

Material Safety Data Sheet

MSDS

1/9

1. Chemical Product and Company Identification

Product name : COMPRESSED GAS, N.O.S.
 MSDS serial number : NTG-CO2N2-02
 Supplier/Manufacture : Nippon Tansan Gas Co., Ltd.
 Address : 3-12-15 Aoi, Adachi-ku, Tokyo, Japan
 Division : Technology Department
 Phone : 03-3849-1571
 Fax : 03-3880-6829
 Emergency calls : 0282-27-5205

2. Composition and Information on Ingredients

Single or compound : Compound
 Material
 Chemical name : Carbon dioxide, Nitrogen
 Content (vol%) : Carbon dioxide 70%, Nitrogen 30%
 Chemical formula : $\text{CO}_2 + \text{N}_2$
 Serial numbers of corresponding official daily gazettes : Carbon dioxide : Law on the Examination and Regulation of Manufacture, etc., of Chemical Substances: 1-169 (Japan)
 Nitrogen : —
 CAS number : Carbon dioxide : 124-38-9
 Nitrogen : 7727-37-9
 Hazardous or toxic components : Carbon dioxide, Nitrogen

3. Hazards Identification

Highest-level danger or toxicity :



Compressed gas (Contents under high pressure)

Health : Carbon dioxide

- Inhalation of high-purity of carbon dioxide may cause adverse effects on the human body.
- If liquefied carbon dioxide is released into the atmosphere, it turns into a low-temperature gas and snow-like dry ice, exposure to which may cause frostbite, and if such cold gas or dry ice enters the eyes, it may cause blindness.
- Note that the gas is asphyxiating even at low toxicity.

Nitrogen

- If the victim inhales nitrogen the following symptoms or conditions appear. In the early stages : facial pallor, facial flushing, increase of pulse, increase of respiration, suffocation, and dizziness. In the last stages : becoming unconscious, convulsions, respiration cease, cardiac arrest, and lethal at worst.
- If the eye of the victim has been exposed to a gas flow of a high pressure gas container, there might be the damage of the retina and the loss of eyesight.

Material Safety Data Sheet

MSDS

2/9

- Environmental impact : Carbon dioxide
- Carbon dioxide is said to be a major cause of global warming, and measures to reduce it are being considered domestically and internationally.
- Nitrogen
- Nitrogen gas is known as nonflammable gas, and there is no effect on the environment.
- Physical or chemical danger : Carbon dioxide
- Carbon dioxide is filled in containers for supply to customers. Because it is under high pressure, it is hazardous.
- Nitrogen
- Nitrogen gas is filled in containers for supply to customers. Because it is under high pressure, it is hazardous.

4. First Aid Measures

- Inhalation :
- Immediately move the victim to fresh air. Loosen clothing and keep warm with a blanket or similar. If the victim is unconscious, loosen clothing, clear the respiratory tract, and conduct artificial respiration. Get medical attention.
 - If breathing is weak, give pure oxygen.
 - If not breathing, give artificial respiration.
- Skin contact : Carbon dioxide
- If the person is lightly frostbitten, rub the affected area to warm it. If frostbite is serious, do not rub, but warm the affected area with tepid water, and wrap in gauze or similar. Get medical attention.
- Nitrogen
- Exposure to nitrogen at atmospheric pressure requires no specific medical treatment.
- Eye contact :
- If the victim has been exposed to a gas flow, wash the part with clear water. Get medical attention.
- Protective measures before starting first aid :
- Ensure sufficient ventilation, and provide respirators and other equipment as needed.

5. Fire Fighting Measures

- Extinguishing media : Carbon dioxide
- Use spray powder extinguisher and/or water. Use appropriate extinguishing media for surrounding fire.
- Nitrogen
- This gas is nonflammable and nonhazardous.
- Specific hazard or toxicity : In case of fire, do the followings to prevent pressure increase of the Cylinder.
- Move containers from fire area if it can be done without risk. If it is not possible to move containers, stay upwind and cool containers with water spray.
 - Keep away from the area of leakage because of the risk of suffocation.

