



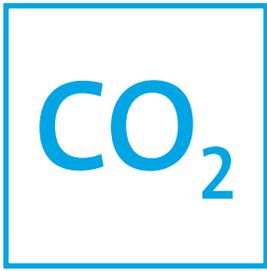
Carbon Dioxide (CO₂)

A versatile processing tool for
the food industry

Freezing and Chilling | Modified Atmosphere Packaging | Dry Ice

Controlled Atmosphere Stunning | Waste Water pH Control

Inerting/Purging | Carbonation | Greenhouses



Carbon Dioxide’s powerful cryogenic refrigeration properties are ideal for your process chilling/freezing or transportation refrigeration needs. Its gaseous properties are used to carbonate beverages, extend your product’s shelf life, more humanely stun hogs/poultry, boost plant growth in greenhouses, and more.

Physical Properties 1 Pound Carbon Dioxide	
Molecular weight	44.01 lb/mol
Boiling point -109.2°F	
Gas density @ 70°F 1 atm	0.1144 lb/ft ³
Specific gravity 1.555	H ₂ O LCO ₂

Process Freezing/Chilling

One of the most common applications for CO₂ in the food industry is freezing and chilling. CO₂ is a cryogenic refrigerant that can operate at temperatures as cold as -109° F. Under these conditions it can be used to form a snow commonly called dry ice. Colder operating temperatures mean a faster freezing or chilling process. The result is less product dehydration, improved yield, and better quality than a traditional mechanical system. It also means that a CO₂ freezer has a smaller footprint and a significantly lower cost. There are also no refrigeration coils or the other nooks and crannies found in a mechanical system and less moving parts means it’s simpler to clean, operate and maintain. Whether it’s batch freezers, tunnel freezers, rotary freezers or spiral freezers, the Air Products team of food industry experts can help determine which equipment is the right solution for your process freezing/chilling needs.

Since CO₂ can be used to form a snow at -109° F, it is also ideal for reducing or maintaining product temperatures throughout the manufacturing process. It is commonly added into mixers, blenders, kettles and tumblers to reduce the temperature of products prior to further processing. Common applications are dough chilling, deli log crust freezing, and chilling of proteins prior to forming nuggets and patties. It can also be layered into product and stored in large boxes or tubs to help maintain product temperatures in the supply chain. Due to the versatility of CO₂ as a cryogenic refrigerant, the possibilities are truly endless.



Dry Ice

As a cryogenic refrigerant, CO₂ can also be used to form dry ice blocks and pellets. In this format, CO₂ is ideal for keeping your products cold during transportation or storage. Air Products can help determine if on-site dry ice production is the most efficient solution to meet your dry ice needs. In this scenario, Air Products would deliver liquid CO₂ into a tank located at your site and specify the proper dry ice equipment to manufacture the dry ice at your location.



Gaseous Applications

In its gaseous form, the physical properties of CO₂ can provide a solution to a variety of your processing needs:

Carbonation – In the carbonation process, CO₂ is dissolved into beverages to give your alcoholic and non-alcoholic beverages the unique fizz and sparkle that only CO₂ can provide.



Modified Atmosphere Packaging (MAP) – CO₂'s anti-microbial properties make it ideal for extending the shelf life of your products by inhibiting the growth of aerobic bacteria and mold. Air Products' application specialists can help you determine the ideal gas mixture for your products.



Waste Water Treatment – Dissolved CO₂ forms carbonic acid which is a safe effective alternative to harsher acids (i.e. sulfuric acid) to reduce the pH levels in your waste water stream.



Controlled Atmosphere Stunning (CAS) of Hogs/Poultry – With an increased consumer focus on animal welfare, there has been a trend toward using CO₂ in a CAS process for hogs or poultry. This reduces animal stress and improves animal welfare while also improving working conditions and producing higher quality meats.



Greenhouses – Optimizing CO₂ levels in greenhouses decreases crop maturity times, increases harvests, and reduces fertilization costs.



Inerting/Blanketing – CO₂ is heavier than air, making it an effective alternative to nitrogen in some inerting and blanketing applications.



Ask Air Products . . . and Expect More

In addition to the equipment and gas supply, we provide training and safety systems necessary for a quality installation. Our food specialists will be there for you to provide technical support before, during, and after installation. Whether your packaging, growing, treating waste water, enhancing animal welfare, chilling, freezing, shipping, or cleaning, the Air Products team offers you the highest purity gases and the latest equipment. We can help improve your productivity, lower your costs, maximize your returns, and help make you more competitive in the market.



Reliability of CO₂ Supply

Air Products' network of CO₂ production facilities ensures the reliability of your supply. Local plant operators, drivers, and mechanics work closely with Air Products' customer service and logistics 24/7/365 to maintain our reliability record of over 99.9% — supplying product on time and at the flow, purity and pressure that you specify.



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