 200 bar  
Generators: up to 40 ml

## Automatic switch off

on internal or external detection through accurate pressure monitoring

## Less risks of leaks

no removal of cylinders and their numerous connections: risk of leaks and errors!

## On-demand gas

Generates only the required amount of H<sub>2</sub> which is supplied directly to the GC.  
No stop of supply.

## No transport

The cylinders are bulky and their transport in the laboratory is dangerous

## H<sub>2</sub> sensors

continuously check if hydrogen is released into the atmosphere



# Why LNI H2 generators?



## Savings

No extra charges or fees, very low maintenance costs, energy savings.



## Green

Unique energy saving functions, remote maintenance. Reduced foot prints.



## Safety

Unique security features like an on-board CPU to reveal any internal leaks.



## Technology

Exclusive and patented solutions like the GLS electronically controlled.



## Efficiency

High flows, purity up to 99,99999%, continuous on-demand operation. Up to 20 units in parallel mode



## Worldwide presence

LNI is present on all continents with sales & service assistance.



## Convenience

Small, light, stackable units (some models) and silent generators.



## Smart

Plug & Play functions, LCD touch-screen for simple management.

H<sub>2</sub>

N<sub>2</sub>

Air



# Why LNI H2 generators?

LNI Swissgas is the genuine multinational reference in manufacturing in Premium Hydrogen generators suitable for any application and in particular the GC one.

Over thirty years of know-how, intense research and development in products and technologies, and 100% in-house production in order to always offer the best innovative solutions and meet the most specific needs of customers.

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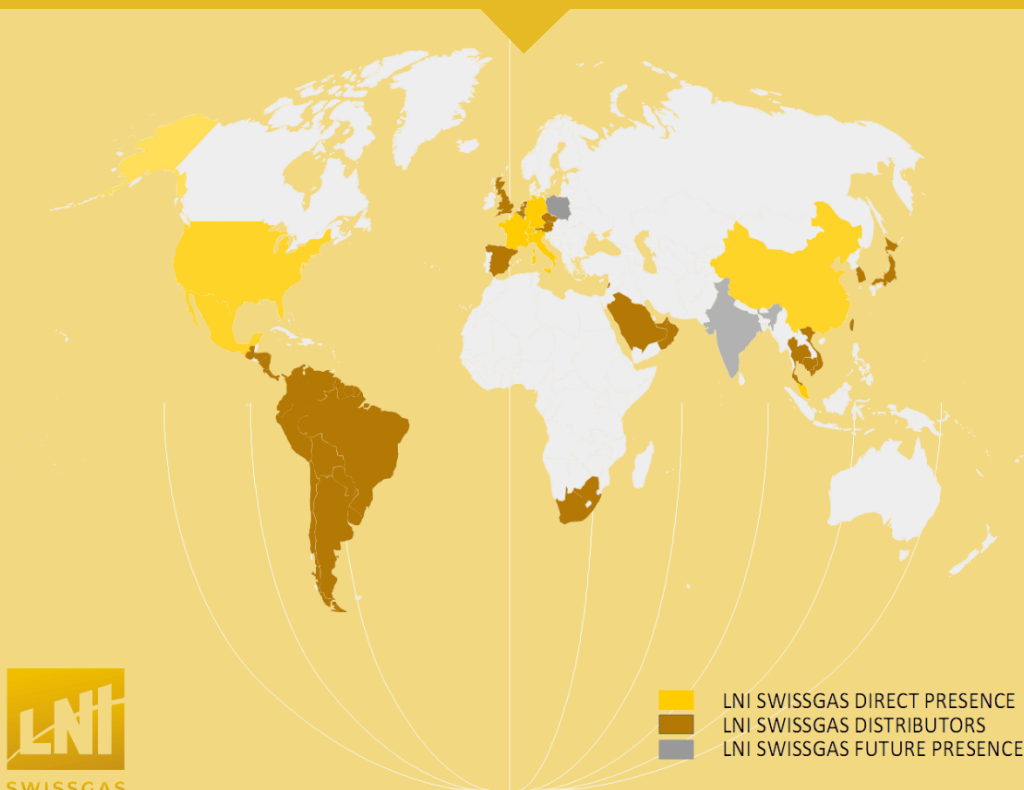
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