Material Safety Data Sheet

MSDS

3/9

- Protective measures :
 extinguishing a fire : • Use fireproof gloves, respirator, and other protective equipments, extinguish from upwind with taking appropriate distance.

6. In Case of Leakage (Accidental release measures)

- Human :
 consideration : • Promptly evacuate personnel from the area of leakage. Keep unauthorized personnel away, and ensure sufficient ventilation.
 • Work at upwind from leakage.
- Protectors :
 : • If oxygen concentration is low, do not enter the area without protection.
- Environmental :
 consideration : Carbon dioxide
 • Carbon dioxide is about 1.5 times heavier than air and tends to remain in low places, resulting in high concentration.
 High concentration may cause suffocation.
- Nitrogen
 • Take measures to ensure that the oxygen concentration in air exceeds 18 v/v%.
- Discharge :
 : • Ventilate the room and let in fresh air.
 • Work in teams of two or more and wear protective equipment such as respirators, protective gloves, and other proper guards.

7. Handling and Storage

- Handling : Preventing personnel from exposure
Suffocation
 • Handle gas in well-ventilated areas and take measures to ensure that the oxygen concentration in air exceeds 18 v/v%.
- Handling of containers
 • Do not use containers roughly.
 • Do not use near fire.
 • Before using, confirm the name of the gas by checking the mark or the other items on the containers.
 • Use only specialized pressure regulators and don't release gas directly.
 • Before connecting a pressure regulator, check the screw type.
 • Before using a gas container, check the pressure regulator, hose, pipes, joints, etc., for leakage.
 • Do not refill gas.
 • Do not modify or erase marks or other items on containers. Do not peel off labels on containers.
 • Do not use gas containers in electric circuits. Be careful not to cause arc strike particularly.
 • Do not touch dry ice with the bare hands because it has an extremely low temperature.
 • Do not touch gas discharged under high pressure. This may cause injury to the body.
 • Do not use gas containers for other purposes.

Material Safety Data Sheet

MSDS

4/9

Storage

- Storage conditions : Storage conditions
- Keep container away from fire and spark sources.
 - Do not store containers near electric lines or ground wire.
 - Keep containers in dry and low-humidity environment.
 - Keep containers away from corrosive atmosphere.
 - Keep containers away from direct sunlight at an ambient temperature of 0 to 40°C.
 - Take a measure container not to fall down.
 - Control oxygen concentration in storage area at 18 vol% or more.
- Safe container material : • Use only container for compressed gas.

8. Exposure Control and Personal Protection

- Acceptable concentration : Carbon dioxide
- Japan Society for Occupational Health: (2000 version) 5,000 ppm (TWA)
 - ACGIH: 5,000 ppm (TLV-TWA) (1999 version)
300,000 ppm (TLV-STEL) (1999 version)
 - NIOSH: 5,000 ppm (TWA)
300,000 ppm (STEL)
 - OSHA: 5,000 ppm (TWA)

Note: ACGIH :American Conference of Governmental Industrial Hygienists

NIOSH: National Institute for Occupational Safety and Health

OSHA : Occupational Safety and Health Administration

TLV : Threshold Limit Value

TWA: Time Weighted Average Concentration

STEL: Short Term Exposure Limit

TLV-TWA: time-weighted average

Expressed as the time-weighted average concentration (TWA) during regular working time of 8 hours a day, 40 hours a week, and the health of most personnel is not adversely affected even when repeatedly exposed to such conditions.

TLV-STEL: short-term exposure limit

Indicates the limit of concentration that does not cause:

- 1) Intolerable stimulus,
- 2) Chronic or irreversible damage to the living body, or
- 3) Increased risk of occurrence of injury, accidents, loss of self-control, or significantly lowered work efficiency caused by anesthetic action even after continuous short-term (15-minute) exposure to that environment provided that the day's average exposure does not exceed the TLV-TWA.

Material Safety Data Sheet

MSDS

5/9

Nitrogen

- ACGIH: Simple suffocation

Nitrogen gas effect as simple suffocative gas without giving a special physiological function.

