

Substance: Isobutane

Rev. dd 24.04.2018 n°. rev. 06

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Commercial name

Isobutane: liquefied hydrocarbons to different degree of purity

Chemical family: hydrocarbons - alkanes

Other names: i-Butane; GPL; Liquefied Petroleum Gas; Hydrocarbon propellant; Butane-i, R 600a; 2-Methyl Propane; UN 1969

Chemical formula: $(CH_3)_2CHCH_3$; iC_4H_{10}

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

Uses: Refrigerant, technical and industrial uses

Uses advised against: intentional abuse of very high concentration of vapours, even for short periods, can produce unconsciousness or might prove fatal.

1.3 Details of the supplier of the safety data sheet

SETTALA GAS S.r.L. viale delle Industrie 18 | 20090 Settala (MI) Italy

| tel. +39 02 95379236 | fax +39 02 95770863 | fax +39 02 95770244 |

e-mail: info@settalagas.it

1.4 Emergency telephone number

+39 02 95379236 (available during the office hours).

Consulting Authority: Anti Poison Centre (Centro Antiveleni CAV) - Ospedale di Niguarda - Milano

tel. + 39 02-66101029 or other Anti Poison National Centre.

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

Classification according to Regulation CE n°1272/2008 , att. VI

Flammable gas Class 1 H220 (Extremely Flammable Gases)

Gas under pressure Liquefied Gas H280 (Contains gas under pressure; may explode if heated)

2.2 Label elements

Labelling according to Reg. CE n°1272/2008 , att. VI

Hazard pictograms



Hazard pictogram code

GHS02

GHS04

Signal word

Danger (for both)

Hazard statement

H220 Extremely Flammable Gas

H280 Contains gas under pressure; may explode if heated.

Further information: Notes H, K, U.

GENERAL STATEMENT RECOMMENDATIONS

P102 Keep out of reach of children.

PRECAUTIONARY STATEMENT PREVENTION

P202 Do not handle until all safety precautions have been read and understood

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking

P260 Do not breathe dust/fume/gas/mist/vapours/spray

P280 Wear protective gloves/protective clothing/eye protection/face protection

PRECAUTIONARY STATEMENT RESPONSE

P377 Leaking gas fire: do not extinguish, unless leak can be stopped safely

P381 Eliminate all ignition sources if safe to do so

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2.2 Label elements (continue)

PRECAUTIONARY STATEMENT RESPONSE

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water with several minutes. Remove contact lenses. If present and easy to do. Continue rinsing.

P337 + P313 If eye irritation persists: get medical advice/attention

PRECAUTIONARY STATEMENT STORAGE

P410 + P412 Protect from sunlight. Do not expose to temperature exceeding 50°C/122°F.

P403 Store in well place

PRECAUTIONARY STATEMENT DISPOSAL

P501 Dispose of contents/containers in accordance with local regulation

ADDITIONAL PHRASES OF THE MANUFACTURER

- To be used far away from sparkles, open fire, heating sources, functioning electrical devises.
- Explosive mixtures may occur in not well- ventilated environments.

2.3 Other hazards

Liquefied gas under pressure, extremely flammable, explosion hazard with air when released in closed or restricted environments. Simple asphyxiant gas, it is dangerous because it displaces oxygen in the atmosphere. High concentration of vapors may cause narcotic effects. When released, the liquid poured out of the container quickly evaporates absorbing heat, mixing itself with air and producing an explosive mixture, causing fire danger and/or explosion with air. The contact with liquid phase causes frostbite. This gas is heavier than air and it spreads close to the ground and it accumulates in restricted areas (sewer, basements, unloading areas...). It is invisible but it produces fog by wet air .

A strong heating of the container (i.e. by fire) should cause a remarkable volume and pressure increase of the liquid with burst danger of the relevant container. In this case the product may decompose producing CO₂ (carbon dioxide) and CO (carbon monoxide highly toxic).

According to the criteria of the REACH regulation, no substance like PBT, vPvB.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Information on ingredients/Dangerous components according to Reg. CE 1272/2008

Isobutane ≥ 95%

n° CAS 75-28-5 n° EINECS 200-857-2 n° CE 601-004-00-0 n° REACH 01-2119485395-27-xxxx

Hazard pictograms



Hazard pictogram code

GHS02 GHS04

Flammable gas, hazard class 1 H220 extremely flammable gas

Gas under pressure: Liquefied gas H280 contains gas under pressure; may explode if heated.

INCI name: Isobutane

propane ≤ 5%

n° CAS 74-98-6 n° EINECS 200-827-9 n° CE 601-003-00-5 n° REACH 01-2119486944-21-xxxx

Hazard pictograms



Hazard pictogram code

GHS02 GHS04

Flammable gas, hazard class 1 H220 extremely flammable gas

Gas under pressure: Liquefied gas H280 contains gas under pressure; may explode if heated.

INCI name: propane

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3.1 Substances (continue)

n-Butane ≤5 %
 n° CAS 106-97-8 n° EINECS 203-448-7 n° CE 601-004-00-0 n° REACH 01-2119474691-32-xxxx



Hazard pictogram code

GHS02

GHS04

Flammable gas, hazard class 1 H220 extremely flammable gas

Gas under pressure: Liquefied gas H280 contains gas under pressure; may explode if heated.

