

**THE SINGLE-SOURCE SOLUTION
FOR YOUR CHEMICAL BUSINESS**

INDUSTRIAL GAS APPLICATIONS



INERTING



ENVIRONMENTAL



CHEMICAL



MATERIAL HANDLING/SEPARATION



OIL/REFINING



COMBUSTION

Blanketing (N₂, CO₂)

Gas blanketing is the safe, economical way to maintain an inert atmosphere above the liquid or solid products inside your storage tanks, reactors, silos and process equipment. Buffering your products from moisture and oxygen helps prevent product degradation, controls volatile emissions and safeguards against explosion.

Purging (N₂, CO₂)

Purging with nitrogen or carbon dioxide removes air, flammable vapors and contaminants from storage tanks, pipelines, process equipment, railcars and ocean bound containers. High reliability, availability and relatively low cost make N₂ and CO₂ the gases of choice for customers in a wide range of industries.

Effluent/Toxic Waste Treatment (CO₂, N₂, O₂)

BOD/COD reduction, pH control, blanketing/inerting and combustion of hazardous waste are environmental applications that are all enhanced by the use of industrial gases. Oxygen, carbon dioxide and nitrogen are used in efficient, safe and cost-effective processes for improving the environment.

Solvent Recovery (N₂)

The Airco ASRS[®] solvent recovery system is one of today's most efficient ways to condense organic solvents for recovery and to meet environmental pollution restrictions. This exclusive, patented system cuts energy consumption by up to 90%. It enhances plant safety and eliminates the two major pitfalls of the conventional oven — solvent loss and heat loss.

Emission Control (N₂, CO₂)

The BOC Group has developed separation technologies to recover light hydrocarbons from various purge gases, waste streams and tank emissions all without formation of flammable gas mixtures anywhere in the system. These technologies can be used not only to recover valuable hydrocarbons, but also to meet strict environmental regulations.

Chemical Reactant (CO₂, O₂)

- Industrial gases play an important role in many chemical reactions. Improved reaction kinetics, higher yields, lower capital costs and reduced raw material consumption are all associated benefits. Whether it's oxygen as a substitute for air, or carbon dioxide as a reagent, productivity will be significantly increased.

Fats/Oils (H₂)

- Airco hydrogen is used for hydrogenation of unsaturated fats and oils, converting the liquid to a thicker, more viscous material and reducing the susceptibility to oxidation which causes odors. This process is used in the manufacture of edible oils, shampoos, industrial lubricants, household cleaners and other industrial products.

Reaction Cooling/Quenching (N₂, CO₂)

- Airco has developed refrigeration systems for chemical reactions requiring low temperatures for the synthesis of certain compounds, or to quench a reaction. Cryogenic liquids have extremely low boiling points, making them powerful, yet precise, refrigerants. Compact and easy to install, a cryogenic system can replace or supplement existing mechanical refrigeration.

Pressure Transfer (N₂)

Airco's gaseous nitrogen pressure transfer system is completely self-contained, simple to operate and requires no external power sources or mechanical compressors. Nitrogen is ideal for moving toxic fluids, highly viscous liquids, ethical pharmaceuticals, or materials that ignite readily or become corrosive when contacted with moisture.

Sparging (N₂)

- Nitrogen sparging is a practical method of reducing the concentration of dissolved gas (usually oxygen) in a liquid. The process can be batch or continuous — in vessels, pipelines or packed columns. Sparging prevents rancidity of edible oils, oxidation of stored flavors and fragrances, and reactions between oxygen and acidic materials.

Supercritical Extraction (CO₂)

- The use of carbon dioxide for supercritical extraction is quickly becoming the standard for many industries. In the chemical industry, CO₂, a very safe solvent, has replaced fluorocarbons as an extractant, and also plays a key role in toxic waste treatment. It has a supercritical temperature of only 90 °F.