The permission concentration is not determined for the individual simple suffocation.

The minimum oxygen concentration that you should secure in environment is 18v/v % at normal pressure.

- OSHA: None required

Note: ACGIH: American Conference of Governmental Industrial Hygienists.

OSHA: Occupational Safety and Health Administration.

Measures for facilities	:	• Before using containers in enclosed place, install a ventilator or similar.
Protectors		
Protectors for respiration	:	• Air respirator, oxygen inhaler, gas mask
Protectors for hands	:	• Not needed
		When handling low-temperature containers, wear leather gloves.
Protectors for eyes	:	• To protect eyes, wear goggles.
Protectors for skin and body	:	• Not needed

9. Physical and Chemical Properties

〈Carbon dioxide〉

Appearance

Physical state : Liquid

Color : Colorless

Odor : Odorless

Explosiveness : Nonflammable

Molecular weight : 44.01 g/mol

Specific gravity : 1.5 (air = 1)
0.93(water = 1)

Temperature for
change in physical
state

Triple point : -56.6°C at 0.518 MPa

Critical temperature :
31.1°C

Critical pressure : 7.382 MPa

Boiling point : -78.5°C

(Sublimation)

Solubility : 0.878 CO₂/H₂O (at 20°C, 1 atm.)

〈Nitrogen〉

Appearance

Physical state : Gas

Color : Colorless

Odor : Odorless

Explosiveness : Nonflammable

Molecular weight : 28.01 g/mol

Specific gravity : 0.967 (air = 1)

Material Safety Data Sheet

MSDS

6/9

Temperature for
change in physical
state

Boiling point : -195.8°C
 (Sublimation)
 Melting point : -209.9°C

10. Stability and Reactivity

Stability : • Stable
 Reactivity : • No special reactivity
 Hazardous or harmful : • None
 degradation products

11. Toxicological Information

Acute toxicity : Carbon dioxide

Inhalation

• The gas is low in inhalation toxicity but causes symptoms of oxygen deficiency if concentration is high.

0.04%	Normal air
0.5% (TLV)	Limit of long-term safety
1.5%	Tolerable for an extended time without affecting operability and basic physiology, but calcium and phosphorus metabolism may be affected in some cases.
2%	Respiration becomes deeper.
3%	Operability drops. Physiological changes appear in variations in blood pressure, heartbeat, and other factors.
4%	Respiration becomes much deeper. Higher breathing, slight gasping. Considerable degree of discomfort.
5%	Extreme difficulty in breathing; serious gasping intolerable for most people; some feeling of nausea. Toxicosis occurs after 30 minute's exposure.
7 to 9%	Limit of tolerance, resulting in violent gasping. In about 15 minutes, the subject loses consciousness.
10 to 11%	Disabled regulation; unconsciousness in about 10 minutes.
15 to 20%	Much more serious symptoms are seen, but not lethal within an hour.
25 to 30%	Respiration weakens, blood pressure drops, resulting in coma, lost reflexes, and paralysis. Death occurs in some hours.

Nitrogen

Inhalation

• Nitrogen gas effect as simple suffocation by substituting it with air.

Oxygen concentration (v/v%)

18 \geq	Minimum safe concentration. Initial anoxia appears.
16-12	Pulse and respiration increase, mental concentration requires exertion, work of close muscles becomes hard, and headache and other symptoms occur.
10-6	Unconsciousness, central nervous system disorders, convulsions, lethargic sleep, breathing stops and the heart stops after 6 to 8 minutes.

Material Safety Data Sheet

MSDS

7/9

6 \geq

One inhalation causes instant fainting, lethargic sleep, breathing stops, convulsions occur. Lethal within death occurs within six minutes.

Local physical effects : • None
on skin, eyes, etc.
Sensitization : • None
Chronic or long-term : • None
toxicity

12. Ecological Information

Global warming : Carbon dioxide : 1
potential (GWP)

* Global Warming Potential (GWP)

Index detailing effects on global warming

Toxicity in fish : Gas is not specified as a Class-1 or Class 2 specific chemical Substance or specified chemical substance in the Law on the Examination and Regulation of Manufacture, etc., of Chemical Substances.