INCI name: n-Butane

It does not contain other products and/or impurity which may influence the product classification

4. FIRST AID MEASURES

4.1 Description of first aid measures

GENERAL

Observe the measures for personal protection. Do not attempt to rescue injured(s) by exposure to the substance without adequate personal protective equipment and without having examined all the security precautions (isolating potential sources of fire ignition ...). Remove injured(s) from contaminated and/or dangerous area and provide fresh air. Keep injured(s) at rest position and under surveillance. Remove immediately contaminated clothes. In case of prolonged exposure to the substance it is essential medical assistance.

Before entering in contaminated areas check that the atmosphere is not flammable or oxygen deficient and in any case, use appropriate protective equipment.

INHALATION

Take interested people in the open air. If the victim is not breathing, give artificial respiration. If breathing is difficult administer oxygen. In any case keep the injured(s) warm and seek immediate medical advice.

SKIN EXPOSURE

The skin that has been in contact with the liquid become gray or white and can be covered of blisters. Remove, if possible, clothes while showering with warm water. Do not to rub frozen injured parts as skin damage may occur. As soon as possible, wet the area with warm water, and, if necessary, cover with sterile gauzes and wrap in a blanket. Seek immediate medical advice.

INGESTION

The ingestion of the product is an unlikely event. Consult a doctor as soon as possible.

EYES EXPOSURE

Irrigate gently with many water with open eyelids (remove contact lenses, if the situation is possible) and seek, as soon as possible, medical attention preferably an ophthalmologist.

4.2 Most important symptoms and effects, both acute and delayed

High concentrations may cause asphyxiation. Symptoms may include loss of consciousness, without the person realizing it. Accidental rapid evaporation of liquid may cause cold burns.

4.3 Indication of any immediate medical attention and special treatment needed

Seek immediate medical attention of emergency specialist. It is a gas that removes oxygen from the atmosphere.

Not known specific antidotes

Providing medical treatments depending on the symptoms and keep the people involved under surveillance.

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

APPLICABLE EXTINGUISHING MEDIA

Powder fire extinguisher, carbon dioxide or foam.

UNSUITABLE EXTINGUISHING MEDIA

Direct water jets.

Use of water and foam combined.

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5.2 Special hazards arising from the substance or mixture

Heat increasing cause an increase of pressure into the drums: they can get deformed and, in severe conditions, can explode. The best anti-fire practice is to let the released gas burn, if it is not possible immediately to intercept the gas flow. Pay attention to possible explosive re-ignitions of the fired gas.
Use jet of water for cooling fire-exposed tanks, cylinders, buildings and machineries.
The gas is heavier than air and flammable or explosive mixtures of steam/air may occur. Protect from sources of ignition/firing.

SPECIFIC RISKS DERIVED FROM THE EXPOSITION

Combustion products are: CO_x and hydrocarbons partially unburned where their exposure can give severe risks for health.

5.3 Advice for firefighters

The special equipment for firefighter operators must include fire retardant clothing, helmets, visors, gloves and in severe conditions breathing apparatus. See reference to norms UNI EN 145 and UNI EN 372.
Protect with jet of water all people working at fire extinguishment.
Use jet of water for cooling fire-exposed tanks, cylinders, buildings and machineries.
Limited fire may be extinguished by the recommended fire extinguisher. Before entering in the contaminated area, check by the explosimeter the gas concentration that must be lower than 10% of LEL (the lower explosiveness limit of the substance is 1.8%)
For massive fires in large areas, keep under control using jet fractioned water launches, in upwind position, when it is not possible to intercept the gas flow. Disperse possible gas clouds using nebulized water or fractioned water jets.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Inform the emergency team.
Evacuate the risk area.
Remove ignition sources and if possible, without risk, stop the flow gas at the origin. Assure the correct grounding of all devices. Leakage of liquid produces a huge quantity of flammable vapours, heavier than the air, which may propagate up to ignition source far away (i.e. sewer, drainage channels, watercourses...)
The use of specific sensors are recommended to detect flammable gas or vapours.
Use nebulized water jets to dissipate gas or vapors, when possible.
Pay attention to symptoms of fatigue or dizziness. Anyway it is possible to get exposure to dangerous gas concentrations without any meaning symptom.
Electrostatic charges may cause gas explosion in case of liquid leakages.
Personal protective equipment is requested for all operators. Skin and eyes must be protected.
Storage far away from flames and sparkles. Do not smoke. Provide appropriate ventilation of environment and ground.
If required, communicate the event to the competent authorities in accordance with governmental/local regulations

6.2 Environmental precautions

Provide for warnings to all persons situated in downwind areas concerning fire and explosion hazards and if necessary foresee the evacuation. Avoid that the gas enter in discharge or ventilation channels (explosion risk). Safety electrical equipment must be only used. Keep away from ignition sources. Do not smoke. Provide for a good ventilation and let the evaporate the substance, for a better dispersion.
Note that vapours are heavier than the air.
Inform the competent Authorities according to the local regulations and (if available) according to the external emergency plan

6.3 Methods and material for containment and cleaning up

Provide good ventilation and allow product to evaporate, encouraging the dispersion and if necessary, wash with water and/or suitable detergent, avoiding use of solvents.
The substance is completely dispersed in the atmosphere

6.4 Reference to other sections

For all individual safety/protection devices, see section 8.

