

BIP[®] technology

Changing the way you
think about high purity gas

²
He
Helium
4.0026

⁷
N
Nitrogen
14.007

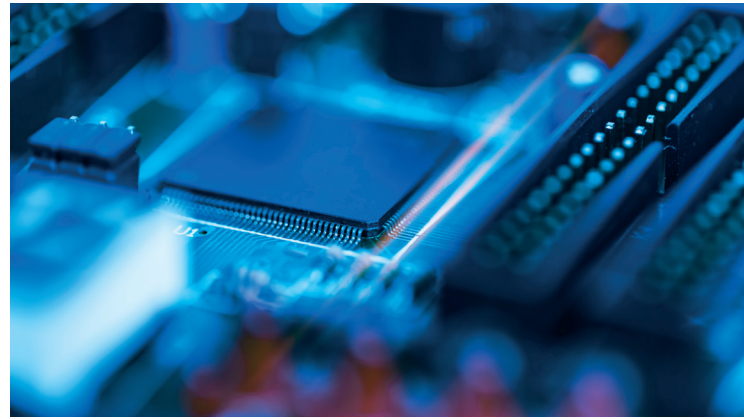
¹⁸
Ar
Argon
39.948

¹
H
Hydrogen
1.008

Minimum impurities for maximum peace of mind

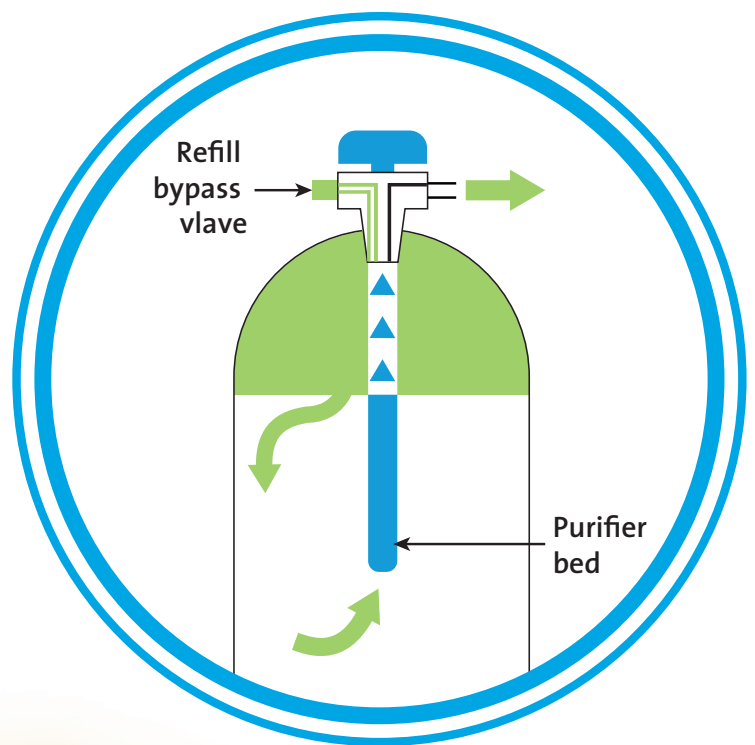
The BIP® range of gases are available with a minimum purity grade of 6.0, however is purity everything?

Even with a purity level of 99.9999% what exactly is in the other 0.0001%? Despite being an extremely tiny percentage, what if some “active” impurities were still affecting your results and processes? Air Products’ ultra-high purity gases delivered with BIP® technology guarantee the market’s lowest possible levels of potentially harmful impurities: oxygen (≤ 10 ppb), moisture (≤ 20 ppb) and total hydrocarbons (< 100 ppb).



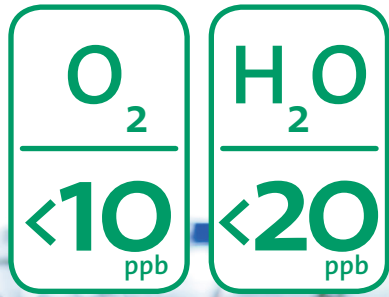
BIP® Technology

The BIP® technology hidden in every cylinder uniquely filters out potentially damaging impurities before the gas leaves the cylinder. By incorporating BIP® technology, impurities are more effectively removed because purification is carried out at high cylinder pressures and, thanks to our innovative design, the purifier is protected from damage and sealed away from atmospheric contamination.



“The slightest contamination could compromise our isotope measurements or damage our equipment. BIP® technology has enabled us to balance our technical demands with cost constraints.”

Cyril GIRARDIN, Engineer, INRA, France



Ultra-high purity and ultra-low impurities

Ultra-high purity gases are the only gases that we put into our BIP® cylinders, this combination produces gases which are up to 300 times purer than normal gas cylinders. By starting with ultra-pure gas and delivering it through our award winning BIP® technology we can guarantee the lowest levels of impurities available in the marketplace today.

BIP® gases have a minimum purity of 6.0, however higher specification grades have been developed for more demanding applications. The table below shows BIP® family of gases, with minimum purity levels of up to 6.8, for specific gases.

For those using GC-ECD (Electron Capture Detector) technique, where low levels of halocarbons are demanded Air Products has developed an ECD grade for both nitrogen and helium gases (<1 ppb)



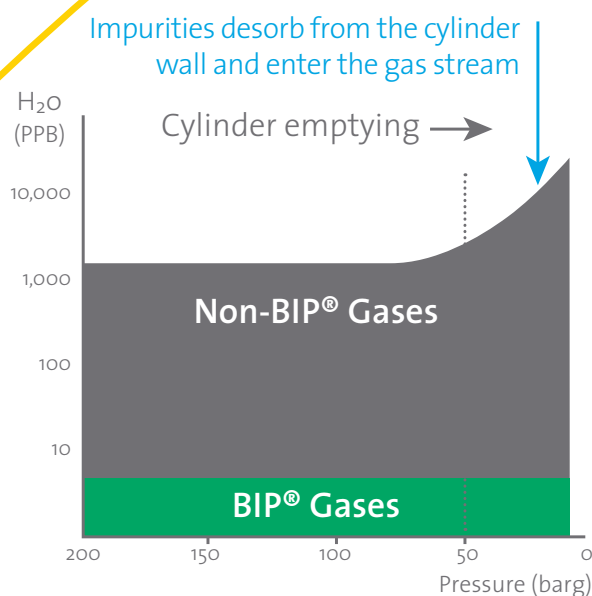
| Gas | Helium (4.0026) | | | Nitrogen (14.007) | | | Hydrogen (1.008) | | Argon (39.948) | |
|---------------------------|-----------------|------------|------------|-------------------|------------|-----------|------------------|------------|----------------|------------|
| Grade | BIP® | BIP® Plus | BIP® ECD | BIP® | BIP® Plus | BIP® ECD | BIP® | BIP® Plus | BIP® | BIP® Plus |
| Purity | 6.0 | 6.7 | 6.0 | 6.0 | 6.8 | 6.0 | 6.0 | 6.6 | 6.0 | 6.6 |
| O ₂ | < 10 ppb | < 10 ppb | < 10 ppb | < 10 ppb | < 10 ppb | < 10 ppb | < 100 ppb | < 100 ppb | < 10 ppb | < 10 ppb |
| H ₂ O | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb | < 20 ppb |
| THC* | < 100 ppb | < 50 ppb | < 100 ppb | < 100 ppb | < 50 ppb | < 100 ppb | < 10 ppb | < 10 ppb | < 100 ppb | < 50 ppb |
| CO + CO ₂ | < 100 ppb | < 50 ppb | < 100 ppb | < 500 ppb | < 50 ppb | < 500 ppb | < 100 ppb | < 50 ppb | < 100 ppb | < 50 ppb |
| H ₂ | — | < 100 ppb | — | < 200 ppb | < 50 ppb | < 200 ppb | — | — | — | — |
| CFC** | — | — | < 1 ppb | — | — | < 1 ppb | — | — | — | — |
| N ₂ | < 1000 ppb | < 100 ppb | < 1000 ppb | — | — | — | < 1000 ppb | < 200 ppb | < 1000 ppb | < 300 ppb |
| NO _x | — | — | — | < 100 ppb | < 20 ppb | — | — | — | — | — |
| SO ₂ | — | — | — | — | < 20 ppb | — | — | — | — | — |
| Certificate of conformity | Batch | Individual | Batch | Batch | Individual | Batch | Batch | Individual | Batch | Individual |

* THC = total hydrocarbons as CH₄ ** CFC = halocarbons

Saving you money

As a standard cylinder starts to empty, impurity levels increase as they desorb from the cylinder wall. These impurities can not only affect your processes, they can also contaminate the gas supply line. And the problem only gets worse as the pressure drops further within the cylinder. As a result of this phenomena, users typically switch to a full cylinder once it drops below a certain pressure. This value varies, but is usually found to be in the 30-50 bar range.

With BIP® technology this is not a concern as potentially harmful “active” impurities are removed. This enables the use of gas to a point beyond which cylinders would typically be switched, providing users with potentially up to 20% additional usable gas from each cylinder.



No more inline purifiers

When you switch to BIP® gases, concerns about impurities become a thing of the past. There is no longer any need for inline purifiers, removing not only the cost of purchasing them, but also the time it takes to maintain, service and dispose of them once saturated.

Extended column life for Gas Chromatography users

By minimising the impurity content of oxygen, moisture and hydrocarbons in your carrier gas you can potentially significantly improve the life of your column. In an independent case study with a leading laboratory, they observed that column life was extended from 24.5 days to 104 days by switching to BIP® Helium from standard Helium 5.0.



“The BIP® cylinder technology from Air Products has demonstrated the potential for cost savings up to 70% in the FAME (fatty acid methyl ester) analysis system.”

Dr. A Edge, Case study partner, UK

Perfect for Gas Chromatography

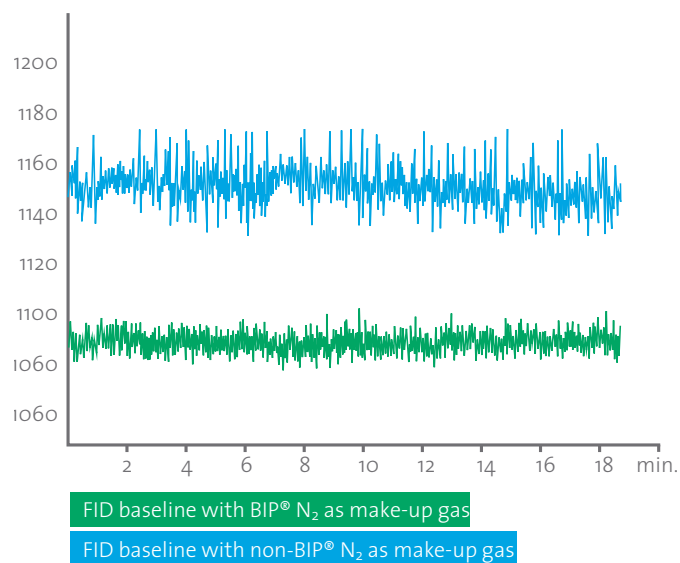
Minimising impurities is rarely more important than during gas chromatography. Oxygen, moisture and hydrocarbon content within your carrier gas can cause column bleed and reduce column life, and also affect your detection limits. To minimise these impurities from entering the column, a number of gas chromatography users rely on external inline purifiers.

Inline purifiers may help, however they can introduce a significant service and maintenance program to your system;

- Performance of purifiers needs to be tracked, just how many cylinders of gas can travel through them before they need to be replaced?
- There is the inconvenience of system downtime when purifiers need to be replaced.
- The spent purifier, now treated as chemical waste, needs to be disposed of in accordance with regulations.

BIP® gases offer not only a simpler solution, but can also improve your results and save you money. With the lowest levels of oxygen, moisture and hydrocarbon impurities straight out of the cylinder, there is no need for inline purifiers, immediately removing the financial and time costs associated with them.

BIP® gases – Performance with GC-FID



“GC operators often pay very little attention to the purifiers. It is difficult to check whether they are still working properly, and they are rarely maintained to specification. Gases using BIP® technology decrease the maintenance efforts in a GC laboratory.”

- Dr. Frank David, Research Institute for Chromatography

BIP® technology, award winning innovation

When it was launched, BIP® technology received the Queen's Award for Innovation in the UK. Today, there are thousands of loyal BIP® gas customers throughout Europe, including leading manufacturers of analytical equipment and several national laboratories.

What our customers have to say...

"Switching over to BIP® cylinder technology is very easy because no adaptation of the current system is required."

Dr Frank David, R&D Manager, Research Institute for Chromatography, Belgium.

"We dramatically improved the performance of our glove boxes with increased lifetime of the catalyst and reduced regeneration downtime. We wouldn't recommend anything other than BIP® cylinder technology and its very low levels of H₂O and O₂."

Arend Kooi, Sales Manager MBRAUN Glove Boxes, BFI OPTILAS B.V., The Netherlands

"In our business, we cannot afford any production stops ... with BIP® technology we now have an insurance on product consistency for each single cylinder we use, from the first to the last molecule."

Willem van Wijk, Production Manager from Alcontrol Laboratories BV Nederland.

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