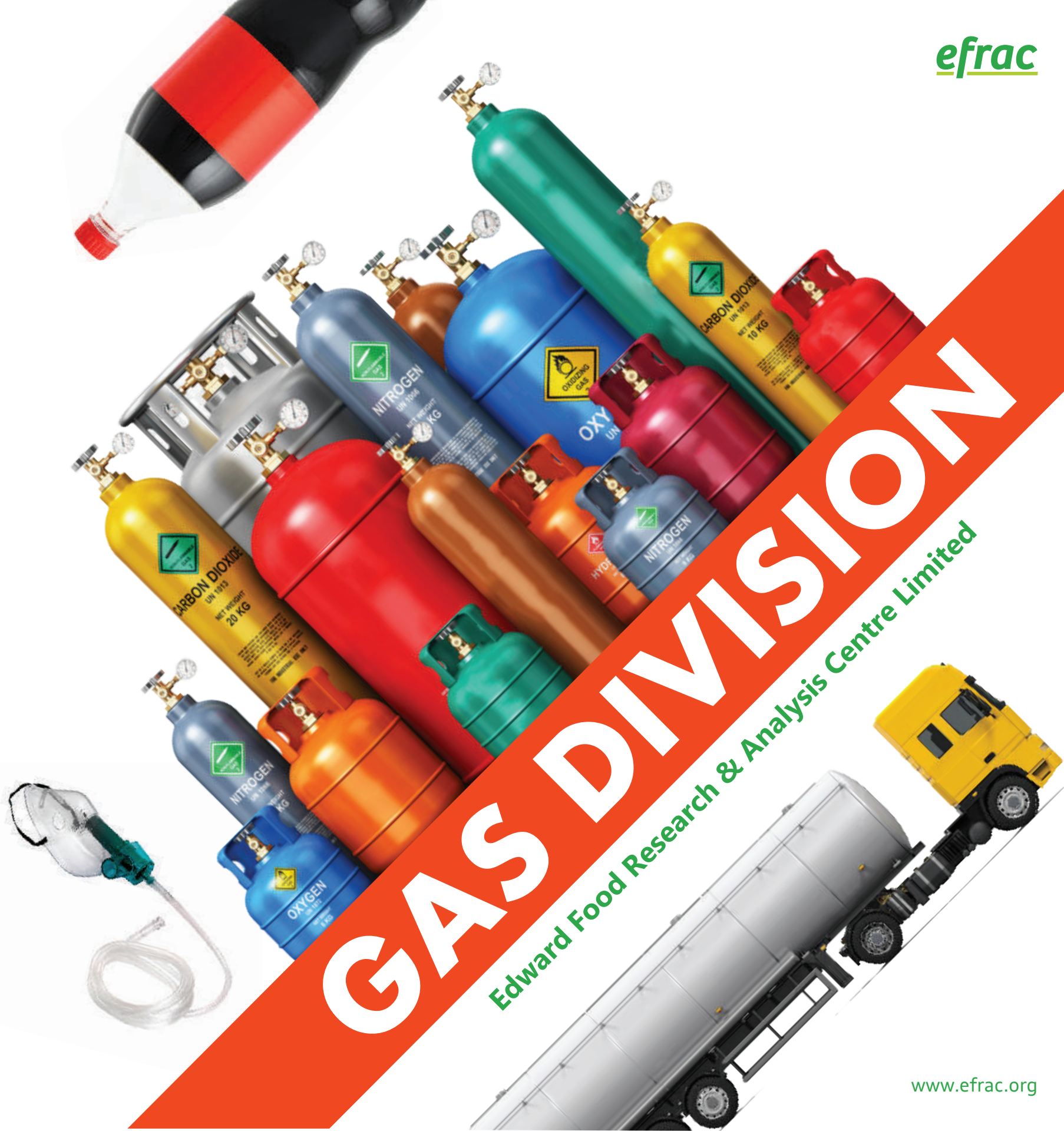


GAS DIVISION

Edward Food Research & Analysis Centre Limited





efrac
Edware Food Research & Analysis Centre Limited

ASIA's FIRST NABL

(ISO 17025:2017)