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7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Follow all procedures for the proper storage/handling of flammable substances and all the instructions required for the gas under pressure. Apply all necessary measures to prevent the accumulation of electrostatic charges.

The substance tends to form explosive mixtures with air and vapours, heavier, tend to spread along the ground to accumulate in confined areas. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Use anti-sparking tools. Work in well ventilated places. Do not disperse in the environment.

During transfer operations, mixing and storage, care for the proper grounding of equipment and implement all necessary measures to prevent the accumulation of electrostatic charges.

During the discharge of the cartridge into the destination circuit, the cartridge could crumple up, if so the operation is finished. Do not handle until all safety precautions wrote on the label of the cartridge have been read and understood.

For loading operations regarding tanks/mobile tanks, load from the bottom in accordance with current regulations. Do not use compressed air during loading and unloading operations. Avoid sucking of water/moisture.

The whole operating system (tanks, pipes, equipments...) should be specific for the operation to be performed and provided with security systems/devices to be tested periodically in accordance with current regulations.

Include the use of valves or similar devices to prevent backflow.

Use appropriate labeling to allow easy identification of the contents of the piping (refer to norm UNI 5634).

Wear personal protective equipment, avoiding the use of synthetic fabric clothing.

Do always wear protective gloves/protective clothing/eye protection/face protection during the handling and use of the cartridges. Avoid contact with skin. Do not eat, drink or smoke while using the substance.

Wash hands thoroughly after handling. Do not re-use contaminated clothing.

7.2 Conditions for safe storage, including any incompatibilities

Do not operate or store near sources of ignition. The equipment and electrical systems must be adequate to safety, and in accordance with current legislation. Store the product in a cool dry place, away from heat sources and away from sunlight. Keep away from sources of ignition. No smoking. Keep away from oxidizing agents, strong acid or alkaline products.

Containers must meet the requirements of the standards for pressure equipments. The mobile recipients must comply with all requirements of the ADR. Store cylinders in dry, well-ventilated area away from heat sources and direct sunlight, and flammable materials. Handle cylinders with a suitable means avoiding that they could collide each other.

Keep cylinders upright and drums in horizontal position firmly secured and with the protection of the valve mounted. Do not drag or roll cylinders and protect them against possible crashes. Keep separated the filled cylinders from the empty.

If case of doubts, contact the supplier of the substance.

Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Check the system with leak detection solution, never with flame. If possible, turn leaking containers so that gas escapes rather than liquid.

Have appropriate extinguishing equipment in the storage area (i.e. sprinkler system, portable fire extinguishers).

After use, close the main valve of the cylinder, replace valve protection cap. Mark card duly filled, drained, where appropriate, with inert gas (ex. nitrogen).

All inspection, cleaning, checking, maintenance operations, must be performed by qualified personnel using appropriate personal protective equipment and draining with an inert gas (eg. nitrogen) all areas where they have to operate. Evaluate through appropriate instruments oxygen content and the degree of flammability.

Keep away from heat/sparks/open flames/hot surfaces and observe the recommendations for storage combined.

Temperature class of materials: T2. Suitable materials for the work structures: mild steel.

7.3 Specific end use(s)

See section 1.2.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

It is suggested to work in conditions of natural or explosion-proof mechanical ventilation to make sure that the substance does not exceed 25% of the LEL (lower explosion limit in air 1.8%).

The concentrations of hazardous occupational inhalation, in addition to which it is foreseeable harm from exposure, are supplied from the tables ACGIH TLV 2010 as follows:

TLV TWA concentration weighted average of 8 hours per working day (chronic exposure), to which nearly all workers may be repeatedly exposed day after day without adverse effects:

800 ppm (1900 mg/m³).

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8.1 Control parameters (continue)

ACGIH also recommends that the exposure limit values of biologically inert particles without a TLV value is kept below 3 mg/m³ for breathable particles, below 10 mg / m³ for inhaled.

For the conditions of monitoring/control, it is suggested to refer to the in force legislation.

DNEL (DERIVED NO-EFFECT LEVEL) AND DMEL (DERIVED MINIMUM EFFECT LEVEL):

Not derived because the substance does not contain components harmful to health

It is suggested to follow the values according to the exposure limits listed above for all applications.

PNEC(S) VALUES (PREDICTED NO-EFFECT CONCENTRATION):

PNEC VALUES IN WATER (CONTINUOUS RELEASE):

Not derived as the substance does not contain environmentally hazardous compounds.

PNEC VALUES IN WATER (INTERMITTENT RELEASE)

Not derived as the substance does not contain environmentally hazardous compounds.

PNEC VALUE FOR SOIL:

Not derived as the substance does not contain environmentally hazardous compounds.

PNEC VALUES FOR SEDIMENTATION:

Not derived as the substance does not contain environmentally hazardous compounds.

