Carbon Dioxide (CO2) is a colorless, odorless gas that is heavier than air (~1.5x), non-flammable, and the primary greenhouse gas reference standard (GWP=1). Supplied as a compressed liquefied gas, CO2 finds use across food and beverage, industrial, laboratory, and extraction applications. IMPORTANT: unlike nitrogen, CO2 exerts direct physiological effects even at normal oxygen levels — it stimulates the respiratory system and causes circulatory effects at concentrations ≥3%.

SECTION 1: PRODUCT IDENTIFICATION

Product Name	Carbon Dioxide (CO2)
CAS Number	124-38-9
Formula	CO2 | MW: 44.01 g/mol
Available Forms	Compressed liquefied gas (cylinders); Refrigerated liquid (bulk); Solid (Dry Ice — see separate TDS)
Purity	≥99.8% (industrial); ≥99.9% (food grade/beverage)
GHS Signal Word	WARNING (gas under pressure; asphyxiant; direct physiological effects)
UN Numbers	UN1013 (compressed gas); UN2187 (refrigerated liquid)
Supplier	Cannagas Supply | 97 Turnpike Rd, Westborough, MA 01581 877-710-1965 | Sales@canna-gas.com

SECTION 2: PHYSICAL & CHEMICAL PROPERTIES

Physical State (STP)	Colorless, odorless gas; liquefied under pressure	**Vapor Density**	1.52 (air=1) — heavier than air; accumulates at floor level
Sublimation Pt.	-78.5°C (-109.3°F) at 1 atm (no liquid at atm. pressure)	**Gas Density (15°C)**	1.96 kg/m3 at 1 atm
		Liquid Density	1,032 kg/m3 at -20°C
Triple Point	-56.6°C (-69.9°F) at 5.2 bar	**Solubility**	1.45 g/L at 25°C — forms carbonic acid H2CO3
Critical Point	31.1°C (88°F), 73.8 bar		
Flammability	Non-flammable; suppresses flames	**GWP**	1 (reference standard)
		OEL (OSHA)	5,000 ppm TWA; 30,000 ppm STEL
Flash Point	Not applicable		

SECTION 3: CO2 vs NITROGEN — KEY DIFFERENCES

Physiological Effects	CO2 is NOT just a simple asphyxiant — it directly stimulates the respiratory and circulatory system. At 3–5%: headache, nausea, impaired judgment. At 7–10%: unconsciousness within minutes.
Air Density	CO2 is 1.5x heavier than air (vs N2 which is slightly lighter). CO2 accumulates dangerously at floor level, in pits, and basements.
OEL Stringency	OSHA PEL 5,000 ppm for CO2 (vs no OEL for nitrogen). CO2 levels must be monitored in enclosed use areas.
Fire Applications	CO2 suppresses fire by displacing oxygen. Used in fire suppression systems.
Greenhouse Gas	CO2 is the primary greenhouse gas reference (GWP=1). Nitrogen is inert in atmosphere.

SECTION 4: APPLICATIONS

Supercritical Extraction	Supercritical CO2 (scCO2) at >31.1°C and >73.8 bar is an excellent selective extraction solvent — widely used for caffeine, hops, and botanical extraction. Leaves no solvent residue.
Food & Beverage	FDA GRAS. Carbonation of beverages, modified atmosphere packaging, refrigerant for cold chain, food freezing (blast freezing).
Welding & Fabrication	Shielding gas for MIG welding (pure CO2 or blends with Argon).
Fire Suppression	Non-conductive, leaves no residue — ideal for electrical equipment and server room suppression.
Laboratory Use	Inert atmosphere, cell culture incubators (CO2/air mix), supercritical fluid chromatography (SFC).
Industrial Inerting	Inerting agent for process equipment — similar to nitrogen but denser.

SECTION 5: STORAGE & HANDLING

Cylinder Storage	Secure upright in ventilated area. Away from heat sources. Valve caps in place.
Valve Connection	CGA 320 (compressed CO2 cylinders)
CO2 Monitoring	CRITICAL: Install CO2 detectors at floor level in all enclosed use areas. CO2 accumulates at floor level — standard O2 monitors may not detect CO2 buildup.
Handling	Trained personnel only. Use appropriate fittings and regulators rated for CO2 service.

SECTION 6: SAFETY SUMMARY

■ **SAFETY NOTE:** ASPHYXIATION AND DIRECT TOXICITY: CO2 is heavier than air and accumulates at floor level. Unlike nitrogen, CO2 has direct physiological effects at 3%+ even at normal oxygen levels. Install CO2 floor-level monitors in all enclosed use areas. Never use in unventilated spaces.

GHS Signal Word	WARNING
Key Hazards	H280: Gas under pressure. Asphyxiant + direct physiological effects at 3%+.
OEL	OSHA PEL 5,000 ppm TWA; NIOSH IDLH 40,000 ppm (4%)
SDS Reference	Full SDS available. CHEMTREC: 1-800-424-9300.