ACCREDITED GAS TESTING LAB

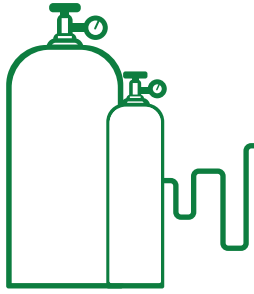


Edward Food Research & Analysis Centre Ltd (EFRAC) is a USFDA Inspected; NABL (ISO 17025:2017) Accredited Testing & R&D Centre engaged in offering Analytical services to a wide range of Processed Foods, Beverages, Pharmaceutical and allied products. EFRAC's sophisticated instrumentation meets 21 CFR Part 11 & DQ, IQ, OQ, PQ Compliance requirements and are coupled with automated Robotic Controls, Data Loggers, Recorders, Class 10K Pressurized & Classified Clean Rooms & LIMS Integration.

EFRAC is fully equipped & NABL (ISO 17025:2017) accredited for Carbon Dioxide (CO₂) Testing as per the requirements of ISBT Scope. The Non-Hazmat Sampling kits satisfy the Safe & Precise Sampling requirements. Our trained Samplers can collect Samples from Cylinders, Feed Lines and Tankers, based on the requirements.

Being the first accredited Gas Testing Lab in India, EFRAC offers CO₂ Testing services of all manufacturers of Carbonated Beverages & Water in India, South West Asia, Middle East & African countries.

Besides, EFRAC's Gas Testing Lab is also equipped to Test other industrial Gases like Nitrogen, Helium, Oxygen, Argon & Compressed Air as per ISBT, EIGA, CGA, IP, BP, USP, JP Standards.



GAS TESTING

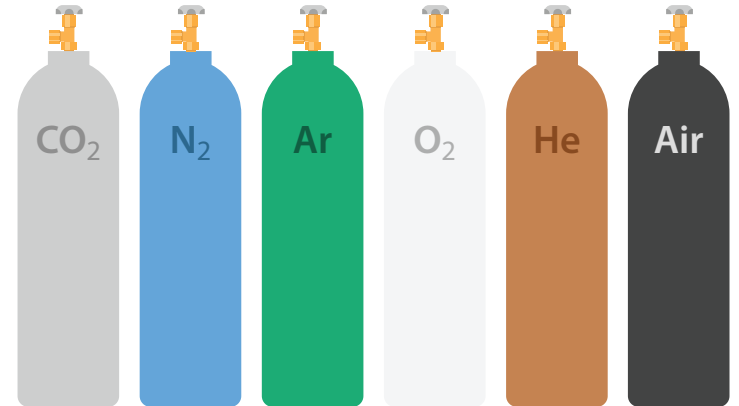
Highly pressurized gases are essential components in the production process of Food Processing, Pharmaceutical & Chemical Industries.

These Gases carry Chemical Residues & thus ascertaining their quality in terms of purity & toxicity is very critical.

At EFRAC, we hold requisite expertise for Sampling of high Pressure Gases to ensure Safe & Correct Sampling.

Our Samplers are trained on handling Sampling requirements from Pressurized Cylinders, Tankers & even from supply lines.

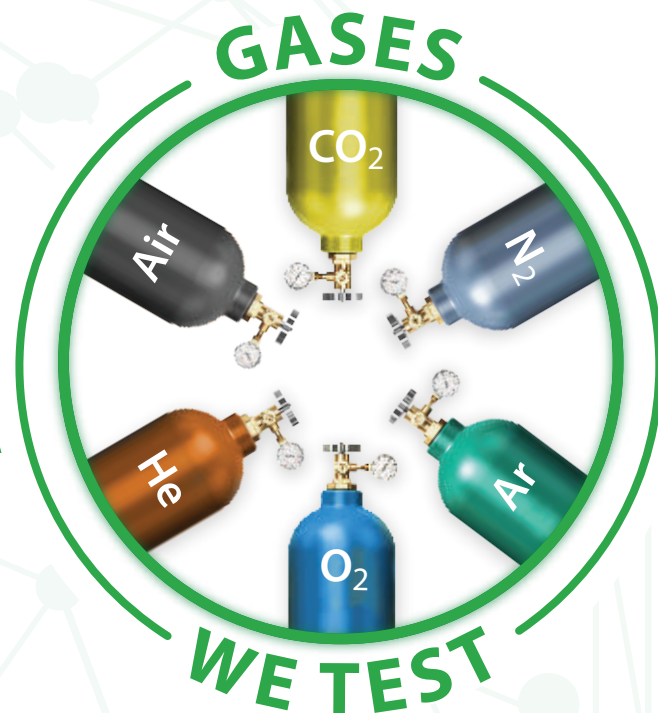
The collected Samples are brought to lab & are Quantified upto ppb(v/v) levels for impurities &



