

Item **Type of gas**
577 **Butane, 227 Gr**

SECTION 1: Substance/mixture and company identification

1.1 Product identification

The butane LPG is a hydrocarbon gas mixture, liquefied

Product name: BUTANE*
Brand name or synonyms: BUTANE** mixture A, A01, A02, A0.
CAS number: 68476-85-7
EC index: 649-202-00-6
EC number: 270-704-2
UN number: 2037
REACH number: N/A
Formula: UVCB

Note:

*- In EINECS and ELINCS many substances defined as "petroleum gas" are identified, which are distinguished above all according to their origin. Their properties and characteristics are generally similar and they are, consequently, subject to the same classification and labelling requirements. The product identification and the choice of the most adequate section is the task of the manufacturer/importer.

** The brand names and the synonyms mentioned are borrowed from the international regulations on the transport of dangerous merchandise. For the above mentioned substances, HYDROCARBON GAS MIXTURES, LIQUIFIED, N.O.S., the following names, used on the market, are accepted for describing the substance: BUTANE for MIXTURES A, A01, A02 and A0.

*** Butane is not exempted from registration according to annex V to Regulation REACH 1907/2006 EC

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

1.2.1 identified uses relevant

Main use category:	Professional use, industrial use and use by the consumer
Specified use professional / industrial:	Use non-dispersive / Use dispersive wide
Use of the substance / mixture:	Fuels Fuels functional fluids Processing polymers Propellant Gas ---- Do not use the product for not designated purposes
Function or category of use:	Fuels, aerosol propellants

1.2.2 Discouraged uses

No further information is available

1.3 Details of the supplier of the safety data sheet:

Supplier/distributor PLEIN AIR INTERNATIONAL SRL Via Cavo 8/10 41037 Cividale di Mirandola (MO) Tel.: +39 0535 21334 (from 8.30 to 17.00) Contact responsible with the SDS: info@pleinaironline.it

1.4 Emergency telephone numbers:

DENOMINAZIONE	NAZIONE	TELEFONO
CEN.NAZ.INFORM.TOSSIC.FOND. S.MAUGERI (CNIT)	IT	+39 0382 24444
CENTRO ANTIVELENI, OSPEDALE NIGUARDA CA' GRANDA	IT	+39 02 66101029
TOX INFO SUISSE	CH	+41 44 251 51 51
REACH and CLP UK CA Help Desk Health and Safety Executive (HSE)	EN	+44 0151 9515897 / 0151 922 9235
Giftnotruf der Charité – Universitätsmedizin Berlin	DE	+49 030 19240
INRS, Institut National de Recherche et de Sécurité	FR	+33 (0)1 45 42 59 59
Centre Antipoison et de Toxicovigilance de PARIS	FR	+33 (0)1 40 05 48 48 / (0)1 40 05 41 93
Servicio de Información Toxicológica	ES	+ 34 91 562 04 20
Instituto Nacional de Emergência Médica	PT	+ 351 213 303 271
NATIONAAL VERGIFTIGINGEN INFORMATIE CENTRUM (NVIC)	NL	+31 030 274 8888

SECTION 2: Hazard identification

2.1 Classification of the substance

The classification of the substance according to Regulation (EC) 1272/2008 [EU-GHS/CLP] is correct according to this standard

Flam. Gas 1 H220
Compressed gas H280

Physical-chemical effects for human health and the environment

Suffocating gas at a high concentration. Extremely flammable. Cryogenic Gas. In contact with the skin can cause cold burns or frostbite. Vapors can form a flammable and explosive mixture with air. High concentrations vapors may cause: headache, sickness, dizziness. A quick accidental liquid evaporation may cause cold burns. For specific information of toxicological characteristics and product classification, check point 11 and/or 12.

Refer to Section 16 for the full text of the H phrases.

2.2 Label elements

The labelling for the substance packed in refillable tank gas cylinders or in non-refillable cartridges according to EN 417, is composed of the following elements ****:

Hazard pictogram (CLP):



GHS02
(Flammable Gas, hazard category 1)

**** The labelling, referring to the articles according to EN 417, is simplified according to the derogation in Annex 1, section 1.3.2.1 to regulation CLP 1272/2008.

Warning (CLP):	Pericolo
H hazard statements (CLP):	H220- Extremely flammable gas H280- Contains gas under pressure; may explode if heated
Precautionary statements (CLP):	P102 - Keep out of reach of children. P210- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P377- Leaking gas fire: do not extinguish, unless leak can be stopped safely P381- Eliminate all ignition sources if safe to do so. P410+P403-Protect from sunlight. Store in a well-ventilated place.
Security closure for children:	No
Tactile warning of danger:	Applicable
Other:	
General informations:	(Not applicable - classified as dangerous according to (EC) No. 1272/2008)

ATTENTION:

The Carc. 1A and Muta. 1B classifications are not necessary, according to Note K, for the substances containing less than 0.1% of w/w 1,3-butadiene.

