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Safety Data Sheet

1. Product and Company Identification

Substance name: Dimethyl Ether (DME), Carbon Dioxide (CO2)

Product name: Best Plan Chugoku Ltd. Air Duster Safety non-CFC (chlorofluorocarbon) 350ml

Name of Supplier:	Best Plan Chugoku Ltd.
Address :	1745 Ohama-cho, Innoshima, Onomichi-shi, Hiroshima-ken
Tel:	0845-26-2175
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Section for enquiry:	General Affairs Section

2. Hazard identification in Summary

GHS classification

Physical hazards	Combustible / flammable gases		: Category 1
	Combustible / flammable aerosol		: not classified as chemically unstable
	susceptibility to burn / oxidized gas		: not classified
	Gases under pressure		: liquefied gas
Health hazards	Acute toxicity	(inhalation; gases)	: not classified
	Specific target organ toxicity	(single exposure)	Category 3: narcotic effects
	Specific target organ toxicity	(repeated exposure)	: not classified
Environmental hazards	Aquatic toxicity	(acute)	: not classified
	Aquatic toxicity	(chronic)	: not classified

GHS Label elements

Pictogram or symbol

Signal Word	Danger
Hazard Statement	Extremely combustible and flammable aerosol Pressurized container: may burst if heated. May cause drowsiness or dizziness

Precautionary statements:

1. Read and understood all the safety precautions before use.
2. Do not eat or smoke while using the product.
3. Ventilate the workplace properly so that the level of concentration does not exceed the acceptable concentration.
4. Avoid direct contact with eyes, skin, nose, or throat. Use protective glasses, working leather gloves, and protective clothing.
5. Do not inhale gases. Avoid contact with liquid that results in frostbite.
6. Wash hands well after use.
7. In case of inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Inhaling large dose can potentially result in death from suffocation because of lack of oxygen.
8. Skin contact: Structure of the product never allows liquefied gas in the container to be sprayed out, but should that occur and come into contact with skin, it is possible that the affected area may be frostbitten in which case soak the affected area in lukewarm water. Wash contaminated clothes thoroughly with water before reuse. In case of exposure or if in doubt, get medical attention and appropriate treatment.
9. For use and storage, keep away from high temperature, spark, and naked flame. No smoking.
10. Store away from direct sunlight or high temperature area. Never store inside a car under direct sunlight as the temperature inside can soar to dangerously threatening levels.
11. Do not store where temperatures exceed 40℃.
12. Avoid high humidity or corrosive environment for storage.
13. Do not drop, knock over or roll to avoid a shock to container.
14. Keep out of research of children.
15. Taken out in the air, evaporation of liquid gas occurs with vaporization latent heat taking a large amount of heat. Direct contact with the substance may cause frostbite.
16. The vapor/gas is heavier than air and may accumulate in low areas. If the inside of equipment has been sprayed, completely release all the remaining gas therein before switching on the power as static discharges or fire can ignite the remaining gas that may lead to an explosion. Hazardous for air-tight equipment such as a shredder. Never to be used with air-tight equipment. For disposal, take container outside where it is free from naked flames. Discharge all the remaining gas by firmly pressing down the button. Dispose in accordance with the trash sorting requirements specified in the local regulations.

Hazardness

Gas is very mildly narcotic. When exposed to the substance at a high atmospheric concentration of 7.5%, for example, a mild discomfort may be experienced without any external changes observed. In addition, if liquefied gas comes direct contact with skin, inflammation or frostbite of tissues may occur (DME).

Inhaling carbon dioxide at high concentration may cause loss of consciousness or coma, leading to death. If skin comes contact with low-temperature gas and snowy dry ice, frostbite may occur, and if the same substance gets in the eyes, loss of sight may occur (CO_2).

Environmental effects	For the effects on the ozone layer and global warming, please refer to "Section 12. Ecological Information." Having carbo-hydro composition, DME causes photochemical oxidant. The substance's lifespan is between 3 and 30 hours in the stratosphere. (DME) Hardly biodegradable. Although CO_2 is known to be one of the causes of greenhouse effect that leads to global warming, under normal conditions it does not have any environmental effects (CO_2).