other trace contaminants using Sophisticated high end instrumentation like GC-MS/FID, GC-PD-HID/SCD & GC-TCD. The Gases are analysed in accordance to the requirements of ISBT, EIGA, CGA, IP, BP, USP, JP, IS, ISO Standards.



CAPABILITY SPECTRUM



INDUSTRIES WE SERVE



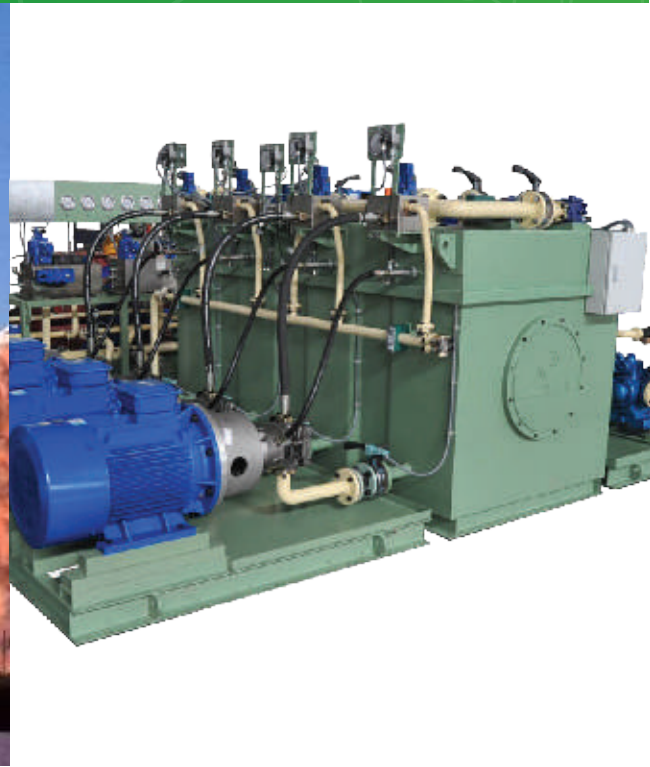
STANDARDS COMPLIANCE

ISBT, EIGA, CGA, IP, BP, USP, JP

efrac



OUR SERVICES



APPORVALS & ACCREDITATIONS



CARBON DIOXIDE (CO₂)