Distribution coefficient : Gas is not specified as a Class-1 or Class 2 specific chemical Substance or specified chemical substance in the Law on the Examination and Regulation of Manufacture, etc., of Chemical Substances.

13. Disposal Consideration

Disposal of Gas

- Gradually release in open air. It may cause simple suffocation.
- It is dangerous to release gas quickly because it may produce dry ice, causing frostbite.

Disposal of containers

- If gas remains in containers, drive into the container cap with appropriate application to release gas and dispose of containers as incombustible.
- Do not dispose unused containers without first checking that all gas has been released
- For empty containers, check if the cap of containers are open and dispose of as incombustible waste.

14. Transport Information

International
regulations

UN classification : Class 2.2 (Compressed gas, Non-flammable gas, Non-toxic gas)
UN number : 1956

15. Regulatory Information

Legal information
(on Japan)

High Pressure Gas : Production, sales, storage, transportation, consumption, disposal
Safety Law
Industrial Safety and : Production, storage, consumption
Health Law
Law for Safety of : Transportation
Containers

Material Safety Data Sheet

MSDS

8/9

Port Regulation Law : Transportation
 Civil Aeronautics Law : Transportation
 Road Trucking : Transportation
 Vehicle Law : Transportation
 Road Traffic Law : Transportation

16. Other Information

- Scope : • This Material Safety Data Sheet applies to Mixture(liquefied carbon dioxide +Nitrogen gas).
 • On article 2 of the High Pressure Gas Safety Law (Japan) , Mixture (liquefied carbon dioxide +Nitrogen gas)is specified as a "High Pressure Gas" .
- Data sheet : • This Material Safety Data Sheet (MSDS) is prepared based on the latest materials and data. It may be subject to change when new material and/or data are obtained.
 The MSDS states precautions assuming that the product is used under normal conditions. The user must operate with appropriate safety measure for unusual use. While the MSDS has been prepared as comprehensively as possible ,we cannot guarantee its applicability or effectiveness under all possible conditions or applications.
- History of revision : Prepared on: May 1, 2008
 Revised on: May 13, 2013
- Bibliography : • Semiconductor Process Gas Safety Data Book, revised and enlarged edition, jointly edited by Special Gas Industrial Association and SEMI Standard Facilities and Safety sectional meeting, published by SEMI Japan (1993)
 • Data Book on Safe Handling of Gas jointly edited by Nippon Sanso Co., Ltd. and Matheson Gas Products, published by Maruzen (1988)
 • Profiles of 100 Hazardous and Harmful Substances, edited by Kikuo Oikawa, published by Maruzen Co., Ltd. (1987)
 • Special Materials Gas Safety Data Book, Ver. 2000, written and edited by Special Gas Industry Sectional Meeting of Japan Industrial Gases Association (1999)
 • 14,906 chemical products PDF by The Chemical Daily Co., Ltd. (2006)
 • Search System of Legal Regulation on Chemicals by Japan chemical data base
 • Handling oxygen, nitrogen and argon: Oxygen Assoc.
 • Chemical Handbook, ed.: Chemical Soc. of Japan.
 • Gas Encyclopedia L'Air Liquide
 • Practical Handbook on Labor Safety and Health, pub.: Shinnippon Hoki Publishing Co., Ltd.
 • Textbook on oxygen deficiency hazardous jobs chief engineers, pub.: Japan Industrial Safety and Health Assoc.
 • ACGIH chemical substances and TLVs of physical factors and BEIs of chemical substances, pub.: Japan Assoc. for Working Environment Measurement.

Nippon Tansan Gas Co., Ltd.

Product: COMPRESSED GAS, N.O.S.
MSDS serial number NTG-CO2N2-02
Prepared on: May 1, 2008
Revised on: May 14, 2013

Material Safety Data Sheet

MSDS

9/9

For further : Technology Department, Nippon Tansan Gas Co., Ltd.
information, please Phone: 03-3849-1571
contact Fax: 03-3880-6829