Airborne Labs International

No-Haz Feed Gas Analysis™

Getting Started

Below is some basic information concerning *ALI's* unique ***No-Haz Sampling-Shipping Kits™*** and accessories for **CO_2 *Feed Gas* Characterization** applications.

A major advantage of our ***No-Haz Kit*** is that you do not need hazmat-certified staff to legally and properly ship your samples!

To properly sample your ***Feed Gas*** using a ***No-Haz Kit***, you might need to rent or purchase from *ALI*:

- A small sampling pump (*Calipump-1S*™*or Model 222) if your ***Feed Gas*** pressure is less than 5 psig (0.34 barg).
- A passivated pressure regulator (PR-1S) if your ***Feed Gas*** pressure is above about 30 psig (2 barg).
- A gas cooling / condensing accessory (HFC-222) if your ***Feed Gas*** source is above about 50°C (122°F).
- Sampling accessories for specialized testing (ex. impingement, sorbent tubes, detector tube testing, particulate / bio-agent collection) that are recommended for some types of ***Feed Gas*** sources.

**** Note:*** *A Calipump-1S is required for low pressure* ***Feed Gas*** *sources requiring specialized testing accessories*

Our Simple 3-Step CO_2 Test Program Start-Up Process:

1. **SURVEY & QUOTE:** To better understand your CO_2 ***Feed Gas*** Testing needs, we ask that you complete a brief ***Feed Gas* Source** survey so that we can design a quote which will include the recommended kit, accessories and testing program. Once our quote is accepted, a Pro Forma Invoice is generated and sent along with payment information. ***Note****: For wire-based transactions, ALI ships your order immediately upon bank confirmation of funds receipt.*

2. **SAMPLING &SHIPPING:** Upon kit delivery, you would perform all ***Feed Gas*** sampling as per our pictorial instructions and training videos, complete the Analysis Authorization form, then repack the sample containers into the shipping case and return them to us as a *NON-HAZMAT.* Two kit shipping service options are available; Round Trip (RT) pre-paid shipping using *ALI's* FedEx courier (recommended), or kit return shipping by your courier (an *ALI approved* courier is required). If the RT-prepaid option is selected, you simply adhere an *ALI* supplied FedEx return address sticker and contact them for pick up right at your door and delivery right to our door!

3. **TESTING & REPORTING:** Testing is performed within 3-5* business days after a kit is received**.** A test report is e-mailed to the contact(s) identified on your "Analysis Authorization" form.

   **Expedited service is available upon request and subject to additional fees.*

Purchase of a ***No-Haz Kit*** is highly recommended for rapid, convenient sampling whenever it is needed.

Thank you for your interest. To get started, please send us your exact ship / bill to address, contact name, phone number, e-mail address and completed ***Feed Gas*** survey to sales@airbornelabs.com for a quotation.

We look forward to being of service to you!

Don Pachuta

Dr. Don Pachuta, President

22C World's Fair Drive | Somerset, NJ 08872 USA | **T:** (+1) 732-302-1950 | **F:** (+1) 732-302-3035
www.airbornelabs.com | ISO/IEC 17025:2005 Accredited Laboratory

No-Haz Feed Gas Sampling™

Selecting your Test Program

CO_2 ***Feed Gas*** profiling is an essential element of any study concerning the economic potential of a new CO_2 industrial source as well as monitoring if any *changes* in composition are occurring in an existing stream. Unexpected changes in ***Feed Gas*** composition are a *major* cause of quality upsets in the production of beverage-grade liquid CO_2. A wide variety of ***Feed Gas*** sources are employed for worldwide, commercial production of liquid CO_2. Each source has its own *unique set* of potential impurities that must be identified and monitored by a proper analysis program. Further information about potential impurities present in common CO_2 ***Feed Gas*** streams can be obtained from ISBT, CGA and EIGA publications.

Not only is obtaining a % CO_2 value important in all cases, but a *thorough* analysis can also provide critical information about the *types and levels of all chemical impurities present*. This impurity data is crucial for the proper design of any new CO_2 production plant and also vital for active plants in order to ensure that effective impurity removal can be *maintained* should the impurity load increase over time.