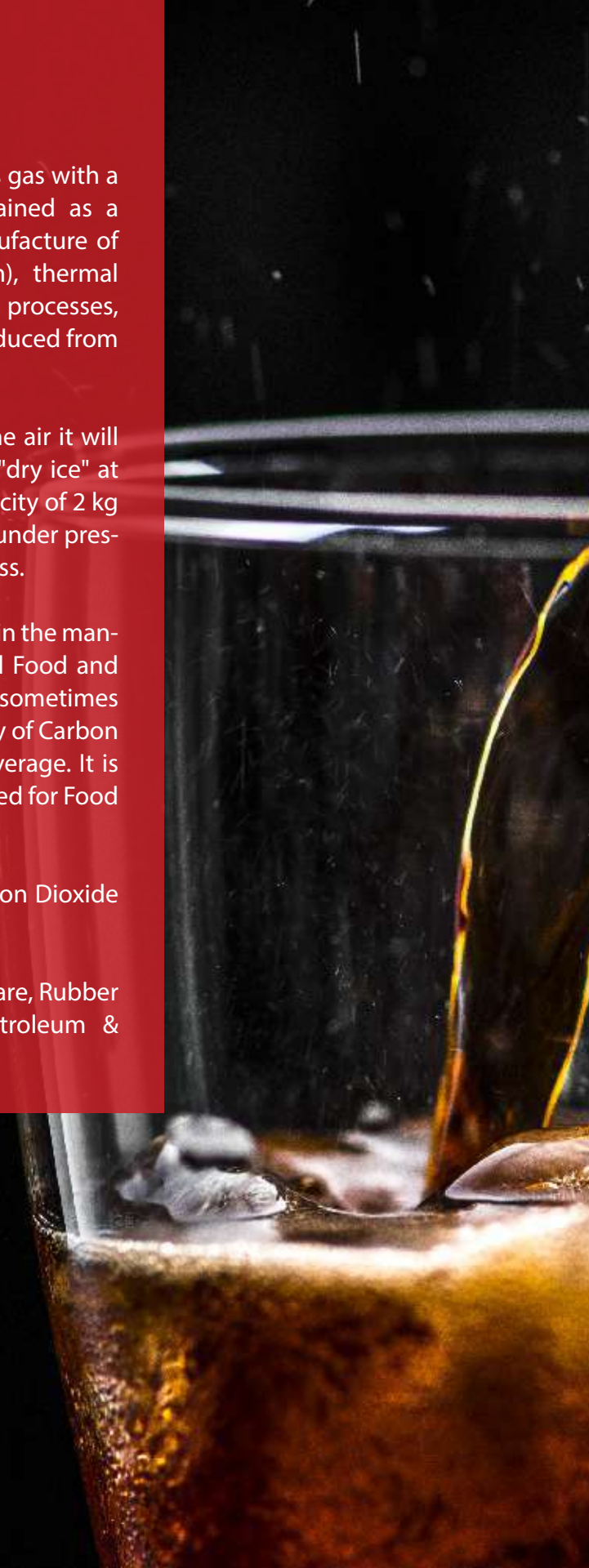
Carbon Dioxide (CO₂) is a slightly toxic, odorless, colorless gas with a slightly pungent, acid taste. CO₂ is commercially obtained as a by-product from a variety of sources including the manufacture of various chemicals (principally ammonia and hydrogen), thermal decomposition of carbonaceous materials, fermentation processes, Gases present in natural wells, geothermal sources or produced from fuel combustion.

CO₂ gas is 1.5 times as heavy as air, thus if released to the air it will concentrate at low elevations. Carbon Dioxide will form "dry ice" at -78.5°C (-109.3° F). One kg of dry ice has the cooling capacity of 2 kg of ordinary ice. Gaseous or liquid Carbon Dioxide, stored under pressure, will form dry ice through an auto-refrigeration process.

Beverage grade Carbon Dioxide is used in large quantities in the manufacture of carbonated Beverages, mostly soft drinks. All Food and Beverage grade CO₂ undergoes a purification process; sometimes trace impurities make their way into the supply. The purity of Carbon Dioxide plays a key role on the quality & taste of the Beverage. It is thus essential to check the CO₂ impurities before being used for Food & Beverages

The presence of Sulfur and certain Hydrocarbons in Carbon Dioxide gas can be corrosive, poisonous, and odorous.

Carbon Dioxide gas is used Food and Beverages, Health Care, Rubber and Plastics Industry, Chemicals, Pharmaceuticals, Petroleum & Metals Industry.



PARAMETERS

Purity of CO₂, Identification of CO₂, Total Hydrocarbon as Methane, Total NVR, NVOR, NVIR, Odour and Appearance of solid CO₂ (Dry Ice), CO₂ Appearance in Water, CO₂ Odour in water, CO₂ Taste in water, Phosphine, Water Vapour, Oxygen, Carbon monoxide, Ammonia, Nitric oxide, Nitrogen dioxide, Total Non methane Hydrocarbon, Methane, Acetaldehyde, Aromatic Hydrocarbon as Benzene, Total sulphur Content, Sulphur dioxide, Vinyl chloride, Benzene, Toluene, Ethyl Benzene, o-xylene, m-xylene, p xylene, Ethylene glycol, Ethane, Ethylene, Propane, Propylene, iso-butane, n butane, isopentane, n-pentane, Butane, Hexanes, Hydrogen sulfide, Carbonyl sulphide, Methyl Mercaptan, Ethyl Mercaptan, Dimethyl sulphide, Carbon disulphide, t-Butyl mercaptan, Isopropyl Mercaptan, n propyl mercaptan, Methyl ethyl sulphide, 2 butyl Mercaptan, i butyl Mercaptan, Diethyl sulphide, n butyl Mercaptan, Dimethyl Disulphide, Dimethyl ether, Ethylene Oxide, Diethyl ether, Propionaldehyde, Acetone, Methanol, t Butanol, Ethanol, Iso propanol, Ethyl acetate, Methyl Ethyl Ketone, 2 Butanol, n propanol, Iso butanol, n Butanol, Isoamyl Alcohol, Isoamyl Acetate