3. Composition/Information on Ingredients

Substance/mixture: Mixture

Ingredient name and chemical name	Chemical formula	CAS No.	Official Report Reference Number		Law concerning Pollutant Release and Transfer Register / PRTR	Poisonous & Deleterious Substances Control Law	Content (Mass %)
			Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.	Industrial Safety and Health Act			
Dimethyl ether (DME)	$(CH_3)_2O$	115-10-6	(2)-360	Published	NA	NA	Business secret
Carbon Dioxide (CO_2)	CO_2	124-38-9	(1)-169	Exempt from the law	NA	NA	Business secret

4. First-aid Measures

Description of necessary first aid measures

Inhalation	In case of inhaling gas at high concentration, remove the victim to fresh air immediately and keep at rest and warm with a blanket, and promptly seek medical attention. If not breathing, or if breathing is feeble, provide artificial respiration or if necessary, oxygen by trained personnel by loosening tight clothing and maintaining an open airway, and get medical attention immediately.
Skin contact	Contact with a gas itself is not hazardous. As contact with liquid can lead to frostbite, soaked clothes or shoes or socks should be immediately removed. Flush contaminated skin with plenty of water or lukewarm water. Get medical attention if irritation occurs.
Eye contact	In case of contact with liquid, immediately flush eyes with plenty of water and continue to rinse for at least 15 minutes and get medical attention immediately.
Ingestion	Under normal use, it is unlikely to ingest liquid gas as liquid rapidly transforms into a gas under normal temperature and air pressures.

5. Fire-fighting Measures

Extinguishing media	Water, powder (ABC), carbon gas
Protective actions	Promptly isolate the scene by removing all containers from the vicinity of the incident if there is a fire. If the removing is impossible, pour water onto the fire-exposed containers so as not to cause further damage, and cool them down. As there may be a risk of container ruptures, fight fire from maximum possible distance. If overheated containers start gushing out gases, withdraw into the safe area as it can lead to a subsequent explosion. If the contents adhere to container surfaces, keep them away from the combustible material if possible. Spray plenty of water to cool containers, and shut off container spill and leak if that can be done without risk. Do not put out fire before shutting off spill on the container. Otherwise, this may lead to the formation of explosive mixture of air.

6. Accidental Release Measures

For non-emergency personnel	If it can be done without risk, shutting off spill on container and shut off flow. If spill and leak from container cannot be shut off, take container out into an open, safe space and release gases. In case of large spill, evacuate all the persons in neighborhood, cordon off the spill area with a rope to prevent any person accidentally entering the area. If necessary, wear protective air-fed respirator.
Personal precautions	Evacuate those in the lee of spill. Provide adequate ventilation by ventilating air.
Environmental precautions	Nothing in particular.
Protective equipment	If necessary, put on protective clothes or fire-proof clothes, air-fed respirator, or circulating-type oxygen breathing apparatus or rubber gloves, rubber boots.

7. Handling and Storage

Precautions for safe handling:

① Do not spray continuously as that may cause a sharp drop of the container temperature. Each spray duration should be kept between one and three seconds.
② Spray nozzle should be at least 10 cm away from the target.
③ Not to be sprayed on human body.

④ When mixed with the air, it can easily become an explosive mixture. Exercise strict vigilance over a gas leak. Avoid close contact with sparks (including a spark caused by static electricity), fire, inducing arc discharges, high-temperature substance, strong oxidizing agent. Not to be used with current-carrying instrument.
⑤ Do not spray a large amount of gas in a confined space.
⑥ Make sure not to inhale the spray as it is detrimental to the human body. Inhaling high dose of gas may cause lack of oxygen that can result in death by suffocation.
⑦ Do not spray excessive amount of gas in one go.
⑧ The vapor/gas is heavier than air and may accumulate in low areas. If the inside of the equipment has been sprayed, completely release all the remaining gas inside the equipment before switching on the power as static discharges or fire may ignite the remaining gas that may lead to an explosion. Hazardous for air-tight equipment such as a shredder. Never to be used with air-tight equipment.

Conditions for safe storage:

① Store in upright position.
② Store away from direct sun light in a cool, well-ventilated place.
③ Store container in a dry area to prevent corrosions from humidity or droplet.
④ Always keep the temperature below 40℃.
⑤ Take some preventive measures against shocks to container and damage to valve.
⑥ Do not store in the vicinity of heat, sparks, and flames.
⑦ Keep out of research of young children.