For existing sources, ISBT 2010 Bulk CO_2 Quality Guidelines recommends that at least (1) ***Feed Gas*** analysis be performed per year, and more frequently depending on source variability (ex. change in underground well source). Major beverage manufacturers also mandate periodic ***Feed Gas*** monitoring from their CO_2 suppliers and establish required analytical programs based upon the potential impurities that can be encountered from a specific source.

Customers need to select a test program that is optimal for their ***Feed Gas*** source and program objectives (ex. new plant design, evaluation of source commercial viability, contractual compliance of a purchased stream, bottler requirements, risk assessments, etc.). Two general *ALI* test programs are offered in addition to a specialty test addition option.

Based upon your Feed Gas Survey answers, ALI will recommend an optimal test program including any specialized tests and generate a formal quotation for you.

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No-Haz Feed Gas Testing

Test Program Options

1 STANDARD TEST PROGRAM:

Recommended for well characterized sources with a limited list of possible impurities and good historical consistency.

Includes:

- ISBT list defined impurities
- Other target (source-dependent) organic impurities

2 ADVANCED TEST PROGRAM:

The most selected program & recommended for new potential sources or sources with a complex list of potential impurities or sources with historically inconsistent impurity profiles

Includes:

- ISBT list defined impurities
- Other target (source-dependent) organic impurities
- Sophisticated GC/MS and / or FTIR scans for possible 'unexpected' source-specific impurities

This program includes all major bottler listed target impurities and meets their ***Feed Gas*** testing requirements for their CO_2 suppliers.

3 OPTIONAL SPECIALIZED TESTS:

*These include highly **Feed Gas** source dependent, targeted tests. Many are useful for fermentation based sources, biogas-based sources, industrial process, troubleshooting potential **Feed Gas** related CO_2 quality issues , or new, not-well studied sources – for toxic agent assessments.*

Examples of Specialized Tests (requires non-std sampling accessories & equipment):

- Mercury (Hg, vapor / volatile organic forms)
- Trace metals (ex. As, Se, Sb, Pb, Cu, Cd, Zn, Mn, Fe, Cr, Sn, & others)
- Volatile organic halides (VXC) - includes a list of common refrigerants, halogenated solvent-like impurities
- Acid Halide Vapors (ex. HCl, HBr, HI, HF, HNO_3, H_2SO_4)
- Halogens (Cl_2, I_2, Br_2, F_2)
- Inorganic Anions: SO_3^{-2}, SO_4^{-2}, S^{-2}, CN^{-1}, NO_2^{-1}, NO_3^{-1}, Cl^{-1}, Br^{-1}, I^{-1}, F^{-1}, PO_4^{-3}, SiO_4^{-4})
- Pipeline additives (ex. anti-corrosive agents)
- Particulate matter (>0.5 um particles, ex. soot, carbon bed fines, mists, ash, fibers, rust / oxides, silicates, clays)
- Inorganic Cations: (Na^{+1}, K^{+1}, Li^{+1}, Ca^{+2}, Mg^{+2}, NH_4^{+1})
- Vegetable oil mists (bio-fermentation)
- Fatty Acids (bio-fermentation / biogas specific)
- Siloxanes (Landfill Biogas specific)
- Radionuclides (ex. Radon^{222} - natural well specific)
- Bio-agents (varied)
- Dry Ice additives (ex. glycols / glycerols)

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Non-Hazardous "No-Haz"
Division 2.2 Gas Sample Kit Shipments
by I.A.T.A. Definition

Dear Customer,

This letter concerns shipment of ***non-compressed*** Division 2.2 (non-flammable, non-toxic) gases including, for example: air, carbon dioxide (CO_2), oxygen (O_2), nitrogen (N_2) argon (Ar) sulfur hexafluoride (SF_6) samples in limited quantities to our laboratory for quality control testing. We have been assured by recognized experts at the International Compliance Center Ltd. and courier HAZMAT specialists that Division 2.2 gas samples that are taken according to supplied directions and shipped in our *No-Haz* Sampling & Shipping Kits (which include gas sampling bags and minicyls) can be properly labeled and shipped as a "***non-hazardous commodity sample of no commercial value"***. The technical reasons for this non-hazardous classification of Division 2.2 gas samples taken in our "*No-HAZ*" kits are as follows:

