

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations Date of issue: 05/13/2015 Version: 2.0

	substance/mixture and of the company/undertaking
1.1. Product identifier	
Product form	: Mixture
Product name	: Desflurane (1.00% - 9.99%), Carbon Dioxide (3.0000% - 59.8299%), Nitrous Oxide (39.1700% - 95.9999%) in Nitrogen
Product code	: HC-2004-03468
1.2. Relevant identified uses of the	substance or mixture and uses advised against
Use of the substance/mixture	: Test gas/Calibration gas.
1.3. Details of the supplier of the sa	fety data sheet
Air Liquide 2700 Post Oak Boulevard Houston, TX 77056 - USA T 1-800-819-1704 www.us.airliquide.com	
1.4. Emergency telephone number	
Emergency number	: CHEMTREC: 1-800-424-9300
SECTION 2: Hazards identification	on
2.1. Classification of the substance	
Classification (GHS-US)	
Ox. Gas 1	H270
Compressed gas	H280
Repr. 1A STOT SE 3	H360 H335
STOT SE 3	H336
2.2. Label elements GHS-US labeling	
	$: \qquad \qquad$
GHS-US labeling	: (HS03) $(HS04)$ $(HS07)$ $(HS08)$
GHS-US labeling Hazard pictograms (GHS-US)	
GHS-US labeling Hazard pictograms (GHS-US) Signal word (GHS-US)	 Danger H270 - May cause or intensify fire; oxidizer H280 - Contains gas under pressure; may explode if heated H335 - May cause respiratory irritation H336 - May cause drowsiness or dizziness H360 - May damage fertility or the unborn child (Inhalation) OSHA-H01 - May displace oxygen and cause rapid suffocation

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2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable 3.2. Mixture

5.2. IMIALUI C			
Name	Product identifier	%	Classification (GHS-US)
Nitrous oxide	(CAS No) 10024-97-2	39.17 - 95.9999	Ox. Gas 1, H270 Liquefied gas, H280 STOT SE 3, H336
Carbon dioxide	(CAS No) 124-38-9	3 - 59.8299	Liquefied gas, H280
Nitrogen	(CAS No) 7727-37-9	0.0001 - 56.83	Compressed gas, H280
Desflurane	(CAS №) 57041-67-5	1 - 9.99	Skin Irrit. 2, H315 Eye Irrit. 2A, H319 Repr. 1A, H360 STOT SE 3, H336 STOT SE 3, H335

Full text of H-phrases: see section 16

SECTION 4: First aid measures	
4.1. Description of first aid measure	95
First-aid measures after inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If you feel unwell, seek medical advice.
irst-aid measures after skin contact	: Adverse effects not expected from this product.
First-aid measures after eye contact	: Adverse effects not expected from this product.
irst-aid measures after ingestion	: Ingestion is not considered a potential route of exposure.
.2. Most important symptoms and	effects, both acute and delayed
Symptoms/injuries after inhalation	: May displace oxygen and cause rapid suffocation. May cause drowsiness or dizziness. May cause respiratory irritation. May increase respiration and heart rate.
Symptoms/injuries after skin contact	: Adverse effects not expected from this product.
Symptoms/injuries after eye contact	: Adverse effects not expected from this product.
Symptoms/injuries after ingestion	: Ingestion is not considered a potential route of exposure.
Symptoms/injuries upon intravenous administration	: Not known.
Chronic symptoms	: May damage fertility. May damage the unborn child.
.3. Indication of any immediate me	dical attention and special treatment needed
f you feel unwell, seek medical advice. If br	eathing is difficult, give oxygen.
ECTION 5: Firefighting measure	es
.1. Extinguishing media	
uitable extinguishing media	: Use extinguishing media appropriate for surrounding fire.
Insuitable extinguishing media	: Do not use water jet to extinguish.
.2. Special hazards arising from th	e substance or mixture
ire hazard	: The product is not flammable.
xplosion hazard	: Product is not explosive. Heat may build pressure, rupturing closed containers, spreading fire and increasing risk of burns and injuries.
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Reactivity	: None known.
5.3. Advice for firefighters	
Firefighting instructions	: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion. Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire.
Protection during firefighting	: Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Do not enter fire area without proper protective equipment, including respiratory protection.