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8. Exposure Controls/Personal Protection

Controlled concentration: Not specified

Exposure limits:

Dimethyl ether	
Japan Society for Occupational Health (2007)	Not specified
ACGIH (2007) However, exposure limits of 10,000ppm is suggested as a reference value based on animal test conducted by the Dutch government.	Not specified
Carbon dioxide	
Japan Society for Occupational Health (2004)	5,000ppm
ACGIH	TWA 5,000ppm STEL 30,000ppm
NIOSH (National Institute of	40,000ppm

	Occupational Safety and Health), **IDLH* Concentrations** (*Immediately Dangerous To Life or Health)	(recommended value)
Facility Protection Measures	When used at indoor workplace, to seal off the source of exposure or to install local exhaust ventilation. For electrical equipment such as fixtures or ventilators, use those with explosion-proof structure. In the vicinity of the operation, make sure to install safety shower, hand washing facility, and eye-wash stations, and clearly indicate their the locations. Put on respiration protector, safety eyewear, protective gloves, and protective clothing as and when necessary.	

9. Physical and Chemical Properties

	Diethyl ether	Carbon dioxide
Colour	Colourless	Colourless
Odour	Strong, characteristic odour (similar to that of chloroform)	React with water to produce pungent odour; weak acidic taste.
Boiling point	-24.8°C: Lide (88th, 2008)	-78.5°C (sublimation point)
Melting point	-138.5°C: Chapman (ver. 16.1, 2008)	-56.6°C (triple point)
Flash point	-41.1°C (closed cup): HSDB (2008)	Not available
Auto ignition	350 °C : NFPA (13th, 2000)	Not available
Explosion limit	3.4 ~ 27 vol %: NFPA (13th, 2000)	Not available
Specific gravity	0.61 (water=1): ICSC (J)	
Vapour density	1.6 (air=1): ICSC (J)	1.54 (air=1, 0 °C, 1 atmospheric pressure)
Water solubility	36wt% (20°C, 0.48MPa): UI Imanns (6th, 2003)	

10. Stability and Reactivity

Chemical stability	: If stored and handled in accordance with regulations, the product is thought to be stable and non-reactive. (DME) Inactive gas and stable. ($CO_{2)}$

Possibility of hazardous reactions	: gas and air mixture is explosive The vapour/gas is heavier than air and will spread along the ground. Gas may travel a considerable distance to a source of ignition and flash back, causing fire or explosion; it may accumulate in low or confined areas, causing lack of oxygen. Under the influence of light or air, the substance may form explosive peroxide. Irritating fumes are formed at combustion. Reactive to oxidizing agent.
Conditions to avoid	: open flame, sparks--- No smoking. (DME) Gas demonstrates acidic property under co-existence of water, of which condition is corrosive to steel. In addition, corrosion process is accelerated under the co-existence of oxygen and in high pressures. (CO_2)
Incompatible materials	: Oxidant agents
Hazardous decomposition products	: explosive peroxide (under the effects of light and air) Irritating fumes (at combustion)

11. Toxicological Information

Dimethyl Ether	
Acute Toxicity (oral)	No data
(transdermally)	No data
(inhalation gas)	In an inhalation test (4h-exposure) using rats, its LC50 is 164,000 ppm (DFGOT (vol. 1, 1991), PATTY (5th, 2001)), and therefore, the substance was classified into "Not classified".
Skin Corrosion/Irritation	No data
Sever Damage/Irritation to eyes	No data
Respiratory Sensitization/Skin Sensitization	No data
Germ Cell Mutagenicity	No data
Carcinogenicity	No data
Reproductive Toxicity	In a rat test, inhalation of 6 hours per day for 13 days before mating caused no effect on the mating behavior or on the number of pregnancies observed. From day 6 to day 16 of gestation, the pregnant rats were exposed for 6 hours per day to the same substance, and no significant changes in fetuses were found (DFGOT (vol. 1, 1991)). However, since there is no male reproductive toxicity information available, the substance was classified into "Classification not possible". The substance is also rated as D (Classification not possible to measure pregnancy risk) by the DFG (MAK/BAT, 2007).