INSTRUMENTS

Zahn & Nagel CO₂ purity check kit, TSC analyzer, Total Hydrocarbon Analyzer, Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, Gas Chromatograph with SCD & PDHID, Gas Chromatograph with MSD-FID-FID, Gas Chromatograph with TCD, Sensory Test Kit, Passivated liquid CO₂ Flash Vaporizer.

METHODS / STANDARDS / REGULATIONS

Indian Standard-307: 1966 , International Society of Beverage Technologists (ISBT), European Industrial Gases Association (EIGA), Compressed Gas Association (CGA), FSSR 2011, British Pharmacopeia, European Pharmacopeia, Indian Pharmacopeia, Japanese Pharmacopeia, United States Pharmacopeia.



NITROGEN (N₂)

Nitrogen (N₂) makes up the major portion of the earth's atmosphere, accounting for 78% of total volume. It is a colorless, odorless, tasteless, non-toxic and almost totally inert gas. Nitrogen is produced in high volumes at air separation plant to meet the industries requirements. A second purification process may be necessary if very high purity levels are required. Membrane techniques can also be used to recover nitrogen in high purities.

One of the main applications of nitrogen is Blanketing, Purging and Spraying in the Food & Chemical industries. It can also be found in Modified Atmosphere Packages (MAP) for Food stuffs. In liquid form, it is an agent to Shock-Freeze Food, Store Biological Material, Perform Cryosurgery and Cryogenically grind Plastics and Rubbers, Besides, Nitrogen is a key additive in fertilizers.

In the semiconductor industry, N₂ is used in large quantities as a purge and carrier gas. In electronics, it acts as an inert agent for epitaxial reactors. It is also useful as a carrier, zero and balancing gas in laboratory analysis. Other common applications include heat treatment, the production of ammonia, fire extinguishing in mines, tyre filling, shrink-fitting and cold traps, where nitrogen can help to increase vacuum efficiency.

Nitrogen has huge requirement for different industries like Aerospace & Aircraft, Automotive & Transportation Equipments, Chemicals, Energy, Food & Beverage, Health Care, Metal Production, Pharmaceuticals & Biotechnological, Oil & Gas, Refining, Welding & Metal fabrication, Electronic, Glass R&D Laboratories. Hence the Quality of Nitrogen used is one of a key factor for the end users.

EFRAC has the facility to quantify these impurities present in the feed nitrogen gas.



PARAMETERS

N₂ Purity, Water Vapor, Oxygen, Carbon monoxide, Carbon Dioxide, Total Hydro Carbon, Sensory evaluation, Nitrous oxide, Nitrogen dioxide, BTX, VOCs

INSTRUMENTS

Total Hydrocarbon Analyzer, Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, Gas Chromatograph with SCD & PDHID, Gas Chromatograph with MSD-FID-FID, Gas Chromatograph with TCD, Sensory Test Kit

METHODS / STANDARDS / REGULATIONS

International Society of Beverage Technologists (ISBT), European Industrial Gases Association (EIGA), Compressed Gas Association (CGA), British Pharmacopeia, European Pharmacopeia, Indian Pharmacopeia, Japanese Pharmacopeia, United States Pharmacopeia.

ARGON (Ar)

Argon (Ar) is a colourless, odourless, non-reactive, inert gas. A crude argon stream containing up to 5% oxygen is removed from the main air separation column and purified to produce the commercial purity grade Argon. Argon can also be recovered from the exhaust streams of certain ammonia plants.

