Safety Data Sheet

Section 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product identifier

Product Name

- **Hydrogen (12.0%), Methane (5.0%), Ethane (4.0%), Carbon Dioxide (3.0%), Ethylene (2.0%), n-Propane (2.0%), Acetylene (1.0%), Carbon Monoxide (1.0%), Methyl Acetylene (1.0%), Propylene (1.0%), 1,2-Propadiene (1.0%), iso-Butane (0.3%), n-Butane (0.3%), 1-Butene (0.3%), iso-Butylene (0.3%), cis-2-Butene (0.3%), trans-2-Butene (0.3%), 1,3-Butadiene (0.3%), Oxygen (0.2%), Isopentane (0.1%), n-Pentane (0.1%), 1-Pentene (0.1%), cis-2-Pentene (0.1%), trans-2-Pentene (0.1%), n-Hexane (.05%), 2-Methyl-2-Butene (.05%), Nitrogen (Balance)**

Product Code

- 90086

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified use(s)

- Laboratory Instrument Calibration Standard

1.3 Details of the supplier of the safety data sheet

Manufacturer

- Air Liquide

2700 Post Oak Blvd.
Houston, TX 77056
United States
www.us.airliquide.com
sds@airliquide.com

Telephone (Technical)

- 713-896-2896

Telephone (Technical)

- 800-819-1704

1.4 Emergency telephone number

Manufacturer

- 800-424-9300

Manufacturer

- +1 703-527-3887

Section 2: Hazards Identification

EU/EEC

According to EU Directive 1272/2008 (CLP)/REACH 1907/2006 [amended by 453/2010]
According to EU Directive 67/548/EEC (DSD) or 1999/45/EC (DPD)

2.1 Classification of the substance or mixture

CLP

- Flammable Gases 1 - H220
  Compressed Gas - H280
  Germ Cell Mutagenicity 1B - H340
  Carcinogenicity 1A - H350

Reproductive Toxicity 1A - H360D
Specific Target Organ Toxicity Repeated Exposure 2 - H373

DSD/DPD

- Extremely Flammable (F+)
  Carcinogenic Substances - Category 1
  Substances Toxic To Reproduction - Category 1
  Mutagenic Substances - Category 2
  Harmful (Xn)
  R12, R20, R45, R46, R48/20, R61

2.2 Label Elements

CLP

DANGER

Hazard statements

- H220 - Extremely flammable gas
  H280 - Contains gas under pressure; may explode if heated
  H340 - May cause genetic defects.
  H350 - May cause cancer.
  H360D - May damage the unborn child.
  H373 - May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention

- P201 - Obtain special instructions before use.
  P202 - Do not handle until all safety precautions have been read and understood.
  P210 - Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.
  P260 - Do not breathe gas.
  P280 - Wear protective gloves/protective clothing/eye protection/face protection.
  P281 - Use personal protective equipment as required.

Response

- P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
  P381 - Eliminate all ignition sources if safe to do so.
  P308+P313 - IF exposed or concerned: Get medical advice/attention.
  P314 - Get medical advice/attention if you feel unwell.

Storage/Disposal

- P403 - Store in a well-ventilated place.
  P405 - Store locked up.
  P501 - Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

DSD/DPD

Risk phrases

- R12 - Extremely flammable.
  R20 - Harmful by inhalation.
  R45 - May cause cancer.
  R46 - May cause heritable genetic damage.
  R48/20 - Harmful: danger of serious damage to health by prolonged exposure through inhalation.
  R61 - May cause harm to the unborn child.

Safety phrases

- S9 - Keep container in a well ventilated place
  S16 - Keep away from sources of ignition - No Smoking.
  S53 - Avoid exposure - obtain special instructions before use.

2.3 Other Hazards

CLP

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.
  According to Regulation (EC) No. 1272/2008 (CLP) this material is considered hazardous.

DSD/DPD

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.

According to European Directive 1999/45/EC this preparation is considered dangerous.

United States (US)

According to OSHA 29 CFR 1910.1200 HCS

2.1 Classification of the substance or mixture

OSHA HCS 2012

- Flammable Gases 1 - H220
  Compressed Gas - H280
  Germ Cell Mutagenicity 1B - H340
  Carcinogenicity 1A - H350
  Reproductive Toxicity 1A - H360
  Simple Asphyxiant

2.2 Label elements

OSHA HCS 2012

DANGER

Hazard statements

- Extremely flammable gas - H220
  Contains gas under pressure; may explode if heated - H280
  May cause genetic defects. - H340
  May cause cancer. - H350
  May damage fertility or the unborn child. - H360
  May displace oxygen and cause rapid suffocation.

Precautionary statements

Prevention

- Obtain special instructions before use. - P201
  Do not handle until all safety precautions have been read and understood. - P202
  Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking. - P210
  Wear protective gloves/protective clothing/eye protection/face protection. - P280
  Use personal protective equipment as required. - P281

Response

- Leaking gas fire: Do not extinguish, unless leak can be stopped safely. - P377
  Eliminate all ignition sources if safe to do so. - P381
  IF exposed or concerned: Get medical advice/attention. - P308+P313

Storage/Disposal

- Store in a well-ventilated place. - P403
  Store locked up. - P405
  Dispose of content and/or container in accordance with local, regional, national, and/or international regulations. - P501

2.3 Other hazards

OSHA HCS 2012

- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to WHMIS

2.1 Classification of the substance or mixture

WHMIS

- Compressed Gas - A
  Flammable Gases - B1
  Very Toxic - D1A
  Other Toxic Effects - D2A
  Other Toxic Effects - D2B

2.2 Label elements

WHMIS

- Compressed Gas - A
  Flammable Gases - B1
  Very Toxic - D1A
  Other Toxic Effects - D2A
  Other Toxic Effects - D2B

2.3 Other hazards

WHMIS

- This material is a simple asphyxiant. May displace or reduce oxygen available for breathing especially in confined spaces.
  In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

2.4 Other information

NFPA

Section 3 - Composition/Information on Ingredients

3.1 Substances

- Material does not meet the criteria of a substance in accordance with Regulation (EC) No 1272/2008.

3.2 Mixtures

Hazardous Components					
Chemical Name	**Identifiers**	**%(weight)**	**LD50/LC50**	**Classifications According to Regulation/Directive**	**Comments**
Nitrogen	**CAS:**7727-37-9 **EINECS:**231-783-9	63.65%	NDA	**EU DSD/DPD:** Not Classified - Criteria not met **EU CLP:** Self Classified: Press. Gas - Comp., H280 **OSHA HCS 2012:** Press. Gas - Comp.; Simp. Asphyx.	NDA
Hydrogen	**CAS:**1333-74-0 **EC Number:**215-605-7	12%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Methane	**CAS:**74-82-8 **EC Number:**200-812-7	5%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp; Simp. Asphyx.	NDA

Ethane	**CAS:**74-84-0 **EC Number:**200-814-8	4%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Press. Gas - Comp.; Simp. Asphyx.; Flam. Gas 1	NDA
Carbon dioxide	**CAS:**124-38-9 **EC Number:**204-696-9	3%	Inhalation-Rat LC50 • 470000 ppm 30 Minute(s)	**EU DSD/DPD:** Not Classified **EU CLP:** Self Classified: Press. Gas - Comp., H280 **OSHA HCS 2012:** Press. Gas - Comp.; Simp. Asphyx.	NDA
Ethylene	**CAS:**74-85-1 **EC Number:**200-815-3	2%	NDA	**EU DSD/DPD:** Annex I: F+; R12 R67 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280; STOT SE 3, H336 **OSHA HCS 2012:** Eye Irrit 2A; Press. Gas - Comp.; Flam. Gas 1; STOT SE 3: Narc.	NDA
Propane	**CAS:**74-98-6 **EC Number:**200-827-9	2%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp, H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
1,2-Propadiene	**CAS:**463-49-0 **EINECS:**207-335-3	1%	NDA	**EU DSD/DPD:** Self Classified: F+, R12 **EU CLP:** Self Classified: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Acetylene	**CAS:**74-86-2 **EC Number:**200-816-9	1%	NDA	**EU DSD/DPD:** Annex I: F+; R12 R5 R6 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas, H280; EUH066 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas; Simp. Asphyx.	NDA
Carbon monoxide	**CAS:**630-08-0 **EC Number:**211-128-3	1%	Inhalation-Rat LC50 • 1807 ppm 4 Hour(s)	**EU DSD/DPD:** Annex I: F+; R12 T; R23-48/23 Repr.Cat.1; R61 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280; Repr. 1A, H360D; Acute Tox. 3, H331; STOT RE 1, H372 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Repr 1A; Acute Tox 3 (inhl)	NDA
Methyl Acetylene	**CAS:**74-49-7	1%	NDA	**EU DSD/DPD:** Self Classified: F+, R12; Xi, R37, R67 **EU CLP:** Self Classified: Press. Gas- Comp., H280; Flam. Gas 1, H220; STOT SE 3: Narc., H336; STOT SE 3: Resp. Irrit., H335 **OSHA HCS 2012:** Press. Gas; Flam. Gas 1; STOT SE 3: Narc.; STOT SE 3: Resp. Irrit.	NDA
Propylene	**CAS:**115-07-1	1%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas- Comp., H280 **OSHA HCS 2012:** Flam Gas 1; Press Gas; Muta 2; Simp. Asphyx.	NDA
(E)-but-2-ene	**CAS:**624-64-6 **EC Number:**210-855-3	0.3%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA

1,3-Butadiene	**CAS:**106-99-0 **EC Number:**203-450-8	0.3%	Inhalation-Rat LC50 • 285000 mg/m³ 4 Hour(s) Ingestion/Oral-Rat LD50 • 5480 mg/kg	**EU DSD/DPD:** Annex I: F+; R12 Carc.Cat.1; R45 Muta.Cat.2; R46 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280; Carc. 1A, H350; Muta. 1B, H340 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Carc. 1A; Muta. 1B; Skin Irrit. 2; Eye Irrit. 2	NDA
1-Butene	**CAS:**106-98-9 **EC Number:**203-449-2	0.3%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
1-Propene, 2-methyl-	**CAS:**115-11-7 **EC Number:**204-066-3	0.3%	Inhalation-Rat LC50 • 550000 mg/m³ 4 Hour (s)	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Press. Gas - Comp., H280; Flam. Gas 1, H220 **OSHA HCS 2012:** Press. Gas - Comp.; Flam. Gas 1; STOT SE 3: Narc.	NDA
2-Butene-cis	**CAS:**590-18-1 **EC Number:**209-673-7	0.3%	NDA	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Butane	**CAS:**106-97-8 **EC Number:**203-448-7	0.3%	Inhalation-Rat LC50 • 658 g/m³ 4 Hour(s)	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp., H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Isobutane	**CAS:**75-28-5 **EC Number:**200-857-2	0.3%	Inhalation-Rat LC50 • 658000 mg/m³ 4 Hour (s)	**EU DSD/DPD:** Annex I: F+; R12 **EU CLP:** Annex VI: Flam. Gas 1, H220; Press. Gas - Comp, H280 **OSHA HCS 2012:** Flam. Gas 1; Press. Gas - Comp.; Simp. Asphyx.	NDA
Oxygen	**CAS:**7782-44-7 **EC Number:**231-956-9	0.2%	NDA	**EU DSD/DPD:** Annex I: O; R8 **EU CLP:** Annex VI: Ox. Gas 1, H270; Press. Gas - Comp., H280 **OSHA HCS 2012:** Ox. Gas 1; Press Gas. - Comp.	NDA
1-Pentene	**CAS:**109-67-1 **EINECS:**203-694-5	0.1%	Inhalation-Rat LC50 • 175000 mg/m³ 4 Hour (s)	**EU DSD/DPD:** Self Classified: F+, R12 **EU CLP:** Self Classified: Flam. Liq. 1, H224; STOT SE 3: Narc., H336 **OSHA HCS 2012:** Flam. Liq. 1; STOT SE 3: Narc.	NDA
2-Methylbutane (In Liquid form)	**CAS:**78-78-4 **EC Number:**201-142-8	0.1%	Inhalation-Rat LC50 • 280000 mg/m³ 4 Hour (s)	**EU DSD/DPD:** Annex I: F+; R12 N; R51-53 Xn; R65 R66 R67 **EU CLP:** Annex VI: Flam. Liq. 1, H224; Asp. Tox. 1, H304; STOT SE 3, H336; Aquatic Chronic 2, H411; EUH066 **OSHA HCS 2012:** Flam Liq. 1; Eye Irrit. 2A; Skin Irrit. 2; STOT SE 3: Resp. Irrit. & Narc.; Asp. Tox. 1	NDA
2-Pentene	**CAS:**109-68-2 **EINECS:**203-695-0	0.1%	NDA	**EU DSD/DPD:** Data Lacking **EU CLP:** Data Lacking **OSHA HCS 2012:** Data Lacking	NDA
2-Pentene, (Z) -	**CAS:**627-20-3 **EINECS:**210-988-7	0.1%	NDA	**EU DSD/DPD:** Data Lacking **EU CLP:** Data Lacking **OSHA HCS 2012:** Data Lacking	NDA

Pentane	**CAS:**109-66-0 **EC Number:**203-692-4	0.1%	Inhalation-Rat LC50 • 364 g/m³ 4 Hour(s) Ingestion/Oral-Rat LD50 • >2000 mg/kg	**EU DSD/DPD:** Annex I: F+; R12 N; R51-53 Xn; R65 R66 R67 **EU CLP:** Annex VI: Flam. Liq. 1, H224; Asp. Tox. 1, H304; STOT SE 3, H336; Aquatic Chronic 2, H411; EUH066 **OSHA HCS 2012:** Flam Liq 1; Asp. Tox. 1.; Eye Irrit. 2A; Skin Irrit. 2; STOT SE 3: Narc.	NDA
2-Methyl-2-butene	**CAS:**513-35-9 **EINECS:**208-156-3	0.05%	NDA	**EU DSD/DPD:** Data Lacking **EU CLP:** Self Classified: Flam. Liq. 2, H225 **OSHA HCS 2012:** Flam. Liq. 2	NDA
Hexane	**CAS:**110-54-3 **EC Number:**203-777-6	0.05%	Ingestion/Oral-Rat LD50 • 25 g/kg Inhalation-Rat LC50 • 48000 ppm 4 Hour(s)	**EU DSD/DPD:** Annex I: F; R11; Repr. 3; R62; Xn; R65-48/20; Xi; R38; R67; N; R51-53 **EU CLP:** Annex VI: Flam. Liq. 2, H225; Repr. 2, H361f; Asp. Tox. 1, H304; STOT RE 2*, H373; Skin Irrit. 2, H315; STOT SE 3: Narc., H336; Aquatic Chronic 2, H411 **OSHA HCS 2012:** Flam. Liq. 2; Repr. 2; STOT RE 2 - CNS & Nervous System; Skin Irrit. 2; Eye Irrit. 2B; STOT SE 3: Narc. & Resp. Irrit.; Asp. Tox. 1	NDA

See Section 16 for full text of H-statements and R-phrases.

Section 4 - First Aid Measures

4.1 Description of first aid measures

Inhalation
- IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin
- Although exposure is unlikely, in case of contact immediately flush skin with running water. If skin irritation develops get medical advice/attention.

Eye
- First aid is not expected to be necessary if material is used under ordinary conditions and as recommended. If irritation develops and persists, get medical attention.

Ingestion
- Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred. A potential health hazard associated with this gas is anoxia.

4.4 Other information

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO GASES WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn. Victim(s) who experience any adverse effect after over-exposure to this gas mixture must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

Section 5 - Firefighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media
- SMALL FIRES: Dry chemical or CO2.
  LARGE FIRES: Water spray or fog.

Unsuitable Extinguishing Media
- No data available

5.2 Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
- EXTREMELY FLAMMABLE
  Will form explosive mixtures with air.
  Vapors may travel to source of ignition and flash back.
  Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
  Containers may explode when heated.
  Ruptured cylinders may rocket.

Hazardous Combustion Products
- No data available

5.3 Advice for firefighters

- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
  Wear positive pressure self-contained breathing apparatus (SCBA).
  DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED
  Move containers from fire area if you can do it without risk.
  FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
  FIRE INVOLVING TANKS: ALWAYS stay away from tanks engulfed in fire.
  FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
  FIRE INVOLVING TANKS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
  FIRE INVOLVING TANKS: Cool containers with flooding quantities of water until well after fire is out.
  FIRE INVOLVING TANKS: Do not direct water at source of leak or safety devices; icing may occur.
  FIRE INVOLVING TANKS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

Section 6 - Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal Precautions
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Do not touch or walk through spilled material. Ventilate the area before entry.

Emergency Procedures
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area) As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions. Stop leak if you can do it without risk. Keep unauthorized personnel away. Keep out of low areas. Stay upwind. LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile)

6.2 Environmental precautions

- No special environmental precautions necessary.