SECTI	ON 6: Accidental release meas	ures
6.1.	Personal precautions, protective equ	ipment and emergency procedures
General	measures	: Ensure adequate ventilation.
6.1.1.	For non-emergency personnel	
Protectiv	ve equipment	: Wear protective equipment consistent with the site emergency plan.
Emergei	ncy procedures	: Escape the danger area by the closest safe route. Close doors and windows of adjacent premises. Keep containers closed. Mark the danger area. Seal off low-lying areas. Keep upwind.
6.1.2.	For emergency responders	
Protectiv	ve equipment	: Standard protective clothing and equipment (e.g., Self Contained Breathing Apparatus) for fire fighters. Equip cleanup crew with proper protection.
Emerger	ncy procedures	: Evacuate and limit access. Ventilate area.
6.2.	Environmental precautions	
Try to st	op release if safe to do so.	
6.3.	Methods and material for containmer	t and cleaning up
For cont	ainment	: Try to stop release if safe to do so.
Methods	for cleaning up	: Dispose of this material and its container in accordance with local regulations.
6.4.	Reference to other sections	
See also	Sections 8 and 13.	
SECTI	ON 7: Handling and storage	
7.1.	Precautions for safe handling	
Addition	al hazards when processed	: Pressurized container: Do not pierce or burn, even after use. Use equipment rated for cylinder pressure. Close valve after each use and when empty.
Precauti	ons for safe handling	: Do not handle until all safety precautions have been read and understood. Use only outdoors or in a well-ventilated area.
Hygiene	measures	: Do not eat, drink or smoke when using this product.
7.2.	Conditions for safe storage, including	g any incompatibilities
Technica	al measures	: Comply with applicable regulations.
Storage	conditions	: Do not expose to temperatures exceeding 52°C (125°F). Keep container closed when not in use. Protect cylinder from physical damage. Store in well ventilated area. Store locked up.
Incompa	tible products	: None known.
Incompa	tible materials	: Flammable materials. Combustible materials. Reducing agents.
7.3.	Specific end use(s)	

See Section 1.2.

SECTION 8: Exposure controls/personal protection		
3.1. Control parameters		
Desflurane (1.00% - 9.99%), Carbon Dioxide (3.0000% - 59.8299%), Nitrous Oxide (39.1700% - 95.9999%) in Nitrogen		
ACGIH	Not applicable	
OSHA Not applicable		
Desflurane (57041-67-5)		
ACGIH	Not applicable	
OSHA	Not applicable	

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Carbon dioxide (124-38-9)			
ACGIH	ACGIH TWA (ppm)	5000 ppm	
ACGIH	ACGIH STEL (ppm)	30000 ppm	
OSHA	OSHA PEL (TWA) (mg/m ³)	9000 mg/m³	
OSHA	OSHA PEL (TWA) (ppm)	5000 ppm	
Nitrous oxide (10024-97-2)			
ACGIH	ACGIH TWA (ppm)	50 ppm	
OSHA	Not applicable		

Nitrogen (7727-37-9)	
ACGIH Not applicable	
OSHA	Not applicable

8.2.	Exposure controls		
Approp	priate engineering controls	Ensure exposure is below occupational exposure limits. Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Oxygel detectors should be used when asphyxiating gases may be released. Consider work permit system e.g. for maintenance activities.	n
Hand p	protection	: Wear working gloves when handling gas containers. 29 CFR 1910.138: Hand Protection.	
Eye pr	otection	: Wear safety glasses with side shields. 29 CFR 1910.133: Eye and Face Protection.	
Skin ar	nd body protection	: Wear suitable protective clothing, e.g lab coats, coveralls or flame resistant clothing.	
Respir	atory protection	: None necessary during normal and routine operations. See Sections 5 & 6.	
Therma	al hazard protection	: None necessary during normal and routine operations.	
Enviro	nmental exposure controls	: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.	
Other i	nformation	: Wear safety shoes while handling containers. 29 CFR 1910.136: Foot Protection.	

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and	chemical properties
Physical state	: Gas
Appearance	: Clear, colorless gas.
Color	: Colorless
Odor	: Slightly sweet Mildly pungent ethereal odor
Odor threshold	: No data available
рН	: No data available
Melting point	: No data available
Freezing point	: No data available
Boiling point	: No data available
Flash point	: Not applicable - not flammable
Relative evaporation rate (butyl acetate=1)	: No data available
Flammability (solid, gas)	: See Section 2.1 and 2.2
Explosion limits	: Not applicable - not flammable
Explosive properties	: Not applicable - not flammable.
Oxidizing properties	: Not combustible but enhances combustion of other substances. May cause or intensify fire; oxidizer.
Vapor pressure	: No data available
Relative density	: No data available
Relative vapor density at 20 °C	: No data available
Molecular mass	: Not applicable for gas-mixtures.
Relative gas density	: Heavier than air
Solubility	: No data available

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Log Pow	: No data available
Log Kow	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Viscosity	: No data available
Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
9.2. Other information	
Additional information	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity	
10.1. Reactivity	
None known.	
10.2. Chemical stability	
Stable under normal conditions.	
10.3. Possibility of hazardous reactions	
May react violently with reducing agents. Can for	m explosive mixtures with flammable materials.
10.4. Conditions to avoid	
None under recommended storage and handling	conditions (see section 7).
10.5. Incompatible materials	
Combustible materials. Flammable materials. Re-	ducing agents.
10.6. Hazardous decomposition products	
Under normal conditions of storage and use haza	rdous decomposition products should not be produced.
SECTION 11: Toxicological informati	on
11.1. Information on toxicological effects	
Acute toxicity	: Not classified
Carbon dioxide (124-38-9)	
LC50 inhalation rat (ppm)	820000 ppm/4h
Nitrous oxide (10024-97-2)	
LC50 inhalation rat (ppm)	250000 ppm/4h
Nitrogen (7727-37-9)	
LC50 inhalation rat (ppm)	820000 ppm/4h
Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	: Not classified
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: May damage fertility or the unborn child (Inhalation).
Specific target organ toxicity (single exposure)	: May cause respiratory irritation. May cause drowsiness or dizziness.
Specific larger organ toxicity (single exposure)	. May cause respiratory initiation. May cause drowsiness or dizzmess.
Specific target organ toxicity (repeated exposure)	: Not classified
Aspiration hazard	: Not classified
Symptoms/injuries after inhalation	: May displace oxygen and cause rapid suffocation. May cause drowsiness or dizziness. May cause respiratory irritation. May increase respiration and heart rate.
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Symptoms/injuries after skin contact	: Adverse effects not expected from this product.
Symptoms/injuries after eye contact	: Adverse effects not expected from this product.
Symptoms/injuries after ingestion	: Ingestion is not considered a potential route of exposure.
Symptoms/injuries upon intravenous administration	: Not known.
Chronic symptoms	: May damage fertility. May damage the unborn child.

SECTION 12: Ecological information

12.1.	Toxicity
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No additional information available

12.2. Persistence and degradability

Carbon dioxide (124-38-9)	
Persistence and degradability	No ecological damage caused by this product.
Nitrous oxide (10024-97-2)	
Persistence and degradability	Not applicable for inorganic gases.
Nitrogen (7727-37-9)	
Persistence and degradability	No ecological damage caused by this product.
Persistence and degradability	

12.3. Bioaccumulative potential

Carbon dioxide (124-38-9)	
BCF fish 1	(no bioaccumulation)
Log Pow	0.83
Bioaccumulative potential	No ecological damage caused by this product.
Nitrous oxide (10024-97-2)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No data available.
Nitrogen (7727-37-9)	
Log Pow	Not applicable for inorganic gases.
Bioaccumulative potential	No ecological damage caused by this product.

12.4. Mobility in soil

Carbon dioxide (124-38-9)	
Ecology - soil	No ecological damage caused by this product.
Nitrous oxide (10024-97-2)	
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.
Nitrogen (7727-37-9)	
Ecology - soil	No ecological damage caused by this product.
12.5. Other adverse effects	
Effect on ozone layer	: No known effects from this product.
Effect on the global warming	: Contains greenhouse gas(es) not covered by 842/2006/EC.

SECTION 13: Disposal considerations	S
13.1. Waste treatment methods	
Waste treatment methods	: Contact supplier if guidance is required. Do not discharge into any place where its accumulation could be dangerous. Ensure that the emission levels from local regulations or operating permits are not exceeded.
Waste disposal recommendations	: Refer to the CGA Pamphlet P-63 "Disposal of Gases" available at www.cganet.com for more guidance on suitable disposal methods.

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SECTION 14: Transport information

SECTION 14. Transport information	
Department of Transportation (DOT)	
In accordance with DOT	
Transport document description	: UN3156 Compressed gas, oxidizing, n.o.s.
UN-No.(DOT)	: UN3156
Proper Shipping Name (DOT)	: Compressed gas, oxidizing, n.o.s.
Hazard labels (DOT)	: 2.2 - Non-flammable gas
	5.1 - Oxidizer
	51
DOT Packaging Non Bulk (49 CFR 173.xxx)	: 302
DOT Packaging Bulk (49 CFR 173.xxx)	: 314;315
DOT Symbols	: G - Identifies PSN requiring a technical name
DOT Special Provisions (49 CFR 172.102)	: A14 - This material is not authorized to be transported as a limited quantity or consumer
DOT Deckoping Exceptions (40 OED 470)	commodity in accordance with 173.306 of this subchapter when transported aboard an aircraft.
DOT Packaging Exceptions (49 CFR 173.xxx)	: 306 . 75 km
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27)	: лэку
DOT Quantity Limitations Cargo aircraft only (49	: 150 kg
CFR 175.75)	Ŭ.
DOT Vessel Stowage Location	: D - The material must be stowed "on deck only" on a cargo vessel and on a passenger vessel
	carrying a number of passengers limited to not more than the larger of 25 passengers or one passenger per each 3 m of overall vessel length, but the material is prohibited on passenger
	vessels in which the limiting number of passengers is exceeded.
Additional information	
Other information	: No supplementary information available.
ADR	
Transport document description	: UN 3156, 2.2 (5.1), (E)
	: 2 - Gases
Class (ADR)	
Hazard identification number (Kemler No.)	: 25 : 10
Classification code (ADR)	
Hazard labels (ADR)	: 2.2 - Non-flammable compressed gas 5.1 - Oxidizer
	2 5.1
Orango platas	· • • • • • • • • • • • • • • • • • • •
Orange plates	25
	3156
Tunnel restriction code (ADR)	: E
Limited quantities (ADR)	: 0
Excepted quantities (ADR)	: E0
באסטירוט עעמווווונס (הטוע)	. 20
Transport by sea	
UN-No. (IMDG)	: 3156
Proper Shipping Name (IMDG)	
	: COMPRESSED GAS, OXIDIZING, N.O.S.
Class (IMDG)	2 - Gases