Argon has many different applications in many industries. The most common one is as a shielding gas for arc welding – either in pure form or as part of various mixtures. It is one of the main Gases used in filling mixtures for incandescent (filament) lamps, phosphorescent tubes.

It is also used as a carrier gas in chromatography, sputtering, plasma etching and ion implantations. It provides a blanket atmosphere in crystal growth, viniculture and pharmaceutical packaging. As an insulation gas, argon is a popular way of improving thermal insulation in multi-pane windows.

It has many protective applications in iron, steel and heat treatment industries – particularly in the case of metals susceptible to nitriding when treated with a nitrogen-based atmosphere.

PARAMETERS

Purity, Identification, Water Vapor, Carbon monoxide, Oxygen

INSTRUMENTS

Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, Gas Chromatograph with SCD & PDHID, Gas Chromatograph with MSD-FID-FID, Gas Chromatograph with TCD

METHODS / STANDARDS / REGULATIONS

European Industrial Gases Association (EIGA), Compressed Gas Association (CGA), British Pharmacopeia, European Pharmacopeia, Indian Pharmacopeia, Japanese Pharmacopeia, United States Pharmacopeia.

OXYGEN (O₂)

Oxygen (O₂) is a colourless and odourless gas. It is vital for most life forms on earth. Medical oxygen is essential in Hospital and Clinical care for resuscitation and surgery and for various therapies. It is also mixed with Nitrogen or Helium to create underwater diving mixtures. Oxygen is obtained on a commercial scale through the liquification and distillation of ambient air at air separation plants. A second purification process may be necessary if ultra-high purity levels are required. High-purity oxygen can also be produced through the electrolysis of water. Membrane techniques are used to lower-purity requirements.

The main industrial application of Oxygen is combustion. Mixing of Oxygen with air greatly enhances combustion efficiency in iron and steel, non-ferrous, glass and concrete industries. It is widely combined with a fuel gas for Cutting, Welding, Brazing and Glass Blowing. Oxygen is also popular in thermal lancing to drill or cut through materials such as concrete, brick, stone and various metals. Due to its ability to help stabilise the arc and reduce surface tension, Oxygen is used as an ingredient in some shielding gas mixtures. The chemical industry relies on pure Oxygen to increase the efficiency of oxidation reactions, for instance. High-purity oxygen is used in laboratories, process-control operations, gas-cooled nuclear reactors, metal analysis instruments, and in semiconductor and optical fibre production.

On the water treatment front, oxygen is an effective way of purifying waste water and treating sewage. Other applications include sealing glass ampoules in the Pharmaceutical industries, Oxygenation of Water for aquaculture, Steel production and so on.

PARAMETERS

O₂ Purity, Water Vapor, Carbon monoxide, Carbon Dioxide, Total Hydro Carbon, Sensory evaluation, Nitrous oxide, Nitrogen dioxide, Sulfur dioxide, Oil, BTX, VOCs

INSTRUMENTS

Total Hydrocarbon Analyzer, Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, Gas Chromatograph with SCD & PDHID, Gas Chromatograph with MSD-FID-FID, Gas Chromatograph with TCD, Sensory Test Kit

METHODS / STANDARDS / REGULATIONS

European Industrial Gases Association (EIGA), Compressed Gas Association (CGA), British Pharmacopeia, European Pharmacopeia, Indian Pharmacopeia, Japanese Pharmacopeia, United States Pharmacopeia.



HELIUM (He)

Helium (He) is a colourless, odourless, non-toxic, non-corrosive and non-combustible gas. It is mainly sourced from natural gas wells. With the lowest boiling point of any gas (4.2 Kelvin or -269° Celsius), liquid helium is the coldest matter on Earth. This makes it ideal as a cryogenic agent for a number of cutting-edge medical and physics applications. For instance, it is used to cool superconductive magnetic coils in magnetic resonance imaging and nuclear magnetic resonance (NMR) medical equipment.

In fact, Helium is indispensable across a wide range of industries. For example, it is used to pressurise rocket fuel; create inert atmospheres for welding, heat treatment and epitaxial crystal growth; purge semiconductor atmospheres; calibrate analytical instruments; inflate airplane tyres and airbags; test for leaks; inflate large balloons for meteorological studies; and fill electronic tubes in neon signs & laboratory research works. It also combines with oxygen to create breathing gas mixtures for divers. It also has different uses in the pharmaceutical industry.