Wells/Fields (CO₂, N₂)

Industrial gases provide superior cleanup compared to other well or field stimulation treatments. As a free gas in the formation, CO₂ and N₂ provide the energy required to remove formation fines, loose or crushed proppant, reaction products and mud lost during drilling. In addition, 60% to 80% of the stimulation fluids are normally recovered.

Refining (O₂, N₂)

- Almost all refining operations have a need for one or more of the industrial gases. Oxygen can be used in a FCCU to decrease the time required for catalyst regeneration and to increase capacity in a Claus plant. Nitrogen provides a cost-effective and reliable means of safely blanketing/inerting process equipment, tanks and flare stacks.

Refining (H₂)

- Most hydrogen requirements for hydrocracking, hydrotreating and desulfurizing are satisfied by on-site production. Airco supplies merchant liquid and gaseous products to supplement these needs — particularly during start-ups.

Furnaces (O₂)

Pure oxygen improves productivity in various chemical industry combustion processes. The addition of oxygen to the flame, coupled with a decrease in air to the burners, helps overall efficiency, since less nitrogen is available to carry heat up the stack. This results in an increase in production and a reduction in fuel consumption.

Kilns/Roasters (O₂)

- When supplemental oxygen is applied to a kiln or roaster, improved sulfur and/or carbon burnout can be realized — translating to increased throughput. In addition to a production increase, exiting products are now higher quality, and lower cost fuels, previously unusable by the industry, may now be burned.

An R&D Leader The BOC Group Technical Center in Murray Hill, New Jersey, is the focus of our worldwide R&D activities. Here, several hundred scientists and engineers conduct a wide range of R&D programs. One, designed specifically to benefit our customers in the chemical industry, involves the development of a proprietary gas separation/recycle system that improves the production of acrylonitrile, maleic anhydride and other chemicals. With this technology, oxygen can be used in existing air-based processes to improve productivity and yields, while reducing emissions.



Your Choice Of Supply Method *Bulk Delivery:* For moderate use with high-purity requirements, we recommend a liquid supply delivered in trucks and stored in large vacuum-insulated cryogenic vessels. This supply method is also used for low-temperature applications.

Airco's sophisticated TEL-TANK™ telemetry system enables us to monitor product levels in your bulk liquid stations. Also, with a personal computer and Airco's AIR-WARE™ software, you can gain direct access to the information TEL-TANK records and use it to analyze and improve your operation's efficiency. Airco's National Scheduling Center uses inventory data from TEL-TANK to provide reliable, on-time, coordinated bulk delivery of gases to customers nationwide.



On-Site Supply: Together, we'll evaluate your volume, purity and pressure requirements. If we determine that an on-site supply method best suits your needs, Airco will custom design a gas generation system that's right for you. Whether it's cryogenic separation for nitrogen or oxygen, pressure swing adsorption (PSA) for nitrogen, oxygen or carbon dioxide, or nitrogen membrane systems, our separation technology enables us to supply gas to our customers at the lowest possible cost.

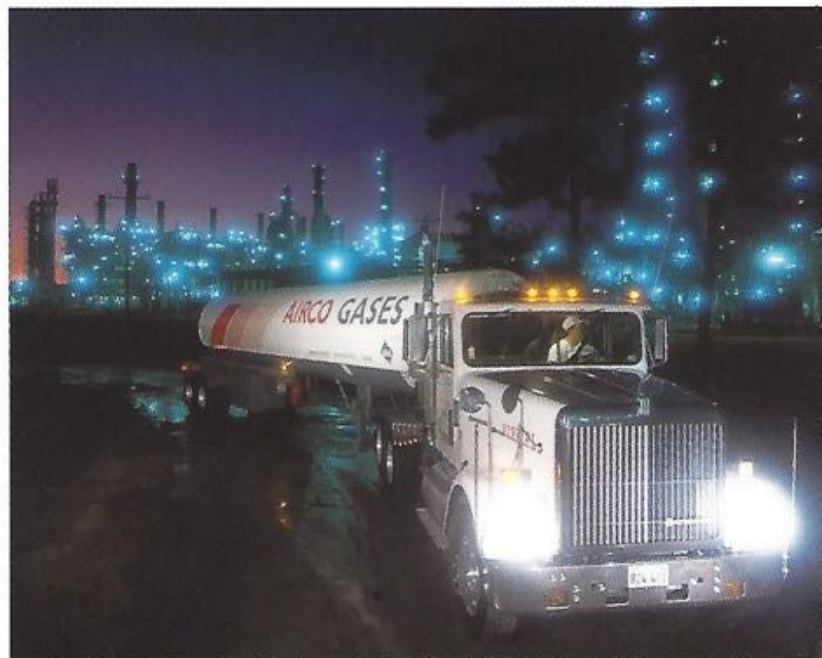
Cylinder Gases: For analytical equipment calibration and emission monitoring requirements, Airco offers a full line of high-purity gases and gas mixtures.