PNEC VALUES IN SEWAGE TREATMENT PLANTS:

Not derived as the substance does not contain environmentally hazardous compounds.

8.2 Exposure controls

Current legislation requires that all chemicals should be taken into consideration for their health risks and as consequence provide appropriate control measures to prevent or reduce exposure control. All this involves a series of control operations (substitution, general ventilation, containment, work methods, changes in process or activity) that must be considered before the use of personal protective equipment. Any personal protective equipment should be conform to specific standards or regulations, appropriate for the use, compatible with the substance to be handled and kept in good condition

INDIVIDUAL PROTECTION MEASURES

EYES/FACE PROTECTION

Use shielding glasses, visor or face shield to protect against liquid sprinklings.

Make reference to UNI EN 166. There must be a device to wash eyes with water .



SKIN PROTECTION

Hand: In case of possible contact with the skin, use gloves made of leather/crust (i.e. characterized by neoprene, PVA, nitrile), heat resistant/thermo insulating for any emergency. Wear gloves after thorough hand washing. Gloves should be replaced at the first sign of wear. The choice of protective gloves depends on the conditions of use, and must take account of the manufacturer's instructions and knowledge on the part of the operator regarding its own allergies. Make reference to UNI EN 374.



Other: Use suitable work clothing material, antistatic complete documents to cover also the upper and lower limbs. Change immediately in case of contamination, if conditions permit, and wash before reuse. Keep good personal hygiene practices and take care of clothing. Change work clothes at the first sign of wear. Make reference to UNI EN 465, EN 466, EN 467.



In confined areas it is suggested to use the respirators with AX filter (brown for vapours and organic gases); in case of high concentrations of gases an vapours use breathing apparatus (UNI EN 529)



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8.2 Exposure controls (continue)

THERMIC DANGERS

See the section "Skin protection"

ENVIRONMENTAL EXPOSURE CONTROLS

There's no further information. Also refer to Section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Liquefied Gas under pressure
Color	Clear
Odour	Characteristic
Odour threshold	Not determined
pH	Not applicable
Melting point /freezing point	-159°C
Initial boiling point and boiling range	-12°C
Flash point	-80°C
Evaporation rate	Not applicable. The substance is extremely volatile at room temperature
Flammability (solid, gas)	Not applicable. The substance is extremely volatile at room temperature
Upper/lower flammability or explosive limits	Lower 1.8% Upper 8.4%
Vapour pressure	2.1 bar g at 20°C
Vapour density at 20°C	0.557 Kg/L (liquid) 2.45 Kg/m ³ (vapour)
Relative density (aria=1)	More than 1
Solubility(ies)	< 0.1 g/L at 20°C
Partition coefficient: n-octanol/water (log Pow)	2.86
Auto-ignition temperature	400°C
Decomposition temperature	Not applicable
Viscosity	15x10 ⁻⁵ Pa x s at 15°C (liquid phase)
Explosive properties	Not classified explosive under normal conditions of use
Oxidising properties	Not classified explosive under normal conditions of use

9.2 Other information

Suitability materials	Dissolve fats and attacks natural rubber. Compatible with metallic materials
VOC content (CE)	100 %

10. STABILITY AND REACTIVITY

10.1 Reactivity

The substance is stable under normal operating conditions of work, and when used for its intended uses.

10.2 Chemical stability

This substance is stable in relation to its physical and chemical properties under normal operating conditions of work, and when used for its intended uses. It decomposes at temperature above 400°C

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10.3 Possibility of hazardous reactions

The substance is stable under normal operating conditions of work, and when used for its intended uses. Contact with strong oxidizers (peroxides, chromates, chlorates, perchlorates ...) or other substances (nitrates, liquid oxygen, fluorine...) can form explosive mixtures with air and can cause a fire hazard under particular conditions (sources of ignition).
The presence of strong acids or alkalis can cause corrosion of the containers with the consequent leakage of the substance.

10.4 Conditions to avoid

Avoid the heat of the product and its containers. Avoid rapid decompression of the containers. Avoid spills and leakages. Avoid the accumulation of the substance in confined spaces. Keep away from strong oxidizing agents, strong acids or alkalis. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid the accumulation of electric charges. Avoid shocks, falls, friction conditions of the containers with the consequent formation of friction and/or sparks. Avoid exposure of containers at high temperatures or direct sunlight (above 50° C).

10.5 Incompatible materials

Strong oxidising agents. Strong acids and alkalis.

10.6 Hazardous decomposition products

The substance is stable under normal operating conditions of work and do not decompose when used for its intended uses. In case of fire and explosion of the container it is possible the formation of not completely combusted organic compounds such as carbon monoxide.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Literature data concerning toxicological studies on short-chain alkanes (C₁-C₄), point out that they are poorly absorbed because they are as vapor phase at room temperature. If the exposure implies an absorption (as in higher concentrations), it would not be particularly relevant: there is little evidence of metabolism, because if this substance were absorbed, normally would be rapidly exhaled.

In addition, on the base of conducted studies, it would appear that the absorption increase with the increasing of molecular weight.