PARAMETERS

He Purity, Identification, Methane, Water Vapor, Carbon monoxide, Carbon Dioxide, Sensory evaluation, Nitrous oxide, Nitrogen dioxide, Sulfur dioxide, Oil, BTX, VOCs

INSTRUMENTS

Total Hydrocarbon Analyzer, Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, Gas Chromatograph with SCD & PDHID, Gas Chromatograph with MSD-FID-FID, Gas Chromatograph with TCD, Sensory Test Kit

METHODS / STANDARDS / REGULATIONS

European Industrial Gases Association (EIGA), Compressed Gas Association (CGA), British Pharmacopeia, European Pharmacopeia, Indian Pharmacopeia, Japanese Pharmacopeia, United States Pharmacopeia.

AIR OR COMPRESSED AIR

Compressed air is air kept under a pressure that is greater than atmospheric pressure. Compressed air is used for power tools such as air hammers, drills, wrenches and others. Compressed air is used to atomize paint, to operate air cylinders for automation, and can also be used to propel vehicles. Brakes applied by compressed air made large railway trains safer and more efficient to operate. Compressed air brakes are also found on large highway vehicles.

Compressed air is used as a breathing gas by underwater device. It may be carried by the diver in a high pressure diving cylinder or supplied from the surface at lower pressure through an air line or diver's umbilical. Similar arrangements are used in breathing apparatus used by fire-fighters, mine rescue workers and industrial workers in hazardous atmospheres.

Without compressed air none of an industry operates their normal process. It has a common use in Food processing, Beverage, Steel making, Power production, pharmaceutical industries and so on

PARAMETERS

Particle Count, Particle concentration, Dew Point, Moisture, Total Oil, Microbial Count.

INSTRUMENTS

Particle size Counter, Total Moisture Analyzer, High & Low Pressure Sampling Kit, Gas Dilution System, FTIR

METHODS / STANDARDS / REGULATIONS

ISO 8753



SAMPLING

EFRAC's unique Non-Hazmat (No-Haz) Sampling Kits and accessories allow to properly obtain a representative Feed Gas sample from Cylinders, Tankers & Lines and easily ship it to our laboratory for rapid analysis. Our trained field staff can collect samples from site following best sampling practices of Safety.

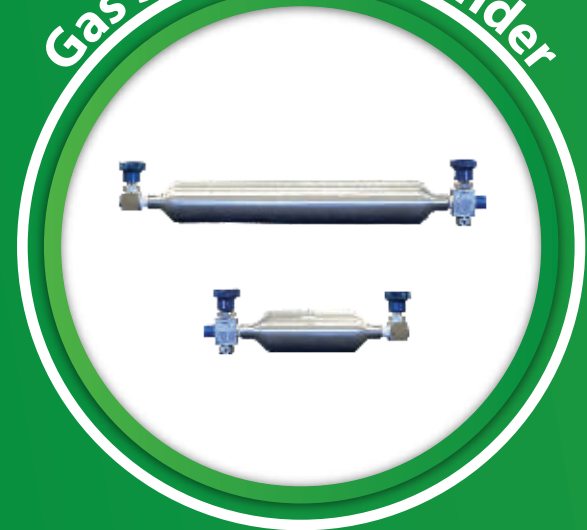
Our trained Samplers can perform Sampling for :

- ▶ Compressed gas sampling from bulk storage vessels specially Liquid CO₂ by using "Double-Ended Passivated Cylinders With Outage Tubes"
- ▶ Compressed gas sampling from bulk storage vessels specially Liquid CO₂ by using "Single-Ended Passivated Cylinders"
- ▶ Compressed gas sampling "Using Polymeric Sampling Bags"
- ▶ Liquid CO₂ sampling using "Snow Generators And Containers"
- ▶ Compressed Gas sampling using "Passivated, Low Pressure Metal Cylinders"

No-Haz CO₂ Sampling Kit II



Gas Sampling Cylinder



Compressed Air Sampler



Compressed Air Microbial Sampler



Tank /Truck Sampling Kit



Compressed Air Particle Counter



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