The BOC Connection As one of the world's largest producers of industrial gases, The BOC Group operates more than 100 companies in over 60 countries, and has annual sales exceeding \$5 billion. A full-service global supplier of industrial gases, The BOC Group provides a wide range of products: oxygen, nitrogen, carbon dioxide, hydrogen, argon, helium and rare and special gases. This global network enables us to meet your gas supply needs overseas, as well as in the U.S.

**A Century
Of Innovation**

For over 100 years, Airco and its international parent company, The BOC Group, have provided innovative solutions to meet the process needs of the worldwide chemical industry.

Here's why chemical manufacturers rely on Airco as their single-source supplier for industrial gases.



**A Solution For
Every Application**

Airco has developed state-of-the-art applications designed to increase productivity, ensure a safe work place and improve the environment.

This ability to provide cutting-edge technology to you, our customer, is what separates Airco from other industrial gas suppliers.

Whatever your application — from blanketing and effluent treatment, to supercritical extraction and solvent recovery, to reaction cooling and refining — Airco can provide a total solution to your process requirements.

**Meeting Your Process
Requirements**

From bulk liquefied gas delivery, to your own on-site gas supply system, Airco can custom-tailor a gas supply method that's right for your process, regardless of volume, purity or pressure requirements.

We'll take a close look at your plant location, power costs and special circumstances. Through this customized approach, Airco can design, engineer and install the most efficient, cost-effective supply solution for your particular needs.

**The People Behind
Our Technology**

From research and application technology, to implementation and market development, through actual installation and start-up, Airco scientists and engineers are committed to providing our customers with innovative solutions through leading-edge technology.

A Public Commitment

Under the Chemical Manufacturers Association Responsible Care® Program, companies in the chemical industry work steadily to advance the cause of responsible management of operations. Specifically, they continuously endeavor to improve performance in terms of health, safety and the environment.

Under Responsible Care, we at Airco seek to open channels of communication between the community and the industry by applying Total Quality Management principles to our own Safety, Health and Environmental Program. It's a contribution that assures you, our customer, that we're not just one of the world's leading suppliers of gases. We're also a company dedicated to becoming one of the business world's most responsible corporate citizens.



R E G I O N A L S A L E S O F F I C E S

For more information on how Airco can meet your industrial gas application needs, contact the Airco office nearest you, or call (908) 771-1155.

California 1588 Doolittle Drive, San Leandro, CA 94577
Phone: 510-297-5000 Fax: 510-352-8132

Georgia 1345 Terrell Mill Road, Suite 200, Marietta, GA 30067
Phone: 404-952-5777 Fax: 404-951-2950

Illinois 2100 Western Court, Suite 100, Lisle, IL 60532
Phone: 708-971-1119 Fax: 708-515-2562

Pennsylvania 301 Lindenwood Drive, Suite 210, Malvern, PA 19355
Phone: 215-296-0300 Fax: 215-889-9044

Canada Canadian Oxygen Limited, 89 Queensway West, Mississauga, Ontario, L5B 2V2
Phone: 416-273-7700 Fax: 416-272-1865



Airco Gases 575 Mountain Avenue Murray Hill, NJ 07974 (908) 464-8100
A member of The BOC Group