Un-branched molecules would be more easily absorbed than branched and aromatic molecules would be more easily absorbed than paraffin.

The main toxicological studies were carried out on rats.

ACUTE TOXICITY

At room temperature and atmospheric pressure, it is a clear odorless gas.

Therefore, the information concerning the acute oral and inhalation are not particularly relevant.

ACUTE TOXICITY - ORAL

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gas phase at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with any significant concentrations test.

ACUTE TOXICITY - INHALATION

LC50 rat [inhalation]: 658 mg/L 4 h (literature value)

Without prior mark - related to substance: butane

Main studies for isobutane:

LC50 rat (male/female) [2 hours] gas phase: 520400 ppm

[Source: Aviado (1982)]

Vapours may cause narcotic effects.

High concentrations in the inhaled air can lead to unconsciousness and asphyxiation due to lack of oxygen.

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11.1 Information on toxicological effects (continue)

ACUTE TOXICITY - SKIN

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gas phase at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with any significant concentrations test.

SKIN CORROSION/IRRITATION

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gas phase at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with any significant concentrations test. Literature data regarding dose-response studies in humans have shown that propane and butane are not irritant and corrosive for skin and mucous membranes. Contact with the liquefied gas can produce frostbite.

SERIOUS EYE DAMAGE/SERIOUS EYE IRRITATION

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted as the substance is present in a gas phase at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with any significant concentrations test. Contact with the liquefied gas can produce frostbite.

SKIN OR RESPIRATORY SENSITIZATION

RESPIRATORY SENSITIZATION

From available data, the substance is not classified as sensitizing. In inhaled acute/repeated toxicity test made on rats, no adverse effects was observed in the respiratory tract that could justify any classification as irritant to the respiratory route.

SKIN SENSITIZATION

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gaseous state at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with significant concentrations in any test. Contact with the liquefied gas can produce frostbite.

GERM CELL MUTAGENICITY

From in vitro and animal experiments, there is not evidence of genotoxicity. In addition, the substance may contain impurities such as 1,3-butadiene at concentrations of less than 0.1% and therefore is not classified as mutagenic according to the legislation on dangerous substances.

CARCIINOGENICITY

No evidence of carcinogenicity. At the present state of knowledge, the results of tests for mutagenicity and toxicity with repeated administration, no carcinogenic effect should be expected. In addition, the substance may contain impurities such as 1,3-butadiene at concentrations lower than 0.1% and therefore is not classified as a carcinogen under the legislation on dangerous substances.

REPRODUCTIVE TOXICITY

Literature data have shown no consistent evidence of toxicity to fertility and therefore the substance is not classified as toxic for reproduction according to the legislation on dangerous substances.

Screening for toxicity inherent the reproduction/growth

Inhalation rat (male/female)

Number of exposure: daily

NOAEL (No Observed Adverse Effect Level) parents: 7.131 mg/L

NOAEL F1: 21,394 mg / L

Method: OECD TG 422

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11.1 Information on toxicological effects (continue)

GROWTH TOXICITY/TERATOGENICITY

Literature data have shown no consistent evidence of growth toxicity/teratogenicity: the main impurities of the substance shall ensure that it is not classified as toxic to reproduction according to the legislation on dangerous substances.

Inhalation rat (male/female)

Number of exposure: daily

NOAEL (No Observed Adverse Effect Level) parents: 21,394 mg/L

NOAEL maternal: 21,394 mg/L

Method: OECD TG 422

In animal studies (OCSE 422, research screening) there were no evidence of damaging effects on growth.

SPECIFIC TARGET ORGAN TOXICITY (STOT) - SINGLE EXPOSURE

No information is available

SPECIFIC TARGET ORGAN TOXICITY (STOT) - REPEATED EXPOSURE

Oral

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gaseous state at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with significant concentrations in any test.

Skin

In accordance with point 2 of Annex XI of EC Regulation No. 1907/2006 (REACH), such testing may be omitted, as the substance is present in a gaseous state at room temperature and atmospheric pressure. Extremely volatile and flammable at room temperature, it tends to form explosive mixtures with air. A high risk of fire or explosion would be associated with significant concentrations in any test.

Inhalation

From studies conducted for a period of 6 weeks on male and female rats, were not observed neurological, hematological, or clinical effects. The lowest concentration at which adverse effects were observed (LOAEC) in this study is 21,394 ppm (OECD TG422 Method).

DANGERS IN CASE OF ASPIRATION

Not applicable. The substance at room temperature and atmospheric pressure, is a colorless gas.

OTHER INFORMATION

Under normal operating conditions the substance can be safely used as above mentioned. However, the deliberate abuse of high concentrations of vapors, even for short periods, may result in unconsciousness state or be fatal. No specific information on neurotoxicity test is available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

At present situation data on aquatic toxicity have shown no toxic phenomena from the environmental and ecological point of view and were not derived PNEC(S) for fresh waters, sea waters, sediments and soils. At room temperature and atmospheric pressure, the substance is gaseous, colorless and odorless, very volatile and practically insoluble in water: in accordance with column 2 of Annexes VII and VIII of the REACH Regulation, the acute toxicity tests (acute toxicity for the aquatic environment, chronic toxicity for the aquatic environment, toxicity on the ground) can't be performed if exist the conditions to indicate that the aquatic toxicity is unlikely.