If the substance is not classified as carcinogen or mutagen, the precautionary statements (P102-) P210- P403 should at least be shown.

As a result of the above, the Sheet only treats hereinafter substances not classified as carcinogen and mutagen.

2.3 Other hazards

The product does not present any risk for the user under the prescribed storage and use conditions.

Hereinafter, we provide information on other dangerous conditions which, in order not to determine the classification of the substance, can contribute to the general hazard of the substance:

- the accumulation of vapours in confined environments can form explosive mixtures in contact with air, especially in closed environments or inside empty, uncleaned containers;
- the accumulation of vapours in confined environments may cause asphyxiation (due to oxygen deficiency);
- vapours are invisible even if the liquid expansion causes mist in the presence of humid air;
- vapours have higher density than the air and tends to stagnate near the ground,
- contact with the liquid may cause serious injuries to eyes and skin from frostbite;
- The combustion produces CO₂ (carbon dioxide), asphyxiating gas. In the absence of oxygen, due to insufficient ventilation/fume discharge, it can produce CO (carbon monoxide), very toxic gas;
- The strong heating of the container (for example, in case of fire) causes a significant increase in the volume of the liquid and pressure, with the danger of bursting the recipient containing it.

Results of the PBT and vPvB assessment

This mixture does not meet the PBT criteria of REACH regulation, annex XIII.

This mixture does not meet the vPvB criteria of REACH regulation, annex XIII.

SECTION 3: Composition/information on ingredients

3.1 Substance

Applicable

Name	Product identification	%	Classification according to Regulation (EC) no. 1272/2008 [EU-GHS/CLP] *
Petroleum gas, liquefied	(CAS number) 68476-85-7 (EC number) 270-704-2 (EU index number) 649-202-00-6	> 99.99	Flam. Gas 1, H220 Compressed gas, H280
Butadiene 1,3- (Impurity)	(CAS number) 106-99-0 (EC number) 203-450-8 (EU index number) 601-013-00-X (REACH no.) N/A	< 0.1	Flam. Gas 1, H220 Press. Gas Carc. 1A, H350 Muta. 1B, H340

- FOR C3-C4 HYDROCARBON, note K is applied:
The Carc. 1A and Muta. 1B classifications are not necessary, according to Note K, for the substances containing less than 0.1% of w/w 1,3-butadiene.

If the substance is not classified as carcinogen or mutagen, the precautionary statements (P102-) P210- P403 should at least be shown.

3.2 Mixtures

N/A

Please refer to section 16 for the full text of H and EUH phrases

SECTION 4: First aid measures

4.1 Description of first aid measures

General first aid measures

None specified

First aid measures in case of inhalation

Gaseous product: If the victim breaths: Lead the patient to fresh air and allow him/her to rest in a warm place and in a safe position. Keep him/her in a safe side position. If breathing is difficult, administer oxygen if possible or carry out assisted breathing. Refer to a physician if the breathing difficulty persists. If the victim is unconscious and does not breathe: check the absence of breathing obstacles and provide artificial respiration by competent personnel. If necessary, perform an external cardiac massage and consult a physician.

First aid measures in case of skin contact

Liquid product: Wash the skin with plenty of water. Consult a physician immediately if irritations, swelling or redness occur and persist. A quick accidental evaporation of the liquid may cause frostbite. In case of signs of frostbite, such as skin whitening or redness or stinging or tingling feeling, do not rub, massage or compress the injured part. Consult a specialised physician or transfer the victim to the hospital.

First aid measures in case of eye contact

Gently rinse with water for several minutes. Remove, if present, contact lenses, if you can easily do it. In case of irritations, blurred eyesight or persistent swelling, consult a specialised physician.

First aid measures in case of ingestion

Liquid product: Not considered a probable ignition source. Frostbite symptoms may occur on the lips and mouth in case of contact with the product in liquid form. Consult immediately a physician.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms/injuries (general indications)

None.

Symptoms/injuries in case of inhalation

The exposure to high concentrations of vapours, especially in closed or insufficiently ventilated environments, may cause respiratory tract irritation, nausea, discomfort and dizziness. The lack of oxygen due to exposure to high concentrations may cause asphyxiation.

Symptoms/injuries in case of skin contact

Contact with the liquid may cause frostbites.

Symptoms/injuries in case of eye contact

Contact with eyes may cause a slight transitory irritation.

Symptoms/injuries in case of ingestion

N/A.

Symptoms/injuries in case of intravenous administration

No information available.

