

# Stable Isotopes

## for Environmental Monitoring



### Key Benefits

- High analytical accuracy of the isotopic ratio, required composition and targeted isotope signature for various pure gases and mixtures
- Increased analyzer calibration efficiency
- Isotopic composition adjusted for each of your products, matching International standardized values

### Rely on an expert partner for your measurements

Understanding the long term changes in the atmospheric composition as well as the origin of pollutants is critical for predicting the impacts on the world and the people in it.

To do this, having comparable results from the various measurement locations around the world is essential. The global scientific community has therefore developed advanced and standardized analytical methods, including isotopic analysis. Isotopic signatures have become useful tools for a more comprehensive understanding of pollution sources.

To aid in this essential research, Air Liquide has developed a range of stable ratio reference gases for Atmosphere monitoring analysis. Our Natural Air product features the same specifications as the Natural Air reference gas defined by the World Meteorological Organization (WMO).

Air Liquide is the first and only gas supplier to propose a complete standardized offer for stable isotopic analysis globally.

With 30+ years of experience in production of specialty gases and applications, as well as strong recognized R&D capabilities, you can trust Air Liquide to ensure product quality, availability and responsiveness.

# A product range dedicated to stable isotopic analysis

Air Liquide's offer provides a high purity level and very precise specification of the isotopic ratio of the molecules to ensure accurate analysis and calibration.



Part of the **ALPHAGAZ™** product range, Air Liquide's premium brand of specialty gases for analytical applications, the Isotopes product range for Environmental Monitoring consists of Isotope Natural Air and Isotope Natural Air standard products with tuned components such as CO<sub>2</sub> and other critical greenhouse gases (GHG):

- Natural Air standard
- Natural Air without CO<sub>2</sub> for calibration
- Natural Air with various concentrations of CO<sub>2</sub>

Natural Air with other molecular or isotopic compositions of N<sub>2</sub>O, CO, SF<sub>6</sub>, etc... are also available on demand.

All **ALPHAGAZ™ products** are made to guarantee high accuracy and repeatability of analysis.

## Simpler choices

- A straightforward range to meet the most common needs of our customers.
- Low- and high-pressure cylinders available in multiple sizes.
- A selected range of gas handling equipment to ensure high accuracy in use.

## Quality you can depend on

- Dedicated expertise to offer accuracy and traceability.
- Delivered with Certificate of Analysis.

## Reliable service

- Guaranteed reliable lead time to meet your requirements.
- Ready-to-ship standard products.
- Custom products with specific molecular and isotopic compositions can be designed upon request to satisfy your unique requirements.
- Experts and front office teams to support you from feasibility and quotation, to delivery at your facility.
- Commitment to move the industry forward, by bringing innovations into the labs and implementing new industry standards.

# ALPHAGAZ™ Isotope Natural Air Standard Products

ALPHAGAZ™ Isotope	Composition	Delta value
Natural Air	CO <sub>2</sub> 360 - 450 ppm CH <sub>4</sub> 1700 ~ 2100 ppb CO 30 - 300 ppb N <sub>2</sub> O 320 - 335 ppb SF <sub>6</sub> 8 - 10 ppt H <sub>2</sub> 450 - 600 ppb SO <sub>2</sub> < 60 ppt NO <sub>2</sub> < 50 ppt NO <sub>x</sub> < 50 ppt NO < 50 ppt	CO <sub>2</sub> , δ <sup>13</sup> C = -7.5 ~ -9.5‰ VPDB CO <sub>2</sub> , δ <sup>18</sup> O = -2 to +2‰ VPDB
CO <sub>2</sub> in Natural Air	250 to 520 ppm of CO <sub>2</sub>	CO <sub>2</sub> , δ <sup>13</sup> C = -7.5 to -9.5‰ VPDB CO <sub>2</sub> , δ <sup>18</sup> O = -2 to +2‰ VPDB
Natural Air without CO <sub>2</sub>	< 50 ppb of CO <sub>2</sub>	N/A
Standard Package	Cylinder: Aluminum 20L, 50L Valve: Rotarex D200 Connection: DIN14	

## Custom products

Elements	Delta Ratio of	Range	Gas Selections
C	δ <sup>13</sup> C ‰ VPDB	-70 to +20	Air, CH <sub>4</sub> and mixtures
C	δ <sup>13</sup> C ‰ VPDB	Please inquire	C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> , n-C <sub>4</sub> H <sub>10</sub> , i-C <sub>4</sub> H <sub>10</sub> , n-C <sub>5</sub> -H <sub>12</sub> , i-C <sub>5</sub> H <sub>12</sub>
O	δ <sup>18</sup> O ‰ VSMOW	-30 to +10	CO, CO <sub>2</sub> , Air and mixtures
H	δ <sup>2</sup> H ‰ VSMOW	-300 to +100	CH <sub>4</sub> and mixtures
H	δ <sup>2</sup> H ‰ VSMOW	Please inquire	C <sub>2</sub> H <sub>6</sub> , C <sub>3</sub> H <sub>8</sub> , n-C <sub>4</sub> H <sub>10</sub> , i-C <sub>4</sub> H <sub>10</sub> , n-C <sub>5</sub> -H <sub>12</sub> , i-C <sub>5</sub> H <sub>12</sub>
N	δ <sup>14</sup> N ‰ AIR	-20 to +20	N <sub>2</sub> , N <sub>2</sub> O, NO <sub>x</sub> , Air and mixtures
S	δ <sup>34</sup> S ‰ VCDT	-20 to +20	SO <sub>2</sub> , H <sub>2</sub> S and mixtures
S	δ <sup>34</sup> S ‰ VCDT	-25 to +25	SF <sub>6</sub> and mixtures (under development)

## Convenient Packaging

- ALPHAGAZ™ Natural Air is available in B20 or B50 size cylinders. Additional sizes are available upon request.
- High pressure returnable or low pressure disposable cylinders available upon request

All of our cylinders are tracked by barcodes, ensuring an optimized inventory management.

## A la carte services

- Local customer service with on-site cylinder management
- Express delivery
- Gas safety training
- Proficiency testing scheme

Check the availability of these services with your local sales representative.

## Your local Stable Isotopes contact

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