Regarding the influence on the treatment of waste waters, there are no specific actions to be performed because the substance occurs at room temperature and atmospheric pressure, in the gaseous state, which is extremely volatile and practically insoluble in water.

TOXICITY FOR FISHES

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

TOXICITY FOR DAPHNIA

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

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12.1 Toxicity (continue)

TOXICITY FOR ALGAE

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

TOXICITY FOR BACTERIA

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

Ames test Salmonella typhimurium

No evidence of mutagenic effects.

Metabolic activation: S-9 mix rat liver

Method: Mutagenicity (Salmonella typhimurium - reverse mutation test) specific for isobutane.

TOXICITY FOR LIVING ORGANISM IN THE SOIL

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

TOXICITY FOR TERRESTRIAL PLANTS

According to the chemical and physical properties of the substance above mentioned, literature data have shown no toxicity phenomena, unlikely due to its volatility.

12.2 Persistence and degradability

PHOTODECOMPOSITION

The substance is rapidly degraded by photochemical reactions in the air.

The life of the substance in the atmosphere may be regarded as a matter of days with ozone-depleting potential practically equal to zero.

The value of the Greenhouse Effect (Global Warming Potential) is 3.

Only under certain conditions, through the complex interaction with other air pollutants that may be present and under certain climatic and meteorological conditions, photochemical degradation could contribute to the formation of tropospheric ozone

BIODEGRADABILITY

Literature data showed that the substance (gaseous at atmospheric temperature and pressure) is readily biodegradable (QSAR Method).

12.3 Bio accumulative potential

According to the chemical and physical properties of the substance above mentioned (log Pow equal to 2.86), the substance has not properties of bioaccumulation as a result of decomposition, reduction and degradation.

12.4 Mobility in soil

At room temperature and atmospheric pressure, the substance appears as a gas, colorless and extremely volatile: for this reason it has the properties to disperse quickly in air without pollute soil. Not expected therefore phenomena of adsorption/absorption in the soil

12.5 Results of PBT and vPvB assessment

According to the criteria in Annex XIII of the REACH Regulation, the substance is not defined persistent, bio accumulative and toxic for the environment.

12.6 Other adverse effects

The substance has a content of volatile organic compounds (VOC) equal to 100%.

Use the substance according to good working practices, without disperse it in the environment.

High concentrations of ozone are associated with adverse effects on humans and during the growing season with different damage on crops, vegetation and forests.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Follow all in force applicable local laws.

The gas should be disposed of with appropriate devices (torches) equipped with not backfire systems.

Avoid the formation of explosive mixtures with air: do not discharge into areas where its accumulation could be dangerous.

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13.1 Waste treatment methods (continue)

For this product it is not possible to assign a specific code number of the waste by the user (producer of the waste) that has the responsibility to choose the most appropriate code based on actual use of the product and any alterations and contaminations (Ref. Directive 2001/118/EC).

The code number of the waste must be decided in accordance with the European Waste List (Decision on EU waste 200/532/CE index) in accordance with specific companies for the disposal factories/producers/National Authorities.

Regarding the containers, there is no disposal problem as they are normally rechargeable.

In case of emergency disposal, burn the contents with appropriate safety precautions under a supervision of a qualified technician and observing local regulations. No longer reusable containers must be drained with water or inert gas.

To dispose of empty containers and/or full:

Code for the empty package: CER 15.01.04

Code for the full package: CER 15.01.10

Refer to authorized Bodies for waste disposal or for the packaging regeneration.

Don't make any kind of physical operation (drilling, cutting, burning ...) on containers that aren't drained.

Contact supplier in case of further information.

14. TRANSPORT INFORMATION

14.1 UN number: 2037

Pictogram ADR/RID, IMDG, IATA



2.1: Flammable gas

14.2 UN proper shipping name

Gas cartridges (flammable) without a release device, non-refillable or receptacles, small, containing gas (gas cartridges) flammable, without release device, not refillable and not exceeding 1 L capacity.

14.3 Transport hazard class(es)

ROAD/RAIL TRANSPORT (ADR/RID)

Class 2

Classification code 5F

Hazard label 2.1

Hazard identification number 23

Tunnel restriction code (ADR)

B / D: Transit prohibited in tunnels of category B and C for transport in tankers.

Transit forbidden through tunnels of category D and E.