Chronic symptoms

None to report, based on our current knowledge.

Adverse physicochemical, human health and environmental effects

Extremely flammable. Vapours can form a flammable and explosive mixture in case of contact with air. High concentrations of vapours may cause: migraine, nausea, dizziness. A quick accidental evaporation of the liquid may cause frostbite.

4.3 Indication of any immediate medical attention and special treatment needed

Begin immediately artificial respiration if breathing has stopped. Administer oxygen, if necessary.

SECTION 5: Fire fighting measures

5.1 Extinguishing media

Suitable extinguishing media:

Small-scale fires: carbon dioxide, dry chemical powder, foam. Large-scale fires: foam or water spray. These agents should be used only by properly trained personnel. Other extinguishing gas (according to the regulation).

Unsuitable extinguishing media

Do not use water jets directly on the burning product. Avoid simultaneous use of foam and water on the same surface, water destroys foam.

5.2 Special hazards arising from substance or mixture

Fire hazard

Extremely flammable.

Explosion hazard

Vapours are heavier than air, spread along ground and for explosive mixtures with air. Heat may cause pressure increase, resulting in the explosion of closed containers, spread of fire and a risk of burns and injuries.

Combustion products

Incomplete combustion may generate a complex mixture of airborne solid and liquid particles and gas, including carbon monoxide and NOx., oxygen compounds (aldehydes, etc.)

5.3 Advice for fire-fighters

Precautionary measures in case of fire

If safety conditions allow it, stop or contain the leakage at the source. Do not try to extinguish a fire as the product leakage was not blocked or if you are sure of immediate interception.

Firefighting instructions

Remove undamaged containers from the danger area, if possible, do it without endangering. Use water jets to cool the surfaces and containers exposed to flames. If the fire cannot be controlled, evacuate the area.

Special protective equipment for firefighters

In case of fire or in confined or poorly ventilated spaces, wear a full fireproof garment and an self-contained breathing apparatus with full face piece mask operated in a positive-pressure mode.

Other information (firefighting)

In case of fire, do not dispose of residual water, residual product and the contaminated material, but collect them separately and treat them in an appropriate way.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

General measures to be taken

If safety conditions allow it, stop or contain the leakage at the source. Avoid direct contact with the released material. Remain in a upwind area. In case of large spills, warn the residents from downwind zones. Eliminate all ignition sources if safety conditions allow it (e.g. electricity, sparks, fires, torches). Use only non-sparking tools. Gas/vapour heavier than air. May accumulate in closed spaces especially at ground level or below it. Proper sensors can be used to detect gas or flammable vapours.

6.1.1 For non-emergency personnel

Protection means

Please refer to Section 8.

Emergency procedures

Clear the spill area of all non-emergency personnel. Alert the emergency teams. Except cases of small-scale spills, the feasibility of interventions must always be assessed and approved, if possible, by qualified and competent personnel in charge with managing the emergency.

6.1.2 For emergency personnel

Protection means

Small-scale spills: normal anti-static work clothing is generally suitable. Large-scale spills: full protective clothing resistant to chemical agents and made of anti-static material. Work gloves (preferably long arm gloves) that provide adequate chemical resistance. If contact with the liquefied product is possible or predictable, gloves should be thermally insulated so as to avoid frostbite. Gloves made of PVA (polyvinyl alcohol) are not waterproof and are not adequate for emergency use. Antistatic and anti-slip safety shoes or boots, with chemical resistance. Safety helmet. Protective goggles or face safety devices if splashes or if eye contact is/are possible or predictable. Respiratory protection: A half-mask or a full-face mask fitted with filter(s) for organic vapours (AX) or a self-contained breathing apparatus can be used, according to the extent of the spill and the predictable exposure level. If the situation cannot be fully assessed or if there is a risk of oxygen deficiency, use only a self-contained breathing apparatus.

Emergency procedures

Warn the competent authorities in compliance with the regulations in force.

6.2. Environmental precautions

Avoid discharging the product in sewerage, rivers or other water streams.

6.3. Methods and material for containment and cleaning up

Methods for containment

Let the product evaporate, favouring its release. Being heavier than air, vapours can spread for significant distances at ground level/ignite/cause source flash-back. Inside buildings or confined spaces, ensure proper ventilation. Water: Spilling the liquid product in water will presumably result in a quick and complete evaporation. Isolate the area and prevent the risk of fire/explosion for boats and other structures, taking into account the wind direction and speed, up to the complete dispersion of the product.

Cleaning methods

None specified.

Other information (accidental release)

Recommended measures are based on the most probable spilling scenarios for this product. Local conditions (wind, air or water temperature, direction and speed of waves and current) can, however, influence significantly the choice of action to follow. