



Buzwair Specialty Gases

Buzwair Scientific & Technical
Gases

Specialist in Gas Mixtures and High Purity Gases

Company Brief Introduction

- ☛ In 1954, Buzwair Industrial Gases factory was established to produce **Industrial Gases**
- ☛ **ISO 9001:2008** standards for our Quality Management System
- ☛ In 2007 Buzwair Industrial Gases became a Member of the **European Industrial Gases Association**
 - ☛ **Frank Brunsdon** is Buzwair Gases General Manager
- ☛ In 2009, Buzwair New **Specialty Gases mixing facility** was installed to produce primary standard specialty gases mixtures in Qatar
- ☛ In 2009 Buzwair Gases signed a technology agreement to enter into a partnership with **Scientific & Technical Gases** based in United Kingdom. This partnership will benefit both companies in providing for Middle East region a complete range of quality assured specialty gases products.
- ☛ In 2010, Buzwair Specialty Gases facility started purifying industrial gases to **99.9999% purity**.



Calibration Mixtures

- For Example:

Sr.	Part No.	Description	Pressure	Gas QTY	Valve	Shelf Life
1	22450679	Oxygen 0.4% V Nitrogen Balance Filled in 50 litres steel cylinder Uncertainty $\pm 2\%$	150 bar	7.5 m3	BS 3 is recommended. DIN1 not suitable for this mixture.	36 months

What are Gas Mixtures used for?

Typical uses include the following and many others:

- Environmental compliance
- Automotive emission testing
- Process control
- Semiconductor manufacturing
- Hydrocarbon chromatography
- Toxic organic measurements
- Laboratory instrument calibration
- Excimer lasers
- Confined space monitoring
- Industrial hygiene and safety

How to make gas mixtures?

GAS & LIQUID MIXING FACILITY

Buzwair Specialty Gases has four mixing booths,

1. **GENERAL FLAMMABLE MIXTURES,**
2. **OXIDANT MIXTURES,**
3. **FLAMOX MIXTURES**
4. **AND CORROSIVE & REACTIVE MIXTURES.**



What are the factors for High Quality Calibration Mixture?

- ❖ Accuracy
- ❖ Stability

MIXTURE PRODUCTION---Gravimetric Method

- **All material (gas & Liquid)** used in the mixing production are strictly controlled. Mixtures are made **gravimetrically**, using a series of high precision balances, which undoubtedly give the highest production accuracy available.
- **Cylinder material and Valve type** are professionally selected depending on customer needs.
- **Our mixing production systems** allow efficient and accurate filling operation, and with our highly experienced chemists and technicians, we can give accurate and reliable delivery times to our customers.



Certified Standard and Primary Standard


- Uncertainty
- Analysis Accuracy, Blending Accuracy, Equipment Limit, etc

MIXTURE GRADES AND SPECIFICATIONS

CERTIFIED STANDARDS			PRIMARY STANDARDS	
Concentration Range	Preparation Tolerance %	Certification Tolerance %	Preparation Tolerance %	Certification Tolerance %
< 1ppm	40	5	n/a	n/a
1 – 9.9ppm	20	5	5	1
10 – 99ppm	10	2	5	1
100ppm – 0.99%	10	2	2	0.5
> 1%	5	2	2	0.2

CERTIFICATION

ALL PRIMARY STANDARD, CERTIFIED STANDARD AND PROCESS MIXTURES are issued with a CERTIFICATE OF COMPOSITION which fully describes the mixture in terms of requested composition and actual certified composition. Mixture pressure, gas volume, mixture accuracy, shelf life, valve type, conditions of storage and use are all prescribed on the certificate. All certificates bear customer order number. The certificate in the form of an adhesive cylinder body label is used. And we also issue an certificate of conformity which is attached to the cylinder



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BUZWAIR SCIENTIFIC & TECHNICAL GASES
CERTIFICATE OF COMPOSITION
COC NO: 26245-4-1

ORDER #: 11212 CYLINDER#: 08/29152UT
CUSTOMER: QATAR LAB CYLINDER VALVE: BS-3
OUR REF: 26245 CYLINDER SIZE: 10L
NET WEIGHT (KG): 1.7 GROSS WEIGHT (KG): 16.9

COMPONENT	REQUESTED VALUE	CERTIFIED VALUE
OXYGEN	0.4%	0.401%
NITROGEN	BALANCE	BALANCE

Pressure: 150 bar Volume: 1515L Valid Until: June 2012

NOTES:

- All units are in MOL% and mixture accuracy +/-
- Relative Mixture Traceable to Standards calibrated at the National Physical Laboratory
- The UK National Physical Laboratory (NPL) Standards are internationally recognized, and directly equivalent to the USA N.I.S.T Standards and Australian N.A.T.A Standards

Certified by: UN#: 1956 Date: 13-06-2009

What is High Purity & Ultra High Purity Gases ?

Nitrogen n6.0

Component name	Level
Oxygen	≤ 0.3 ppm
Water	≤ 0.5 ppm
Total Hydrocarbons	≤ 0.1 ppm
Carbon Monoxide	≤ 0.1 ppm
Argon	≤ 0.5 ppm
Nitrogen	99.9999% min.

What Kinds of High Purity Gases or Liquid we supply?

Acetylene	Chlorine	Hydrogen Sulphide	Nitrogen
Air	Cyanogen Chloride	Hydrogen Iodide	Nitrogen Dioxide
Allene	Cyclopropane	Hydrogen Flouride	Nitrous Oxide
Ammonia	Deuterium	Halocarbons**	Oxygen
Argon	Dimethylamine	Krypton	Phosgene
Boron Trichloride and Flouride	Dimethyl Ether	Methane	Propane
Bromomethane	Ethane	Iso Butane	Propylene
Butane	Ethyl Aceylene	Iso Butylene	R - see Halocarbons
Butene I	Ethyl Chloride	Methyl Acetylene	Sulphur Hexaflouride
Butene Cis 2	Ethylene	Methyl Bromide	Sulphur Dioxide
Butene Trans 2	Ethylene Oxide	Methyl Chloride	Trimethylamine
1;3 Butadiene	Flourine	Methyl Mercaptan	Vinyl Bromide
Carbon Dioxide	Helium	Mono Ethylamine	Vinyl Chloride
Carbon Monoxide	Hydrogen	Mono Methylamine	Xenon
Carbonyl Sulphide	Hydrogen Bromide	Neon	
	Hydrogen Chloride	Nitric Oxide	

What are pure gases and liquid used for?

Buzwair pure gases can be used for:

- ✓ GC and GC-MS
- ✓ VOC-free pure gases for ppb measurements
- ✓ Mobile phases for supercritical fluid chromatography and extraction
- ✓ Reaction chemistry and chemical processing
- ✓ Elemental analysis
- ✓ Instrument zero gases
- ✓ Inert pure gases for blanketing
- ✓ Flame ionization fuel gas mixtures
- ✓ Thermal conductivity pure gas mixtures
- ✓ Chemical ionization pure gas for mass spectrometry



Why Buzwair High Purity Gases to be Recommended ?

- ❖ **Produce locally** here in our Specialty Facility in Industrial Area, Doha.
 - **2 Purifiers** for He,H₂,Ar,N₂ up to 99.9999% pure
- ❖ **Positive Pressure Valve** to prevent contamination caused by low internal cylinder pressure
- ❖ **Quality Control** by Analyzers
- ❖ Use of Buzwair pure gases will optimize analytical results, regardless of application, and significantly extend instrument life guaranteed by all the **procedures**.



How to Prepare Cylinder?

- Cylinder and Valve Material Selection
 - Depending on Mixture Character and Stability
- Cylinder Treatment
 - Oven
 - Vacuum Pump -0.7%



CYLINDER

REFILLABLE CYLINDER RANGE

- Water capacity 50L, 20L, 10L, 5L, 3L, 1L.
- Steel and Aluminum

NON-REFILLABLE CYLINDER RANGE

- Gas capacity 112L, 103L, 60L, 34L, 20L.
- Steel and Aluminum



Cylinder

Gas Equipment & Accessories

- Handling tools

- Trolley
- Rack
- Customized



- Pipeline

Buzwair Gases can offer complete gas reticulation systems from design to installation using international standards

- Regulators

- Single or Dual Stage Regulators
- Change-Over – auto & semi-auto
- Brand : Spectron, Go, Swagelok



- Fitting

- Bull nose
- Hoses & Adaptors

- Valve

- BS CGA DIN
- Positive Pressure Valve to ensure 6.0N Ultra High Purity Gases

Do you have your own **Gas Reticulation Systems** ?

Pipeline

Buzwair Gases can offer complete gas reticulation systems from design to installation using international standards



How to Order

1. Gas

- pure gas : gas name
- mixture gas : Components & Balance gas

2 Pressure of Gas

3 Gas purity

- pure gas purity (see "gas purity" section)
- mixture gas concentration--% ppm ppb

3 Cylinder Size

4 Valve

- Valve Material, Outlet Connection, Hand Wheel or Key Operated Spindle Type

5 Regulator (see "Gas Distribution System" section)

- Outlet Pressure
- Outlet Connection

6 Certificate

7 MSDS

Cylinder Safety

- Gas cylinders are heavy and unwieldy. To avoid personal injury or property damage caused by a falling cylinder, these precautions must be followed:
 - Always secure the gas cylinder to a stable support using an appropriate clamp so that it cannot be knocked over. Common supports are bench tops, a column or post, or a cylinder rack (if one is available in the laboratory).
 - If possible, secure cylinders out of laboratory traffic areas.
 - When moving a cylinder always use a cart designed to carry cylinders (available from your gas supplier). If the cart has a safety chain or strap (it should!), use it. The best carts has four wheels so the cart – instead of you – takes the weight of the cylinder.
 - Don't move a cylinder by "rolling" it on its base. It can easily get away from you.
 - Keep the cylinder cap tightly in place until you're ready to connect the regulator.
 - Never use a mechanic's open-end wrench, screwdriver. Or bar to force open a stuck cylinder cap. You could inadvertently rotate the valve hand wheel and release the cylinder contents into the lab while trying to remove the cap. A heavy-duty strap wrench (like an automotive oil filter wrench but sturdier) is useful. If you can't get the cap off, ask your gas supplier to replace the cylinder.

Gas Purity

- What purity gas should I use?
 - That depends primarily on the sensitivity of the analyses you perform. You also have to consider the impact of gas impurities and their concentrations in the carrier gas that are critical for specific stationary phases. The instrument vendor's specifications are generic, offering no column-specific information, but they do point you in the right direction.
- There are two approaches to ensuring the purity of your instrument gases:
 - 1. Buy low grade gases and purify them with point-of-use purifiers;
 - 2. Buy high-grade gases and either dispense with the purifier trains or consider them as insurance against the potential rogue cylinder that could slip through the gas supplier's statistical quality control defenses.
- The optimum solution is a grade of gas that is guaranteed on a per cylinder basis to exceed the instrument vendor's specifications for H₂O, O₂, and THC. The problem with per cylinder guarantees is that the analytical costs incurred by the gas supplier to ensure the gas quality of each cylinder are passed along to the customer. These are expensive gases.
- Here are some technical issues to keep in mind.
 - The lower the guaranteed maximum levels – the specifications – of H₂O, O₂, and THC in the gas, the longer your columns will last and the less background noise you will have to deal with (which means greater sensitivity and extended linear dynamic range of the detector).
 - Selective detectors are also affected by ultra-trace levels of contaminants that are not normally certified in the chromatography gases. For example the ECD can be contaminated with halocarbons, both volatile solvents and semi volatile lubricant oligomers, in the carrier and detector gases.
 - Consider the sensitivity of your instrument and the degree of accuracy required in your analysis. If you are working at percent levels, the purity of your gases is not as important as if you were working at the ppm level. (Unless, of course, you use the same instrument for both purpose.) Consistency of purity, however, is always critically important.
- Contact your gas supplier for more information. By specifying the proper grade of gas for your application, you can extend column life and reduce downtime while ensuring the baseline quality you need.

How many 9's are enough for my needs?

Gas suppliers commonly specify the purity of their products in terms of 99.999% (5 nines), 99.9999% (6 nines), and so on. The purer the gas, the more 9's. These numbers are calculated by subtracting the total impurity specifications (as if they were actual analytical results – which they are not) from 100%. This number is called (total purity).

Note: impurity specifications are always written as “<” (less than). According to arithmetic rules for dealing with inequalities, subtracting a “<” from 100% results in a “>”; thus, the total 9's should be read as “>99.999%” purity. The 9's specify the lowest possible purity of the labeled product.

The 9's are used to define different grades of gas. For example, the highest grade of gas is specified as being >99.9999% or 6 9's (or 6.0), and a lower grade is defined at >99.9995% or 5 9's (5.5). You might also encounter gas grade names like “research,” “carrier,” “ultra high purity,” “high purity,” “zero,” and so on, and grade designations like 6.0, 5.5, 5.0. Each of these grades has a different 9's specification.

The problem with summarizing gas purity with 9's is that there is no standard procedure for deriving them. It varies from product-to-product and from vendor-to-vendor. You must look at the specifications used to produce the total purity. We'll go into more detail in the next section.

Remember:

- your GC gases must be pure enough so that the impurities – and there are always some – don't interfere with your analysis or damage your equipment. We recommend that you select your gas according to the key impurity levels, and not on the basis of total purity descriptors.

- The specific impurities can selectively affect your detector. Suppose you have a cylinder of helium carrier gas containing mid-ppb levels of methylene chloride. This gas will be perfectly acceptable for a thermal conductivity or flame ionization detector, but an electron capture detector with its high selectivity and sensitivity for halocarbons will be rendered useless by the methylene chloride background at that concentration.

The same considerations hold for your columns. The resistance of your column's stationary phase to oxidation depends on the type of phase. More polar columns are significantly less stable in the presence of oxygen and heat than are the methyl silicone phase.

So, we can't really answer your question just by counting 9's. We suggest that you consult a gas supplier who understands the question. All of the major vendors do.

What materials should I use for my gas distribution system?

- This is easily answered. Use clean metal components throughout.
 - How is this done? Just follow a few simple rules:
 - Be certain that all components are clean before assembling them. It is almost impossible to clean contaminated components after they are assembled.
 - Use only regulators with stainless steel diaphragms that are specified for use with high-purity gases. Many manufacturers have both an “industrial” and “analytical grade” line of regulators. You want the top grade. Industrial regulators are not compatible with analytical gases.
 - Use copper or stainless steel tubing for all distribution lines. Stainless steel is good for fixed manifolds. Copper is appropriate for the lines to the instruments.
 - Make all connections metal-to-metal. High quality compression fittings are a good choice. Do not use o-rings, gaskets, or lubricants.
 - If you must use pipe thread connections seal them with virgin-grade Teflon tape. Never use oil-based sealants that can contaminate your system beyond recovery.

What specifications should I look for on regulators?

- There are only a few but they are all important.
- Select single stage or two stage regulation.
 - Single-stage regulators are appropriate where precise pressure control is not needed, or where this regulator follows or will be followed by another stage of regulation. A single-stage regulator will permit the outlet flow rate to increase as the cylinder pressure decreases.
 - Two-stage regulators are essentially two regulators in the same body. The first stage reduces the high cylinder pressure to an intermediate level the second stage further reduces this to the required outlet pressure. A two-stage regulator prevents the outlet flow rate drifting as a function of the cylinder pressure.
- Use the correct regulator for the required gas service. Avoid adapted regulators because the internal materials of regulators may vary with the gas they are intended for.
- The GC manufacturer will tell you what pressure is needed. Select a regulator such that you will be operating just above the center of the scale on the outlet gage. This makes it easier to set pressures and allows you to use higher-than-normal pressure when you need it.
- Be sure that the regulator has a stainless steel diaphragm.
 - Diaphragms of Neoprene or other elastomers outgas volatile organic and inorganic materials that can contaminate the gas stream. Additionally, exposure of an elastomeric diaphragm to air leaking into the regulator can lead to increased levels of O₂ in the gas stream. Stainless steel diaphragms avoid this problem. It is worth small extra cost to preserve the purity of the gas you purchased.
- Verify that the regulator is rated for high purity gas work.
- Experience: a tee purge (block-and-bleed) valve assembly is the ideal interface between your regulator and the cylinder. Its isolation valve protects the regulator and all downstream plumbing from air contamination when changing cylinders. And the vent valve permits sequential cycle purging of the cylinder valve outlet and tee purge assembly volume to remove atmospheric contaminants prior to opening the isolation valve. See below for details.

When should I change a cylinder?

- Before it is empty.
- But doesn't this decrease the usable amount of gas I paid for?
- Yes, it does, but here are two reasons for not exhausting a cylinder:
 - By replacing the cylinder at about 150 psig (10 barg), you reduce the risk of running out of carrier or detector gas in the middle of an important analysis.
 - You also protect your purifier train and instrument from contamination. Contaminants which are adsorbed or condensed on the cylinder walls such as moisture and oils desorb as the cylinder pressure decreases, thus increasing their concentration in the gas.

Welcome to Inquiry

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