Description of goods (technical name): See section 14.2

SHIPPING (IMDG)

Class 2.1

EMS F-D, S-U

Marine pollutant No

Description of goods (technical name): See section 14.2

AIR TRANSPORT (ICAO/IATA)

Class 2.1

Not be carried on passenger flights. Cargo aircraft only: permission. ERG-Code 10L

Description of goods (technical name): See section 14.2

14.4 Packing Group

ROAD/RAIL TRANSPORT (ADR/RID)

Packaging Instructions - General: P003

SHIPPING (IMDG) PACKING GROUP IMO

Packaging Instructions: P003

AIR TRANSPORT (ICAO/IATA)

Packaging Instructions: P003

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14.5 Environmental hazards

The substance is not classified as dangerous in accordance with the dispositions ADR, RID IMDG, ICAO/IATA.
 Emergency Schedule (EmS) - Fire : F-D
 Emergency Schedule (EmS) - Spillage: S-U- Instructions
 Marine pollutant: No
 Packaging Instructions:P003

14.6 Special precautions for users

The packages must not be transported in the same place where is present the driver of vehicles.
 The cylinders must be kept upright and the drums kept in horizontal position and carried only in a safe position, preferably on a vehicle in a well ventilated or open trucks.
 Avoid transport on vehicles where the load space is not separated from the place where is present the driver.
 Make sure the driver is informed of the potential hazards of the load and he knows what to do in case of accident or emergency.
 Before to start a transport:
 - Be assured that containers are firmly secured.
 - Be assured that the cylinder valves are closed and that loss will not occur.
 - Be assured that the valve protection device, where provided, is properly mounted.
 - Be assured for an adequate ventilation.
 - Compliance with applicable regulations.

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

For the in bulk transports, follow the MARPOL 73/78 Annex II and IBC Code where applicable.

15. REGULATORY INFORMATIONS

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

Authorization under REACH (Regulation EC 1907/2006 and subsequent amendments):
 the substance is not in the list of substances of very high concern (SVHC) candidate authorization.
 Regulation EC 1272/2008 and subsequent amendments (CLP/GHS)
 OTHER EU DIRECTIVES:
 Category Seveso (Directive 96/82/EC and Dir 105/2003/CE and subsequent amendments) of Annex I Part 1.
 Dangerous Chemical Agent (Directive 98/24/EC) and subsequent amendments

MAIN BIBLIOGRAPHY

ADR 2011 European Agreement on the transport of dangerous goods by road
 AGCIH 2009 American Conference of Governmental Industrial Hygienists
 European Chemical Substances Information System ESIS - IUCLID Dataset
 IATA / ICAO 2008 International Air Transport Association - International Civil Aviation Organisation
 2008 IMDG International Maritime Dangerous Goods Code
 NIOSH National Institute for Occupational Health and Safety - Registry of Toxic Effects of Chemical Substances
 QSAR: Quantitative Structure Activity Relationship
 IUCLID International Uniform Chemical Information Database.

15.2 Chemical safety assessment

Assessment was performed on Chemical Safety
 All information contained in sections 11 and 12 are extracted from IUCLID database

16. OTHER INFORMATION

Texts of danger phrases warnings

H220: Extremely flammable gas
 H280 Contains gas under pressure; may explode if heated

Dangers that may arise for the improper use are mainly those relating to a fire or explosion or asphyxiation in the event of not fired leakages in confined areas.
 It is absolutely necessary that all operators and users of LPG are well informed and trained on the precautions to be taken for the safe handling and use.

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16. OTHER INFORMATION (continue)

Workers must be trained according to their specific duties according to relevant laws.
Formation and training of workers on chemical agents should be conducted according to Directive 98/24/EC.

KEY TO ACRONYMS

CSR = Chemical Safety Report
DNEL = Derived no-effect level
DMEL = Derived Minimum effect levels
EC50 = Median effective concentration
IC50 = Inhibitory concentration, 50%
LC50 = Lethal concentration, 50%
LD50 = Median lethal dose
PNEC = Predicted no effect environmental concentration
PBT = Persistent, bio accumulative and toxic
CNS = Central nervous system
STOT = Specific target organ toxicity
(STOT) RE = Specific target organ toxicity Repeated
(STOT) SE = Specific target organ toxicity Single exposure
TLV[®] TWA = Threshold Limit Value-Time Weighted Average
STEL TLV[®] = Threshold Limit Value-limit for a short time of exposure
vPvB = Very persistent and very bio accumulative

Note H (Table 3.1):

The classification and label shown for this substance applies to the hazard or hazards indicated by the hazard statement or hazard statements in combination with the hazard classification shown. The requirements of Article 4 of Regulation (EC) No 1272/2008 on supplier of this substance apply to all other hazard classes, differentiations and categories. The final label shall follow the requirements of section 1.2 of Annex I to Regulation (EC) No 1272/2008

Note K:

The classification as a carcinogen or mutagen need not apply if it can be shown that the substance contains less than 0.1% w/w 1,3 butadiene (EINECS No 203-450-8). If the substance is not classified as a carcinogen or mutagen, at least the precautionary statements (P102-) P210-P403 should apply. This note applies only to certain complex oil-derived substances in Part 3 of the Annex VI to Regulation (EC) No 1272/2008

Note U (Table 3.1):

When put on the market gases have to be classified as 'Gases under pressure', in one of the groups compressed gas, liquefied gas, refrigerated liquefied gas or dissolved gas. The group depends on the physical state in which the gas is packaged and therefore has to be assigned case by case.

Revision Date: 24.04.2018

The revision became necessary following the application of the EC Regulation 1907/2006 (REACH) and subsequent changes incorporated as amended Annex II of EU Regulation 453/2010 and in accordance with EC Regulation 1272/2008 (CLP), and with EC Regulation 2015/830.
The paragraph 1.3 was changed.