STOT (Specific Target Organ Toxicity)/Systemic Toxicity－Single Exposure	Since it is described that in a rabbit inhalation test (45 minutes) and in a dog inhalation test (five minutes) performed at doses above guidance values, anaesthesia, reduced blood pressure, and increased heart rate were seen (DFGOT (vol. 1, 1991)), and in humans, effects on the nervous system, such as unconsciousness, visual defects, and analgesia, were observed, the substance was classified into Category 3 (narcotic effects).
STOT (Specific Target Organ Toxicity)/Systemic Toxicity－Repeated Exposure	In a 14-day inhalation test using rats (6 hours/day, 5 days/week), at the dose of 10,000 ppm, the only significant effect was reduced body weight, and the NOAEL was determined to be < 10,000 ppm. In addition, in a 13-week inhalation test using rats (6 hours/day, 5 days/week), at the dose of 20,000 ppm, increased SGOT values, reduction in liver weight, and increased SGPT activity were observed, while at the dose of 2,000 ppm, they were not observed. In a 13-week inhalation test using hamsters (6 hours/day, 5 days/week), at the dose of 20,000 ppm, a significant reduction in the number of leukocytes was found (DFGOT (vol. 1, 1991)), but at the dose of 10,000 ppm, the reduction was not significant, and the NOAEL was determined to be 5,000 ppm. Since each of these doses is above the guidance value of Category 2, the substance should be equivalent to "Not classified (inhalation)." However, since there is no data on other route available, the substance was classified into "Classification not possible".
Aspiration Respiratory Hazard	No data

Carbon dioxide

The atmospheric concentrations of CO_2 have the following effects on the human body:

CO_2 Atmospheric Concentration (%)	
0.04	Normal air
0.5 (TLV-TWA)	Long-term safety limit (TLV-TWA)
1.5	Although one can tolerate for long time without compromising workability and basic physiology, calcium/phosphorus metabolism can sometimes

	be affected.
2.0	Breathing becomes deeper: increase in respiratory volume by 30%.
3.0	Reduction in workability/exercise: physiological changes lead to changes in weight, blood pressure, and heart rate.
4.0	Breathing becomes even deeper. Increase in breathing rate follows mild gasping. Considerable malaise.
5.0	Extreme breathing difficulty. Severe gasping. Conditions that many people can hardly tolerate. May develop nausea. 30-minute exposure results in manifestation of symptoms from toxicity.
7-9	Permissible level watershed : heavy gasping : leads to unconsciousness in about 15 minutes.
10-11	Regulatory dysfunction : loss of consciousness in about ten minutes.
15-20	Demonstrate more severe symptoms. One-hour exposure is not lethal.
25-30	Hypopnea; hypotension; coma; loss of reflex action; paralyzation: lead to death within several hours.

12. Ecological Information

	Dimethyl Ether	Carbon Dioxide
Hazardous to the aquatic environment (Acute)	Based on its 96h-LC50 > 4,000 mg/L for fish (guppies) and 48h-EC50 > 4000 mg/L for crustaceans (Daphnia magna) (both from IUCLID, 2000), the substance was classified into "Not classified".	No data
Hazardous to the aquatic environment (Chronic)	Since it is water soluble (water solubility, 4.6E+004 mg/L (PHYSPROP Database, 2008)) and its preexisting classification for acute toxicity is "Not classified", the substance was classified into "Not classified".	No data

13. Disposal Consideration

Empty container outdoors away from fire. Completely release gas by pressing down the button until hissing injection noise is no longer heard. Dispose the emptied container in accordance with the local government’s garbage separation policy.

14. Transport Information

Before loading, make sure there is no damages or leaks to the container. Avoid shocks, rolling over, and damages by fall as well as taking measures against shifting, and avoid direct sunlight during transportation.

UN classification	: 2.1
UN number	: UN1950 Aerosol (AEROSOL maximum 1 liter)

15. Regulatory Information

Industrial Safety and Health Act	Appended Table: Category 1 “Dangerous Substances (Flammable gases)” --- Dimethyl Ether The Ordinance on Prevention of Anoxia, Ordinance on Health Standards in the Office ---Carbon Dioxide
High Pressure Gas Safety Act	Article 3 (Exemptions) [Notification] Article 4
Act on Port Regulations	Ordinance for Enforcement Article 12 “Dangerous Substances (High Pressure Gas)”
Civil Aeronautics Act	Ordinance for Enforcement Article 194, Appended Table, Category 1 & 2 (High Pressure Gas).
Ship Safety Act	Regulations for the Carriage and Storage of Dangerous Goods in Ships. Article 3, Appended Table, Category 1 & 2 (High Pressure Gas).
*Law concerning Pollutant Release and Transfer Register (PRTR)	As of June 2014 Non-applicable substance

16. Other Information

References	1) Material Safety Data Sheet: Dimethyl ether (revised date: 20th June 2012) Sumitomo Seika Chemicals Co., Ltd. 2) Material Safety Data Sheet: Carbon Dioxide. (revised date: 25th July 2005) Nippon Ekitan Corporation.
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