1.) Division 2.2 gases are those that have non-flammable and non-toxic properties. These gases are properly classified as dangerous materials (hazmat) **only** when they are **compressed** or **liquefied**. A compressed Division 2.2 gas is defined in IATA regulations as one which is "transported under pressure **at or above** 200 kPag (gauge) = 2.97 atm = 43.7 psia (29 psig) @ 20°C". This means that Division 2.2 gas samples should **not** be classified as hazmat if it is contained and shipped at a pressure **less** than this "compressed gas" definition value. As the pressure inside of a gas sampling bag is essentially 0 psig (14.7 psia) @ 20°C, it does not meet the conditions necessary for it to be IATA-defined as a hazardous material. Therefore **non-compressed** Division 2.2 gases in a sample bag is **not** a Div. 2.2 hazmat. The weight of Division 2.2 gas contained within a 2-3 x 2L sample bag is no more than approximately 37 g = 0.037 kg. The maximum acceptable amount of compressed gas meeting Division 2.2 HAZMAT definition requirements for passenger aircraft is 75 kg and 150 kg for cargo aircraft.

2.) The same IATA "exemption" definition descriptions outlined for a gas sampling bag **also** pertain to a non-compressed Division 2.2-defined gas samples stored in our minicyls. A minicyl is a small (ex. 75 – 500 cc [0.075 – 0.5L]) capacity US DOT cylinder that can be charged with **no more than** 25 psig of Div. 2.2 gas (fill-limited by a 25 psig check valve). Because of its design, the **non-compressed**, minimal amount (approx. 0.22-1.5L) of gas sample contained within a minicyl does **not** meet the definition of a Div 2.2 hazardous material. Therefore, **non-compressed** Div. 2.2 gas sample contained in a minicyl is **not** IATA-defined as hazardous material as per it's "exemptions" description.

3.) Concerning any small sorbent tubes (ex. charcoal tubes) or nylon filters that may be periodically included with these kits, these materials are not I.A.T.A. Hazmat-listed.

It is the prerogative of your designed carrier to make a final decision concerning acceptance of your shipment. However, based upon the sound technical data listed above, which indicates total compliance with both the letter and spirit of IATA dangerous goods shipping regulations, ***ALI* recommends that your sample be properly labeled as a "*non-hazardous industrial sample of no commercial value".***

Please see the attached confirmation of this letter's contents by the Manager of Dangerous Goods – FedEx and contact us if you require assistance with your sample shipment.

Corporate Safety
Dangerous Goods Hotline
3670 Hacks Cross Road
Module G
Memphis, TN 38125

Telephone 901.434.2400
Fax 901.263.1663

FedEx Express

January 2015

Subject: **Airborne Labs International Gas Sample Kit Shipments**

To Whom It May Concern:

The Non-Flammable, Non-Toxic Gas Sample Kit shipments (air, carbon dioxide, oxygen, nitrogen, argon, sulfur hexafluoride) are not Dangerous Goods according to the enclosed information from Airborne Labs International when prepared according to Airborne Labs instructions (last revised 01/2015).

The samples are not dangerous goods when the pressure is below 200 kPa gauge pressure (29 psig, 43.5 psia) according to IATA Dangerous Goods Regulations (see section 3.2.2.4.1). These shipments should NOT be rejected for not having dangerous goods marking, labeling, or documentation.

Please contact DG Administration at 1-901-434-7233 or 1-888-288-3786, or the DG Hotline at 1-901-434-3200 or 1-800-463-3339, silent prompt 81 if you have any questions concerning these shipments.

Sincerely,

Thomas J. Leech, III
Manager, Dangerous Goods Hotline

Note: This letter is for use with Airborne Labs International, Inc., *"Non-Hazardous "No-Haz" Division 2.2 Gas Sample Kit Shipments by I.A.T.A. Definition"* letter (revised 01/2015).