The information contained herein are based on the knowledge we possess at present, and in accordance with current legislation.

All possible measures have been taken to ensure that all information contained in this schedule in terms of health and safety at work are correct at the time of issuance of the same card.

No warranty or representation, express or implied, is granted as to the accuracy or completeness of the data and information contained in this schedule. The data and advice given apply when the product is sold for the application stated. The data and advice given apply when the product is sold for the application stated

Do not use the substance if not for applications declared, without consulting the supplier. The user has the responsibility to manage the product according to the instructions and take all necessary measures to meet the needs of local laws and regulations relating to health, safety and occupational hygiene and environmental protection. No responsibility for any damage or injury resulting from different uses than those indicated, improper use of the product, any failures to adhere to recommendations, or from any hazards inherent in the nature of the material. All downstream users of the substance have a duty to take all necessary measures to ensure that any person handling or use of the substance is informed/trained by their managers with the information contained in this sheets.

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ANNEX

List of identified uses for the substance Isobutane

List of descriptor used for gases	IUCLID 5		ECHA uses descriptors				
List of uses for gas	Main use categories	Specifications for industrial and professional uses	Proc	PC	SU	NACE	ERC
Formulation of mixtures with gas in pressure receptacles	Industrial	Close system	1,3	n.a.	10		ERC2
Using gas alone or in mixtures for calibration of analysis equipment	Industrial	Close system	1,3	21	0 - 2a, 2b	M74.9	ERC8D
Transfiling gas or liquid	Industrial	Close system	9	n.a.	10		ERC2
Using gas as a fuel	Consumers	Non-dispersive use	16	13	3, 21, 22		open
Use gas as feedstock in chemical process	Industrial	Close system	1	19	3,8		ERC6A, ERC1
Use of gas as to refill refrigeration equipment Refrigerant gas	Professional	Close system	8	16	3, 22		ERC7
Aerosol Propellant use	Industrial	Wide dispersive use	2,5,7,9b 11	0,3,8,9a, 9b, 24,34,35,29,39	3,10,21,22		ERC2-8A
Use gas in mixtures as foaming agents in personal care products	Industrial	Close system	12	39	21		open
Using of blowing agents in manufacture of plastic foam	Industrial	Close system	12	32	12	22.2	ERC3
Use as intermediate (transport, on-site isolated)	Industrial	Close system	1	19	3		ERC6A

Legend

IUCLID International Uniform Chemical Information Database
 PC Preparation Category
 SU Sector of use category
 NACE Nomenclature General of Economic Activities within European Communities
 ERC Environmental release category
 ECHA European Chemicals Agency
 N.A. Not Applicable

PROC 1 Use in closed process, no likelihood of exposure
 PROC 2 Use in close, continuous process with occasional controlled exposure (e.g. sampling)
 PROC 3 Use in batch and other process (synthesis or formulation)
 PROC 5 Mixing or blending in batch processes for formulation of preparations and articles (multistage)
 PROC 7 Industrial spraying
 PROC 8 Transfer of a substance or preparation (charging/discharging) from / to vessels / large containers at non- dedicated facilities
 PROC 9 Transfer of a substance or preparation into small containers (dedicated filling line, including weighing)
 PROC 11 Non-industrial spraying
 PROC 12 Use of blowing agents in manufacture of foam
 PROC 16 Using materials as fuel sources, limited exposure to unburned product to be expected. Industrial or not industrial setting

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ANNEX

List of identified uses for the substance Isobutane (continue)

- PC 0 Other products
- PC 3 Air care products
- PC 8 Biocidal products (eg, disinfectants, pest control)
- PC 9a Coatings and paints, thinners, paint removers
- PC 9b Fillers, Putties
- PC 13 Fuels
- PC 16 Heat transfer fluids
- PC 19 Intermediate
- PC 21 Laboratory Chemicals
- PC 24 Lubricants, Greases and Release Products
- PC 29 Pharmaceuticals
- PC 32 Polymer Preparations and Compounds
- PC 34 Textile dyes, finishing and impregnating products, including bleaches and other processing aids
- PC 35 Washing and Cleaning (including solvent based products)
- PC 39 Cosmetic, personal care products

- SU 0 Others
- SU 2a Mining (without offshore industries)
- SU 2b Offshore industries
- SU 3 Industrial use: end uses of substances as such or preparations at industrial sites
- SU 8 Manufacture of bulk ,large scale chemicals (including petroleum products)
- SU 10 Formulation: Formulation (mixing) of preparations and/or re-packaging
- SU 12 Manufacture of plastics products, including compounding and conversion
- SU 21 Consumer uses: private households (=general public=consumer)
- SU 22 Professional Uses: Public domain (administration, education, entertainment, services, craftsmen)

- ERC 1 Manufacture of substances
- ERC 2 Formulation of preparations
- ERC 3 Formulation in materials
- ERC 6a Industrial use resulting in manufacture of another substance (use of intermediates)
- ERC 7 Industrial use of substances in closed systems
- ERC 8a Wide dispersive indoor use of processing aids in open systems