6.3 Methods and material for containment and cleaning up

Containment/Clean-up Measures
- All equipment used when handling the product must be grounded.
  Stop leak if you can do it without risk.
  If possible, turn leaking containers so that gas escapes rather than liquid.
  Use water spray to reduce vapors; do not put water directly on leak, spill area or inside container.
  Do not direct water at spill or source of leak.

Isolate area until gas has dispersed.

6.4 Reference to other sections

- Refer to Section 8 - Exposure Controls/Personal Protection and Section 13 - Disposal Considerations.

Section 7 - Handling and Storage

7.1 Precautions for safe handling

Handling

- Keep away from heat and ignition sources – No Smoking. Take precautionary measures against static charges. All equipment used when handling the product must be grounded. Use only non-sparking tools. Use only with adequate ventilation. Ventilate closed spaces before entering. Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly ventilated area; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to olfactory fatigue or oxygen deficiency. Cylinders should be firmly secured to prevent falling or being knocked-over. Use explosion-proof - electrical, ventilating and/or lighting equipment. Do not attempt to repair, adjust, or in any other way modify cylinders. If there is a malfunction or another type of operational problem, contact nearest distributor immediately. Empty containers retain product residue and can be hazardous. Do not cut, weld, puncture or incinerate container.

7.2 Conditions for safe storage, including any incompatibilities

Storage

- Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52C (125F). Cylinders must be protected from the environment, and preferably kept at room temperature approximately 21C (70F). Protect cylinders against physical damage. Cylinders should be firmly secured to prevent falling or being knocked-over. Store locked up.

7.3 Specific end use(s)

- Refer to Section 1.2 - Relevant identified uses.

Section 8 - Exposure Controls/Personal Protection

8.1 Control parameters

Exposure Limits/Guidelines						
	Result	**ACGIH**	**Canada Ontario**	**Canada Quebec**	**China**	**China Highly Toxic Goods**
Hexane (110-54-3)	STELs	Not established	Not established	Not established	180 mg/m3 STEL	Not established
	TWAs	50 ppm TWA	50 ppm TWA	50 ppm TWAEV; 176 mg/m3 TWAEV	100 mg/m3 TWA	Not established
Pentane (109-66-0)	STELs	Not established	750 ppm STEL; 2210 mg/m3 STEL	Not established	1000 mg/m3 STEL	Not established
	TWAs	600 ppm TWA (listed under Pentane, all isomers)	600 ppm TWA; 1770 mg/m3 TWA	120 ppm TWAEV; 350 mg/m3 TWAEV	500 mg/m3 TWA	Not established
2-Methylbutane (In Liquid form) (78-78-4)	STELs	Not established	750 ppm STEL (listed under Pentane, all isomers); 2210 mg/m3 STEL (listed under Pentane, all isomers)	Not established	1000 mg/m3 STEL	Not established
			600 ppm TWA (listed			

	TWAs	600 ppm TWA (listed under Pentane, all isomers)	under Pentane, all isomers); 1770 mg/m3 TWA (listed under Pentane, all isomers)	Not established	500 mg/m3 TWA	Not established
1,3-Butadiene (106-99-0)	STELs	Not established	Not established	Not established	12.5 mg/m3 STEL	Not established
	TWAs	2 ppm TWA	2 ppm TWA	2 ppm TWAEV; 4.4 mg/m3 TWAEV	5 mg/m3 TWA	Not established
1-Propene, 2-methyl- (115-11-7)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established
2-Butene-cis (590-18-1)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established
Isobutane (75-28-5)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	800 ppm TWA (listed under Aliphatic hydrocarbon gases)	Not established	Not established	Not established
Butane (106-97-8)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	800 ppm TWA (listed under Aliphatic hydrocarbon gases)	800 ppm TWAEV; 1900 mg/m3 TWAEV	Not established	Not established
1-Butene (106-98-9)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established
(E)-but-2-ene (624-64-6)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established
Carbon monoxide (630-08-0)	Ceilings	Not established	Not established	Not established	20 mg/m3 Ceiling [MAC] (high altitude area, 2000-3000m); 15 mg/m3 Ceiling [MAC] (high altitude area, >3000m)	Not established
	STELs	Not established	100 ppm STEL	200 ppm STEV; 230 mg/m3 STEV	30 mg/m3 STEL (not in high altitude area)	30 mg/m3 STEL (not in high altitude area)
	TWAs	25 ppm TWA	25 ppm TWA	35 ppm TWAEV; 40 mg/m3 TWAEV	20 mg/m3 TWA (not in high altitude area)	20 mg/m3 TWA (not in high altitude area)
Propylene (115-07-1)	TWAs	500 ppm TWA	500 ppm TWA	Not established	Not established	Not established
Ethylene (74-85-1)	TWAs	200 ppm TWA	200 ppm TWA	Not established	Not established	Not established
Propane (74-98-6)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	1000 ppm TWA	1000 ppm TWAEV; 1800 mg/m3 TWAEV	Not established	Not established
Carbon dioxide (124-38-9)	STELs	30000 ppm STEL	30000 ppm STEL	30000 ppm STEV; 54000 mg/m3 STEV	18000 mg/m3 STEL	Not established
	TWAs	5000 ppm TWA	5000 ppm TWA	5000 ppm TWAEV; 9000 mg/m3 TWAEV	9000 mg/m3 TWA	Not established
Ethane (74-84-0)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	1000 ppm TWA	Not established	Not established	Not established

Methane (74-82-8)	TWAs	1000 ppm TWA (listed under Aliphatic hydrocarbon gases: Alkane C1-4)	1000 ppm TWA	Not established	Not established	Not established

Exposure Limits/Guidelines (Con't.)

	Result	Europe	France	Germany DFG	Germany TRGS	Ireland
Hexane (110-54-3)	TWAs	20 ppm TWA; 72 mg/m3 TWA	20 ppm TWA [VME] (restrictive limit); 72 mg/m3 TWA [VME] (restrictive limit)	Not established	50 ppm TWA AGW (exposure factor 8); 180 mg/m3 TWA AGW (exposure factor 8)	20 ppm TWA; 72 mg/m3 TWA
	Ceilings	Not established	Not established	400 ppm Peak; 1440 mg/m3 Peak	Not established	Not established
	MAKs	Not established	Not established	50 ppm TWA MAK; 180 mg/m3 TWA MAK	Not established	Not established
Pentane (109-66-0)	TWAs	1000 ppm TWA; 3000 mg/m3 TWA	1000 ppm TWA [VME] (restrictive limit); 3000 mg/m3 TWA [VME] (restrictive limit)	Not established	1000 ppm TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2); 3000 mg/m3 TWA AGW (The risk of damage to the embryo or fetus can be excluded when AGW and BGW values are observed, exposure factor 2)	1000 ppm TWA; 3000 mg/m3 TWA
	STELs	Not established	Not established	Not established	Not established	750 ppm STEL; 2250 mg/m3 STEL
	Ceilings	Not established	Not established	2000 ppm Peak (listed under Pentane); 6000 mg/m3 Peak (listed under Pentane)	Not established	Not established
	MAKs	Not established	Not established	1000 ppm TWA MAK; 3000 mg/m3 TWA MAK	Not established	Not established
2-Methylbutane (In Liquid form) (78-78-4)	TWAs	1000 ppm TWA; 3000 mg/m3 TWA	1000 ppm TWA [VME] (indicative limit); 3000 mg/m3 TWA [VME] (indicative limit)	Not established	1000 ppm TWA AGW (exposure factor 2); 3000 mg/m3 TWA AGW (exposure factor 2)	1000 ppm TWA; 3000 mg/m3 TWA
	STELs	Not established	Not established	Not established	Not established	750 ppm STEL; 2250 mg/m3 STEL
	Ceilings	Not established	Not established	2000 ppm Peak (listed under Pentane); 6000 mg/m3 Peak (listed under Pentane)	Not established	Not established
				1000 ppm TWA MAK;		

	MAKs	Not established	Not established	3000 mg/m3 TWA MAK	Not established	Not established
1,3-Butadiene (106-99-0)	TWAs	Not established	Not established	Not established	Not established	1 ppm TWA; 2.2 mg/m3 TWA
Isobutane (75-28-5)	TWAs	Not established	Not established	Not established	1000 ppm TWA AGW (exposure factor 4); 2400 mg/m3 TWA AGW (exposure factor 4)	Not established
	Ceilings	Not established	Not established	4000 ppm Peak (listed under Butane); 9600 mg/m3 Peak (listed under Butane)	Not established	Not established
	MAKs	Not established	Not established	1000 ppm TWA MAK; 2400 mg/m3 TWA MAK	Not established	Not established
Butane (106-97-8)	TWAs	Not established	800 ppm TWA [VME]; 1900 mg/m3 TWA [VME]	Not established	1000 ppm TWA AGW (exposure factor 4); 2400 mg/m3 TWA AGW (exposure factor 4)	1000 ppm TWA
	Ceilings	Not established	Not established	4000 ppm Peak (listed under Butane); 9600 mg/m3 Peak (listed under Butane)	Not established	Not established
	MAKs	Not established	Not established	1000 ppm TWA MAK; 2400 mg/m3 TWA MAK	Not established	Not established
Carbon monoxide (630-08-0)	TWAs	Not established	50 ppm TWA [VME]; 55 mg/m3 TWA [VME]	Not established	30 ppm TWA AGW (The risk of damage to the embryo or fetus cannot be excluded even when AGW and BGW values are observed, exposure factor 1); 35 mg/m3 TWA AGW (The risk of damage to the embryo or fetus cannot be excluded even when AGW and BGW values are observed, exposure factor 1)	20 ppm TWA; 23 mg/m3 TWA
	STELs	Not established	Not established	Not established	Not established	100 ppm STEL; 115 mg/m3 STEL
	Ceilings	Not established	Not established	60 ppm Peak; 70 mg/m3 Peak	Not established	Not established
	MAKs	Not established	Not established	30 ppm TWA MAK; 35 mg/m3 TWA MAK	Not established	Not established
Propylene (115-07-1)	TWAs	Not established	Not established	Not established	Not established	500 ppm TWA (gaseous)
Ethylene (74-85-1)	TWAs	Not established	Not established	Not established	Not established	200 ppm TWA
					1000 ppm TWA AGW	

Propane (74-98-6)	TWAs	Not established	Not established	Not established	(exposure factor 4); 1800 mg/m3 TWA AGW (exposure factor 4)	1000 ppm TWA
	Ceilings	Not established	Not established	4000 ppm Peak; 7200 mg/m3 Peak	Not established	Not established
	MAKs	Not established	Not established	1000 ppm TWA MAK; 1800 mg/m3 TWA MAK	Not established	Not established
Carbon dioxide (124-38-9)	TWAs	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA [VME] (indicative limit); 9000 mg/m3 TWA [VME] (indicative limit)	Not established	5000 ppm TWA AGW (exposure factor 2); 9100 mg/m3 TWA AGW (exposure factor 2)	5000 ppm TWA; 9000 mg/m3 TWA
	Ceilings	Not established	Not established	10000 ppm Peak; 18200 mg/m3 Peak	Not established	Not established
	MAKs	Not established	Not established	5000 ppm TWA MAK; 9100 mg/m3 TWA MAK	Not established	Not established
Ethane (74-84-0)	TWAs	Not established	Not established	Not established	Not established	1000 ppm TWA
Methane (74-82-8)	TWAs	Not established	Not established	Not established	Not established	1000 ppm TWA

Exposure Limits/Guidelines (Con't.)

	Result	Israel	Italy	NIOSH	OSHA	Portugal
Hexane (110-54-3)	TWAs	50 ppm TWA	20 ppm TWA; 72 mg/m3 TWA	50 ppm TWA; 180 mg/m3 TWA	500 ppm TWA; 1800 mg/m3 TWA	50 ppm TWA [VLE-MP]
Pentane (109-66-0)	TWAs	600 ppm TWA	667 ppm TWA; 2000 mg/m3 TWA	120 ppm TWA; 350 mg/m3 TWA	1000 ppm TWA; 2950 mg/m3 TWA	600 ppm TWA [VLE-MP]
	Ceilings	Not established	Not established	610 ppm Ceiling (15 min); 1800 mg/m3 Ceiling (15 min)	Not established	Not established
2-Methylbutane (In Liquid form) (78-78-4)	TWAs	600 ppm TWA (listed under Pentane, all isomers)	667 ppm TWA; 2000 mg/m3 TWA	Not established	Not established	600 ppm TWA [VLE-MP] (as Pentane, all isomers)
1,3-Butadiene (106-99-0)	TWAs	2 ppm TWA	Not established	Not established	1 ppm TWA	2 ppm TWA [VLE-MP]
	STELs	Not established	Not established	Not established	5 ppm STEL (see 29 CFR 1910.1051)	Not established
1-Propene, 2-methyl- (115-11-7)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established	Not established
2-Butene-cis (590-18-1)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established	Not established
Isobutane (75-28-5)	TWAs	1000 ppm TWA (gas)	Not established	800 ppm TWA; 1900 mg/m3 TWA	Not established	Not established
Butane (106-97-8)	TWAs	1000 ppm TWA (gas)	Not established	800 ppm TWA; 1900 mg/m3 TWA	Not established	Not established
1-Butene (106-98-9)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established	Not established

(E)-but-2-ene (624-64-6)	TWAs	250 ppm TWA (listed under Butenes, all isomers)	Not established	Not established	Not established	Not established
Carbon monoxide (630-08-0)	TWAs	25 ppm TWA	Not established	35 ppm TWA; 40 mg/m3 TWA	50 ppm TWA; 55 mg/m3 TWA	25 ppm TWA [VLE-MP]
	Ceilings	Not established	Not established	200 ppm Ceiling; 229 mg/m3 Ceiling	Not established	Not established
Propylene (115-07-1)	TWAs	500 ppm TWA	Not established	Not established	Not established	500 ppm TWA [VLE-MP]
Acetylene (74-86-2)	Ceilings	Not established	Not established	2500 ppm Ceiling; 2662 mg/m3 Ceiling	Not established	Not established
Ethylene (74-85-1)	TWAs	200 ppm TWA	Not established	Not established	Not established	200 ppm TWA [VLE-MP]
Propane (74-98-6)	TWAs	1000 ppm TWA (gas)	Not established	1000 ppm TWA; 1800 mg/m3 TWA	1000 ppm TWA; 1800 mg/m3 TWA	1000 ppm TWA [VLE-MP]
Carbon dioxide (124-38-9)	STELs	30000 ppm STEL	Not established	30000 ppm STEL; 54000 mg/m3 STEL	Not established	30000 ppm STEL [VLE-CD
	TWAs	5000 ppm TWA	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA; 9000 mg/m3 TWA	5000 ppm TWA [VLE-MP]
Ethane (74-84-0)	TWAs	1000 ppm TWA (gas)	Not established	Not established	Not established	1000 ppm TWA [VLE-MP]
Methane (74-82-8)	TWAs	1000 ppm TWA (gas)	Not established	Not established	Not established	1000 ppm TWA [VLE-MP]

Exposure Limits/Guidelines (Con't.)

	Result	Spain	Sweden
Hexane (110-54-3)	TWAs	20 ppm TWA [VLA-ED] (indicative limit value); 72 mg/m3 TWA [VLA-ED] (indicative limit value)	25 ppm LLV; 90 mg/m3 LLV
	Biological Limit Values (BLV)	0.4 mg/L urine end of workweek 2,5-Hexanedione (without hydrolysis) (1,8)	Not established
	STELs	Not established	50 ppm STV; 180 mg/m3 STV
Pentane (109-66-0)	TWAs	1000 ppm TWA [VLA-ED] (indicative limit value); 3000 mg/m3 TWA [VLA-ED] (indicative limit value)	600 ppm LLV; 1800 mg/m3 LLV
	STELs	Not established	750 ppm STV; 2000 mg/m3 STV
2-Methylbutane (In Liquid form) (78-78-4)	TWAs	1000 ppm TWA [VLA-ED] (indicative limit value); 3000 mg/m3 TWA [VLA-ED] (indicative limit value)	600 ppm LLV; 1800 mg/m3 LLV
	STELs	Not established	750 ppm STV; 2000 mg/m3 STV
		2 ppm TWA [VLA-ED] (manufacturing,	

1,3-Butadiene (106-99-0)	TWAs	commercialization, and use restrictions under REACH); 4.5 mg/m3 TWA [VLA-ED] (manufacturing, commercialization, and use restrictions under REACH)	0.5 ppm LLV; 1 mg/m3 LLV
	Biological Limit Values (BLV)	2.5 mg/L urine end of shift 1,2-Dihydroxy-4-(N-acetylcysteinyl)-butane (2,S,F); 2.5 pmol/g hemoglobin blood not critical Mixture of N-1 and N-2-(hydroxybutenyl)valine	Not established
	STELs	Not established	5 ppm STV; 10 mg/m3 STV
Butane (106-97-8)	TWAs	1000 ppm TWA [VLA-ED]	Not established
Carbon monoxide (630-08-0)	TWAs	25 ppm TWA [VLA-ED]; 29 mg/m3 TWA [VLA-ED]	20 ppm LLV (regulated under exhaust fumes); 25 mg/m3 LLV (regulated under exhaust fumes); 35 ppm LLV; 40 mg/m3 LLV
	Biological Limit Values (BLV)	3.5 % of Carboxyhemoglobin in total hemoglobin blood end of shift Carboxyhemoglobin (2,F,I); 20 ppm alveolar air end of shift CO end-cut of exhaled air (2,F,I)	Not established
	STELs	Not established	100 ppm STV; 120 mg/m3 STV
Propylene (115-07-1)	TWAs	500 ppm TWA [VLA-ED]	500 ppm LLV; 900 mg/m3 LLV
Ethylene (74-85-1)	TWAs	200 ppm TWA [VLA-ED]	250 ppm LLV; 330 mg/m3 LLV
	STELs	Not established	1000 ppm STV; 1200 mg/m3 STV
Propane (74-98-6)	TWAs	1000 ppm TWA [VLA-ED]	Not established
Carbon dioxide (124-38-9)	TWAs	5000 ppm TWA [VLA-ED] (indicative limit value); 9150 mg/m3 TWA [VLA-ED] (indicative limit value)	5000 ppm LLV; 9000 mg/m3 LLV
	STELs	Not established	10000 ppm STV; 18000 mg/m3 STV
Ethane (74-84-0)	TWAs	1000 ppm TWA [VLA-ED]	Not established

Methane (74-82-8)	TWAs	1000 ppm TWA [VLA-ED]	Not established

Exposure Control Notations

Portugal

•1,3-Butadiene (106-99-0): **Carcinogens:** (A2 - Suspected Human Carcinogen)

•Ethylene (74-85-1): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

•Hydrogen (1333-74-0): **Simple Asphyxiants:** (Simple Asphyxiant)

•Hexane (110-54-3): **Skin:** (skin - potential for cutaneous exposure)

•Acetylene (74-86-2): **Simple Asphyxiants:** (Simple Asphyxiant)

•Nitrogen (7727-37-9): **Simple Asphyxiants:** (Simple Asphyxiant)

•Propylene (115-07-1): **Carcinogens:** (A4 - Not Classifiable as a Human Carcinogen)

Italy

•1,3-Butadiene (106-99-0): **Carcinogens:** (Category 1 Carcinogen) | **Mutagens:** (Category 2 Mutagen)

•Isobutane (75-28-5): **Carcinogens:** (Category 1 Carcinogen (containing >= 0.1% Butadiene)) | **Mutagens:** (Category 2 Mutagen (containing >= 0.1% Butadiene))

•Butane (106-97-8): **Carcinogens:** (Category 1 Carcinogen (containing >= 0.1% Butadiene)) | **Mutagens:** (Category 2 Mutagen (containing >= 0.1% Butadiene))

France

•Carbon monoxide (630-08-0): **Reproductive Toxins:** (Reproductive Toxin category 1)

•Hexane (110-54-3): **Reproductive Toxins:** (Reproductive Toxin category 3)

Ireland

•Carbon monoxide (630-08-0): **Substances with Potential Chronic Health Effects:** (Category 1 Reproductive Toxin)

•1,3-Butadiene (106-99-0): **Carcinogens:** (Category 1 Carcinogen) | **Mutagens:** (Category 2 Mutagen)

•Ethylene (74-85-1): **Simple Asphyxiants:** (Asphyxiant)

•Hydrogen (1333-74-0): **Simple Asphyxiants:** (Asphyxiant)

•Ethane (74-84-0): **Simple Asphyxiants:** (Asphyxiant)

•Propane (74-98-6): **Simple Asphyxiants:** (Asphyxiant)

•Acetylene (74-86-2): **Simple Asphyxiants:** (Asphyxiant)

•Nitrogen (7727-37-9): **Simple Asphyxiants:** (Asphyxiant)

•Methane (74-82-8): **Simple Asphyxiants:** (Asphyxiant)

•Propylene (115-07-1): **Simple Asphyxiants:** (Asphyxiant)

Spain

•Carbon monoxide (630-08-0): **Reproductive Toxins:** (known reproductive toxins with classification from human data)

•1,3-Butadiene (106-99-0): **Carcinogens:** (Known human carcinogen) | **Mutagens:** (Suspected human mutagen)

•Hydrogen (1333-74-0): **Simple Asphyxiants:** (simple asphyxiant)

•Acetylene (74-86-2): **Simple Asphyxiants:** (simple asphyxiant)

•Nitrogen (7727-37-9): **Simple Asphyxiants:** (simple asphyxiant)

Sweden

•Carbon monoxide (630-08-0): **Reproductive Toxins:** (Causes reproductive disturbances)

•1,3-Butadiene (106-99-0): **Carcinogens:** (Carcinogen)

Germany TRGS

•Ethylene (74-85-1): **Carcinogens:** (Based on current data, this substance can not be classified in categories 1-3) | **Developmental Toxins:** (Based on current data, this substance can not be classified in categories 1-3) | **Reproductive Toxins:** (Based on current data, this substance can not be classified in categories 1-3) | **Germ Cell Mutagens:** (Category 3)

Germany DFG

•Carbon monoxide (630-08-0): **Pregnancy:** (risk to embryo/fetus probable)

•1,3-Butadiene (106-99-0): **Carcinogens:** (Category 1 (causes cancer in man))

•Pentane (109-66-0): **Pregnancy:** (no risk to embryo/fetus if exposure limits adhered to)

•Ethylene (74-85-1): **Carcinogens:** (Category 3B (could be carcinogenic for man))

•2-Methylbutane (In Liquid form) (78-78-4): **Pregnancy:** (no risk to embryo/fetus if exposure limits adhered to)

•Isobutane (75-28-5): **Pregnancy:** (classification not yet possible)

•Propane (74-98-6): **Pregnancy:** (classification not yet possible)

•Butane (106-97-8): **Pregnancy:** (classification not yet possible)

•Hexane (110-54-3): **Pregnancy:** (no risk to embryo/fetus if exposure limits adhered to)

8.2 Exposure controls

Engineering Measures/Controls

- Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof - electrical, ventilating and/or lighting equipment.

Personal Protective Equipment

Respiratory

- In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced. Have available emergency self-contained breathing apparatus or full-face airline respirator when using this chemical.

Eye/Face

- Wear safety glasses.

Skin/Body

- Wear leather gloves when handling cylinders.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

LLV = Limit Level Value is the exposure limit for 8-hour work day

PEL = Permissible Exposure Level determined by the Occupational Safety and Health Administration (OSHA)

MAK = Maximale Arbeitsplatz Konzentration is the maximum permissible concentration

STEL = Short Term Exposure Limits are based on 15-minute exposures

STEV = Short Term Exposure Value

TLV = Threshold Limit Value determined by the American Conference of Governmental Industrial Hygienists (ACGIH)

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

Section 9 - Physical and Chemical Properties

9.1 Information on Physical and Chemical Properties

Material Description			
Physical Form	Gas	Appearance/Description	Colorless compressed gas with no odor.
Color	Colorless	Odor	Odorless
Odor Threshold	Data lacking		
General Properties			
Boiling Point	-196 C(-320.8 F) Nitrogen	Melting Point	-210 C(-346 F) Nitrogen
Decomposition Temperature	Data lacking	pH	Data lacking
Specific Gravity/Relative Density	0.967 Water=1 Nitrogen	Water Solubility	Data lacking
Viscosity	Data lacking	Explosive Properties	Not explosive.
Oxidizing Properties:	Not an oxidizing gas.		
Volatility			
Vapor Pressure	Data lacking	Vapor Density	0.97 Air=1 Nitrogen
Evaporation Rate	Data lacking		
Flammability			
Flash Point	Data lacking	UEL	Data lacking

LEL	Data lacking	Autoignition	Data lacking
Flammability (solid, gas)	Flammable gas.		
Environmental			
Octanol/Water Partition coefficient	Data lacking		

9.2 Other Information

- No additional physical and chemical parameters noted.

Section 10: Stability and Reactivity

10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

- Stable under normal temperatures and pressures.

10.3 Possibility of hazardous reactions

- Hazardous polymerization will not occur.

10.4 Conditions to avoid

- Avoid exposing cylinders to extremely high temperatures, which could cause cylinders to rupture.

10.5 Incompatible materials

- No data available

10.6 Hazardous decomposition products

- No data available

Section 11 - Toxicological Information

11.1 Information on toxicological effects

Component Name	CAS	Data
Carbon dioxide (3%)	124-38-9	**Acute Toxicity:** ihl-rat LC50:470000 ppm/30M; **Reproductive:** ihl-rat TCLo:6 pph/24H (10D preg)
Carbon monoxide (1%)	630-08-0	**Acute Toxicity:** ihl-rat LC50:1807 ppm/4H; **Reproductive:** ihl-rat TCLo:150 ppm (0-20D preg)
Propylene (1%)	115-07-1	**Mutagen:** slt-rat-ihl 200 ppm/4W/6H; **Tumorigen/Carcinogen:** ihl-rat TCLo:128750 mg/kg/103W-C
1-Propene, 2-methyl- (0.3%)	115-11-7	**Acute Toxicity:** ihl-rat LC50:550000 mg/m3/4H
Butane (0.3%)	106-97-8	**Acute Toxicity:** ihl-rat LC50:658 gm/m3/4H
Isobutane (0.3%)	75-28-5	**Acute Toxicity:** ihl-rat LC50:658000 mg/m3/4H
Oxygen (0.2%)	7782-44-7	**Reproductive:** ihl-rat TCLo:10 pph/9H (22D preg)
1-Pentene (0.1%)	109-67-1	**Acute Toxicity:** ihl-rat LC50:175000 mg/m3/4H
2-Methylbutane (In Liquid form) (0.1%)	78-78-4	**Acute Toxicity:** ihl-rat LC50:280000 mg/m3/4H
Pentane (0.1%)	109-66-0	**Acute Toxicity:** orl-rat LD50:>2000 mg/kg; ihl-rat LC50:364 gm/m3/4H
Hexane (0.05%)	110-54-3	**Acute Toxicity:** orl-rat LD50:25 gm/kg; ihl-rat LC50:48000 ppm/4H; **Irritation:** eye-rbt 10 mg MLD; **Reproductive:** ihl-rat TCLo:5000 ppm (6-19D preg)

GHS Properties	Classification
Acute toxicity	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Aspiration Hazard	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Carcinogenicity	**EU/CLP** • Carcinogenicity 1A **OSHA HCS 2012** • Carcinogenicity 1A
Germ Cell Mutagenicity	**EU/CLP** • Germ Cell Mutagenicity 1B **OSHA HCS 2012** • Germ Cell Mutagenicity 1B
Skin corrosion/Irritation	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Skin sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
STOT-RE	**EU/CLP** • Specific Target Organ Toxicity Repeated Exposure 2 **OSHA HCS 2012** • Classification criteria not met
STOT-SE	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Toxicity for Reproduction	**EU/CLP** • Toxic to Reproduction 1A **OSHA HCS 2012** • Toxic to Reproduction 1A
Respiratory sensitization	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met
Serious eye damage/Irritation	**EU/CLP** • Classification criteria not met **OSHA HCS 2012** • Classification criteria not met

Route(s) of entry/exposure
- Skin, Eye, Inhalation, and Ingestion

Potential Health Effects

Inhalation

Acute (Immediate)
- If this material is released in a small, poorly ventilated area (i.e. an enclosed or confined space), an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The following effects associated with decreased levels of oxygen: increase in breathing and pulse rate, emotional upset, abnormal fatigue, nausea, vomiting, collapse, loss of consciousness, convulsive movements, respiratory collapse and death.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Skin

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Eye

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Ingestion

Acute (Immediate)
- Under normal conditions of use, no health effects are expected.

Chronic (Delayed)
- Under normal conditions of use, no health effects are expected.

Mutagenic Effects
- May cause mutagenic effects based on animal test data for 1,3-Butadiene.

Carcinogenic Effects
- Not classified or listed by IARC, NTP, OSHA, EU and ACGIH Material level data is not available however this gas mixture contains an ingredient which may cause

carcinogenic effects upon prolonged and repeated exposure.

Carcinogenic Effects				
	CAS	OSHA	IARC	NTP
1,3-Butadiene	106-99-0	Specifically Regulated Carcinogen	Group 1-Carcinogenic	Evidence of Carcinogenicity Known Human Carcinogen

Reproductive Effects

- The Carbon Monoxide component of this gas mixture can cause teratogenic effects in humans. Severe exposure to Carbon Monoxide during pregnancy has caused adverse effects and the death of the fetus. In general, maternal symptoms are an indicator of the potential risk to the fetus since Carbon Monoxide is toxic to the mother before it is toxic to the fetus.

Key to abbreviations

TC = Toxic Concentration
LD = Lethal Dose
MLD = Mild
LC = Lethal Concentration

Section 12 - Ecological Information

12.1 Toxicity

Component	CAS	Data	Comments
Hexane (0.05%)	110-54-3	**Fish:** 96 Hour(s) LC50 Fish 2.1-2.98 mg/L	

12.2 Persistence and degradability

- Material data lacking.

12.3 Bioaccumulative potential

- Material data lacking.

12.4 Mobility in Soil

- Material data lacking.

12.5 Results of PBT and vPvB assessment

- PBT and vPvB assessment has not been conducted for this material.

12.6 Other adverse effects

- According to Annex VI to Regulation (EC) No 1272/2008 Table 3.1 and Table 3.2 the isopentane, pentane, and hexane components of this material may cause adverse effects to the environment.

Section 13 - Disposal Considerations

13.1 Waste treatment methods

Product waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste

- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	14.1 UN number	14.2 UN proper shipping name	14.3 Transport hazard class(es)	14.4 Packing group	14.5 Environmental hazards
DOT	UN1954	Compressed gas, flammable, n.o.s. (Hydrogen, Nitrogen)	2.1	NDA	NDA
TDG	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S. (Hydrogen, Nitrogen)	2.1	NDA	NDA
IMO/IMDG	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S. (Hydrogen, Nitrogen)	2.1	NDA	NDA
IATA/ICAO	UN1954	Compressed gas, flammable, n.o.s. (Hydrogen, Nitrogen)	2.1	NDA	NDA

14.6 Special precautions for user

- Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

- Not relevant.

14.8 Other information

DOT

- According to Appendix A to 49 CFR 172.101 1,3-Butadiene has a reportable quantity of 10 lbs (4.54 kg) According to Appendix A to 49 CFR 172.101 Hexane has a reportable quantity of 5000 lbs (2270kg)

Section 15 - Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications

- Acute, Chronic, Fire, Pressure(Sudden Release of)

State Right To Know				
Component	**CAS**	**MA**	**NJ**	**PA**
Nitrogen	7727-37-9	Yes	Yes	Yes
Hydrogen	1333-74-0	Yes	Yes	Yes
Methane	74-82-8	Yes	Yes	Yes
Ethane	74-84-0	Yes	Yes	Yes
Carbon dioxide	124-38-9	Yes	Yes	Yes
Ethylene	74-85-1	Yes	Yes	Yes
Propane	74-98-6	Yes	Yes	Yes
1,2-Propadiene	463-49-0	No	Yes	No
Acetylene	74-86-2	Yes	Yes	Yes
Carbon monoxide	630-08-0	Yes	Yes	Yes
Methyl Acetylene	74-49-7	No	No	No
Propylene	115-07-1	Yes	Yes	Yes
(E)-but-2-ene	624-64-6	Yes	Yes	Yes
1,3-Butadiene	106-99-0	Yes	Yes	Yes

1-Butene	106-98-9	Yes	Yes	Yes
1-Propene, 2-methyl-	115-11-7	Yes	Yes	Yes
2-Butene-cis	590-18-1	Yes	Yes	Yes
Butane	106-97-8	Yes	Yes	Yes
Isobutane	75-28-5	Yes	Yes	Yes
Oxygen	7782-44-7	Yes	Yes	Yes
1-Pentene	109-67-1	Yes	Yes	Yes
2-Methylbutane (In Liquid form)	78-78-4	Yes	Yes	Yes
2-Pentene	109-68-2	No	No	No
2-Pentene, (Z) -	627-20-3	Yes	Yes	Yes
Pentane	109-66-0	Yes	Yes	Yes
2-Methyl-2-butene	513-35-9	Yes	Yes	Yes
Hexane	110-54-3	Yes	Yes	Yes

Inventory						
Component	**CAS**	**Canada DSL**	**Canada NDSL**	**China**	**EU EINECS**	**EU ELNICS**
Nitrogen	7727-37-9	Yes	No	Yes	Yes	No
Hydrogen	1333-74-0	Yes	No	Yes	Yes	No
Methane	74-82-8	Yes	No	Yes	Yes	No
Ethane	74-84-0	Yes	No	Yes	Yes	No
Carbon dioxide	124-38-9	Yes	No	Yes	Yes	No
Ethylene	74-85-1	Yes	No	Yes	Yes	No
Propane	74-98-6	Yes	No	Yes	Yes	No
1,2-Propadiene	463-49-0	Yes	No	No	Yes	No
Acetylene	74-86-2	Yes	No	Yes	Yes	No
Carbon monoxide	630-08-0	Yes	No	Yes	Yes	No
Methyl Acetylene	74-49-7	No	No	No	No	No
Propylene	115-07-1	Yes	No	Yes	Yes	No
(E)-but-2-ene	624-64-6	Yes	No	Yes	Yes	No
1,3-Butadiene	106-99-0	Yes	No	Yes	Yes	No
1-Butene	106-98-9	Yes	No	Yes	Yes	No
1-Propene, 2-methyl-	115-11-7	Yes	No	Yes	Yes	No
2-Butene-cis	590-18-1	Yes	No	Yes	Yes	No
Butane	106-97-8	Yes	No	Yes	Yes	No
Isobutane	75-28-5	Yes	No	Yes	Yes	No
Oxygen	7782-44-7	Yes	No	Yes	Yes	No
1-Pentene	109-67-1	Yes	No	Yes	Yes	No
2-Methylbutane (In Liquid form)	78-78-4	Yes	No	Yes	Yes	No
2-Pentene	109-68-2	Yes	No	No	Yes	No
2-Pentene, (Z) -	627-20-3	Yes	No	Yes	Yes	No

Pentane	109-66-0	Yes	No	Yes	Yes	No
2-Methyl-2-butene	513-35-9	Yes	No	Yes	Yes	No
Hexane	110-54-3	Yes	No	Yes	Yes	No

Inventory (Con't.)		
Component	**CAS**	**TSCA**
Nitrogen	7727-37-9	Yes
Hydrogen	1333-74-0	Yes
Methane	74-82-8	Yes
Ethane	74-84-0	Yes
Carbon dioxide	124-38-9	Yes
Ethylene	74-85-1	Yes
Propane	74-98-6	Yes
1,2-Propadiene	463-49-0	Yes
Acetylene	74-86-2	Yes
Carbon monoxide	630-08-0	Yes
Methyl Acetylene	74-49-7	No
Propylene	115-07-1	Yes
(E)-but-2-ene	624-64-6	Yes
1,3-Butadiene	106-99-0	Yes
1-Butene	106-98-9	Yes
1-Propene, 2-methyl-	115-11-7	Yes
2-Butene-cis	590-18-1	Yes
Butane	106-97-8	Yes
Isobutane	75-28-5	Yes
Oxygen	7782-44-7	Yes
1-Pentene	109-67-1	Yes
2-Methylbutane (In Liquid form)	78-78-4	Yes
2-Pentene	109-68-2	Yes
2-Pentene, (Z) -	627-20-3	Yes
Pentane	109-66-0	Yes
2-Methyl-2-butene	513-35-9	Yes
Hexane	110-54-3	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Carbon monoxide	630-08-0	1%	A, B1, D1A, D2A
• 1,3-Butadiene	106-99-0	0.3%	A, B1, D2A, F
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	B2
• 2-Butene-cis	590-18-1	0.3%	Not Listed

• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	A, B1, D2B
• Hydrogen	1333-74-0	12%	A, B1
• Ethane	74-84-0	4%	A, B1
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	B2
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	A, C
• Isobutane	75-28-5	0.3%	A, B1 (listed under Methyl-2 propane)
• Carbon dioxide	124-38-9	3%	A; Uncontrolled product according to WHMIS classification criteria (solid)
• Propane	74-98-6	2%	A, B1
• Butane	106-97-8	0.3%	A, B1
• Hexane	110-54-3	0.05%	B2, D2A, D2B
• Acetylene	74-86-2	1%	A, B1, F; A, B1 (dissolved)
• Nitrogen	7727-37-9	63.65%	A
• Methane	74-82-8	5%	A, B1
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	A, B1, D2B
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Canada - WHMIS - Ingredient Disclosure List

• Carbon monoxide	630-08-0	1%	0.1 %
• 1,3-Butadiene	106-99-0	0.3%	0.1 %
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	1 %
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	1 %
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	1 %
• Hexane	110-54-3	0.05%	1 %
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Priority Substance List 2 (substance considered toxic)
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

China

Environment

China - Ozone Depleting Substances - First Schedule

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed

• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

China - Ozone Depleting Substances - Second Schedule

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

China - Ozone Depleting Substances - Third Schedule

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed

• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Other

China - Annex I & II - Controlled Chemicals Lists

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed

• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

China - Dangerous Goods List

• Carbon monoxide	630-08-0	1%	UN1016
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	UN1055
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	UN2200
• Ethylene	74-85-1	2%	UN1038; UN1962
• Hydrogen	1333-74-0	12%	UN1049; UN1966
• Ethane	74-84-0	4%	UN1035; UN1961
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	UN2460 PG = II
• Oxygen	7782-44-7	0.2%	UN1072; UN1073
• Isobutane	75-28-5	0.3%	UN1969
• Carbon dioxide	124-38-9	3%	UN1013; UN1845 PG = III; UN2187
• Propane	74-98-6	2%	UN1978
• Butane	106-97-8	0.3%	UN1011
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	UN1001
• Nitrogen	7727-37-9	63.65%	UN1066; UN1977
• Methane	74-82-8	5%	UN1971; UN1972
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	UN1077
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

China - Export Control List - Part I Chemicals

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed

• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Europe

Other

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Classification

• Carbon monoxide	630-08-0	1%	F+; R12 T; R23-48/23 Repr.Cat.1; R61
• 1,3-Butadiene	106-99-0	0.3%	F+; R12 Carc.Cat.1; R45 Muta.Cat.2; R46
• 1-Propene, 2-methyl-	115-11-7	0.3%	F+; R12
• Pentane	109-66-0	0.1%	F+; R12 N; R51-53 Xn; R65 R66 R67
• 2-Butene-cis	590-18-1	0.3%	F+; R12
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	F+; R12 R67
• Hydrogen	1333-74-0	12%	F+; R12
• Ethane	74-84-0	4%	F+; R12
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	F+; R12 N; R51-53 Xn; R65 R66 R67
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	O; R8
• Isobutane	75-28-5	0.3%	F+; R12
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	F+; R12
• Butane	106-97-8	0.3%	F+; R12
• Hexane	110-54-3	0.05%	F; R11 Xi; R38 N; R51-53 Repr.Cat.3; R62 Xn; R65-48/20 R67
• Acetylene	74-86-2	1%	F+; R12 R5 R6
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	F+; R12
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	F+; R12
• (E)-but-2-ene	624-64-6	0.3%	F+; R12
• Propylene	115-07-1	1%	F+; R12
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Concentration Limits

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed

• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	5%<=C: Xn; R48/20
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Labelling

• Carbon monoxide	630-08-0	1%	F+ T R:61-12-23-48/23 S:53-45
• 1,3-Butadiene	106-99-0	0.3%	F+ T R:45-46-12 S:53-45
• 1-Propene, 2-methyl-	115-11-7	0.3%	F+ R:12 S:(2)-9-16-33
• Pentane	109-66-0	0.1%	F+ Xn N R:12-51/53-65-66-67 S:(2)-9-16-29-33-61-62
• 2-Butene-cis	590-18-1	0.3%	F+ R:12 S:(2)-9-16-33
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	F+ R:12-67 S:(2)-9-16-33-45
• Hydrogen	1333-74-0	12%	F+ R:12 S:(2)-9-16-33
• Ethane	74-84-0	4%	F+ R:12 S:(2)-9-16-33
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	F+ Xn N R:12-51/53-65-66-67 S:(2)-9-16-29-33-61-62
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	O R:8 S:(2)-17
• Isobutane	75-28-5	0.3%	F+ R:12 S:(2)-9-16
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	F+ R:12 S:(2)-9-16
• Butane	106-97-8	0.3%	F+ R:12 S:(2)-9-16
• Hexane	110-54-3	0.05%	F Xn N R:11-38-48/20-62-65-67-51/53 S:(2)-9-16-29-33-36/37-61-62
• Acetylene	74-86-2	1%	F+ R:5-6-12 S:(2)-9-16-33
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	F+ R:12 S:(2)-9-16-33
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	F+ R:12 S:(2)-9-16-33
• (E)-but-2-ene	624-64-6	0.3%	F+ R:12 S:(2)-9-16-33
• Propylene	115-07-1	1%	F+ R:12 S:(2)-9-16-33

• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Notes - Substances and Preparations

• Carbon monoxide	630-08-0	1%	E
• 1,3-Butadiene	106-99-0	0.3%	D
• 1-Propene, 2-methyl-	115-11-7	0.3%	C
• Pentane	109-66-0	0.1%	C
• 2-Butene-cis	590-18-1	0.3%	C
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	C
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	C
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	C
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	C
• (E)-but-2-ene	624-64-6	0.3%	C
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

EU - CLP (1272/2008) - Annex VI - Table 3.2 - Safety Phrases

• Carbon monoxide	630-08-0	1%	S:53-45
• 1,3-Butadiene	106-99-0	0.3%	S:53-45
• 1-Propene, 2-methyl-	115-11-7	0.3%	S:(2)-9-16-33
• Pentane	109-66-0	0.1%	S:(2)-9-16-29-33-61-62
• 2-Butene-cis	590-18-1	0.3%	S:(2)-9-16-33
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	S:(2)-9-16-33-45
• Hydrogen	1333-74-0	12%	S:(2)-9-16-33
• Ethane	74-84-0	4%	S:(2)-9-16-33
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	S:(2)-9-16-29-33-61-62
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	S:(2)-17
• Isobutane	75-28-5	0.3%	S:(2)-9-16
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	S:(2)-9-16
• Butane	106-97-8	0.3%	S:(2)-9-16

• Hexane	110-54-3	0.05%	S:(2)-9-16-29-33-36/37-61-62
• Acetylene	74-86-2	1%	S:(2)-9-16-33
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	S:(2)-9-16-33
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	S:(2)-9-16-33
• (E)-but-2-ene	624-64-6	0.3%	S:(2)-9-16-33
• Propylene	115-07-1	1%	S:(2)-9-16-33
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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Germany

Environment

Germany - TA Luft - Types and Classes

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	carcinogenic substance: 5.2.7.1.1, Class III
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	organic substance: 5.2.5, Class I
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Germany - Water Classification (VwVwS) - Annex 1

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	ID Number 1193, not considered hazardous to water

• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	ID Number 742, not considered hazardous to water
• Hydrogen	1333-74-0	12%	ID Number 741, not considered hazardous to water
• Ethane	74-84-0	4%	ID Number 91, not considered hazardous to water
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	ID Number 743, not considered hazardous to water
• Isobutane	75-28-5	0.3%	ID Number 562, not considered hazardous to water (ratio 1,3-butadiene <0.1%)
• Carbon dioxide	124-38-9	3%	ID Number 256, not considered hazardous to water
• Propane	74-98-6	2%	ID Number 560, not considered hazardous to water
• Butane	106-97-8	0.3%	ID Number 561, not considered hazardous to water (1,3-Butadiene <0.1%)
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	ID Number 1182, not considered hazardous to water
• Nitrogen	7727-37-9	63.65%	ID Number 1351, not considered hazardous to water
• Methane	74-82-8	5%	ID Number 1343, not considered hazardous to water
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	ID Number 792, not considered hazardous to water
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	ID Number 816, not considered hazardous to water
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Germany - Water Classification (VwVwS) - Annex 2 - Water Hazard Classes

• Carbon monoxide	630-08-0	1%	ID Number 257, hazard class 1 - low hazard to waters
• 1,3-Butadiene	106-99-0	0.3%	ID Number 218, hazard class 2 - hazard to waters
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	ID Number 452, hazard class 2 - hazard to waters
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	ID Number 648, hazard class 2 - hazard to waters
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	ID Number 124, hazard class 2 - hazard to waters
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed

• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Germany - Water Classification (VwVwS) - Annex 3

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Other

Germany - Specifically Regulated Chemicals in TRGS

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed

• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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Portugal

Other

Portugal - Prohibited Substances

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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United Kingdom

Environment

United Kingdom - Pollution Inventory - Schedule 1 - Thresholds for Releases to Air

• Carbon monoxide	630-08-0	1%	100000 kg
• 1,3-Butadiene	106-99-0	0.3%	100 kg
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	100 kg
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	1000 kg
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	10 kg
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	10000000 kg (qualifying renewable fuel sources are reportable when the total amount of CO2 released is above 10 million kg); 10000000 kg
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	10 kg
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	10000 kg
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	10000 kg
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

United Kingdom - Substances Contained in Dangerous Substances or Preparations

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed

• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Other

United Kingdom - Workplace Exposure Limits (WELs) - Substances in Review

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	HSC/E plans to review the limit values for this substance
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

United Kingdom - The Red List - Dangerous Substances in Water

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed

• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	5 ppm STEL (See 29 CFR 1910.1051, 15 min); 0.5 ppm Action Level; 1 ppm TWA
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	

• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	10 lb final RQ; 4.54 kg final RQ
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	5000 lb final RQ; 2270 kg final RQ
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed

• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	0.1 % de minimis concentration
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	1.0 % de minimis concentration
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	1.0 % de minimis concentration
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed

• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	1.0 % de minimis concentration
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	carcinogen, initial date 4/1/88
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed

• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Carbon monoxide	630-08-0	1%	developmental toxicity, initial date 7/1/89
• 1,3-Butadiene	106-99-0	0.3%	developmental toxicity, initial date 4/16/04
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	0.4 µg/day NSRL
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed

• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	female reproductive toxicity, initial date 4/16/04
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	Not Listed
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed

• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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United States - Pennsylvania

Labor

U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List

• Carbon monoxide	630-08-0	1%	
• 1,3-Butadiene	106-99-0	0.3%	
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances

• Carbon monoxide	630-08-0	1%	Not Listed
• 1,3-Butadiene	106-99-0	0.3%	
• 1-Propene, 2-methyl-	115-11-7	0.3%	Not Listed
• Pentane	109-66-0	0.1%	Not Listed
• 2-Butene-cis	590-18-1	0.3%	Not Listed
• 1,2-Propadiene	463-49-0	1%	Not Listed
• Ethylene	74-85-1	2%	Not Listed
• Hydrogen	1333-74-0	12%	Not Listed
• Ethane	74-84-0	4%	Not Listed
• 2-Methylbutane (In Liquid form)	78-78-4	0.1%	Not Listed
• 2-Methyl-2-butene	513-35-9	0.05%	Not Listed
• Oxygen	7782-44-7	0.2%	Not Listed
• Isobutane	75-28-5	0.3%	Not Listed
• Carbon dioxide	124-38-9	3%	Not Listed
• Propane	74-98-6	2%	Not Listed
• Butane	106-97-8	0.3%	Not Listed
• Hexane	110-54-3	0.05%	Not Listed
• Acetylene	74-86-2	1%	Not Listed
• Nitrogen	7727-37-9	63.65%	Not Listed
• Methane	74-82-8	5%	Not Listed
• 2-Pentene, (Z) -	627-20-3	0.1%	Not Listed
• 1-Pentene	109-67-1	0.1%	Not Listed
• 1-Butene	106-98-9	0.3%	Not Listed
• (E)-but-2-ene	624-64-6	0.3%	Not Listed
• Propylene	115-07-1	1%	Not Listed
• Methyl Acetylene	74-49-7	1%	Not Listed
• 2-Pentene	109-68-2	0.1%	Not Listed

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15.2 Chemical Safety Assessment

- No Chemical Safety Assessment has been carried out.

Section 16 - Other Information

Relevant Phrases (code & full text)

- H224 - Extremely flammable liquid and vapour
  H225 - Highly flammable liquid and vapour
  H270 - May cause or intensify fire; oxidizer
  H304 - May be fatal if swallowed and enters airways
  H315 - Causes skin irritation
  H335 - May cause respiratory irritation
  H336 - May cause drowsiness or dizziness
  H361f - Suspected of damaging fertility.
  H372 - Causes damage to organs through prolonged or repeated exposure.
  H411 - Toxic to aquatic life with long lasting effects
  EUH066 - Repeated exposure may cause skin dryness or cracking.

  R5 - Heating may cause an explosion.
  R6 - Explosive with or without contact with air.
  R8 - Contact with combustible material may cause fire.
  R11 - Highly flammable.
  R37 - Irritating to respiratory system.
  R38 - Irritating to skin.
  R51 - Toxic to aquatic organisms.

R53 - May cause long-term adverse effects in the aquatic environment.
R62 - Possible risk of impaired fertility.
R65 - Harmful: may cause lung damage if swallowed.
R66 - Repeated exposure may cause skin dryness or cracking.
R67 - Vapours may cause drowsiness and dizziness.

Last Revision Date

- 12/April/2013

Preparation Date

- 12/April/2013

Disclaimer/Statement of Liability

- To the best of Air Liquide'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 gas mixture 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.

Key to abbreviations

NDA = No Data Available