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Air transport

3156
COMPRESSED GAS, OXIDIZING, N.O.S.
2

SECTION 15: Regulatory information
15.1. US Federal regulations
Carbon dioxide (124-38-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Nitrous oxide (10024-97-2)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Nitrogen (7727-37-9)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

No additional information available

Carbon dioxide (124-38-9)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class A - Compressed Gas
Nitrous oxide (10024-97-2)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class A - Compressed Gas Class C - Oxidizing Material Class D Division 2 Subdivision A - Very toxic material causing other toxic effects
Nitrogen (7727-37-9)	
Listed on the Canadian DSL (Domestic Sustances List)	
WHMIS Classification	Class A - Compressed Gas

EU-Regulations

No additional information available

Carbon dioxide (124-38-9)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Nitrous oxide (10024-97-2)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Nitrogen (7727-37-9)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP] Not classified

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD] No additional information available

National regulations

Carbon dioxide (124-38-9)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Listed on the Canadian IDL (Ingredient Disclosure List)

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Nitrous oxide (10024-97-2) Listed on the AICS (Australian Inventory of Chemical Substances) Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China) Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory Listed on the Korean ECL (Existing Chemicals List) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances) Listed on the Canadian IDL (Ingredient Disclosure List) Nitrogen (7727-37-9) Listed on the Korean ECL (Existing Chemical Substances) Listed on the AICS (Australian Inventory of Chemical Substances) Listed on the AICS (Australian Inventory of Chemical Substances) Listed on the Korean ECL (Existing Chemical Substances) Listed on the Korean ECL (Existing Chemical Substances) Listed on the Korean ECL (Existing Chemical Substances) Listed on NZIOC (New Zealand Inventory of Chemical Substances) Listed on NZIOC (New Zealand Inventory of Chemicals List) Listed on NZIOC (New Zealand Inventory of Chemicals) Listed on NZIOC (New Zealand Inventory of Chemicals) Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

15.3. US State regulations

Nitrous oxide (10024-97-2)					
U.S California - Proposition 65 - Carcinogens List	U.S California - Proposition 65 - Developmental Toxicity	U.S California - Proposition 65 - Reproductive Toxicity - Female	U.S California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)	
No	Yes	Yes	No		

Carbon dioxide (124-38-9)
U.S Massachusetts - Right To Know List U.S New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) List
Nitrous oxide (10024-97-2)
U.S Massachusetts - Right To Know List U.S New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) List
Nitrogen (7727-37-9)
U.S Massachusetts - Right To Know List U.S New Jersey - Right to Know Hazardous Substance List U.S Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information	
Indication of changes	 Revised safety data sheet in accordance with OSHA final rule on GHS implementation promulgated March 26, 2012.
Other information	: This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this

product.

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Il text of H-phrases:		
Compressed gas	Gases under pressure Compressed gas	
Eye Irrit. 2A	Serious eye damage/eye irritation Category 2A	
Liquefied gas	Gases under pressure Liquefied gas	
Ox. Gas 1	Oxidizing gases Category 1	
Repr. 1A	Reproductive toxicity Category 1A	
Skin Irrit. 2	Skin corrosion/irritation Category 2	
STOT SE 3	Specific target organ toxicity (single exposure) Category 3	
STOT SE 3	Specific target organ toxicity (single exposure) Category 3	
H270	May cause or intensify fire; oxidizer	
H280	Contains gas under pressure; may explode if heated	
H315	Causes skin irritation	
H319	Causes serious eye irritation	
H335	May cause respiratory irritation	
H336	May cause drowsiness or dizziness	
H360	May damage fertility or the unborn child	

SDS US (GHS HazCom 2012)

This Safety Data Sheet is offered pursuant to OSHA's Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this product. To the best of Air Liquide America Corporation's knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this product is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.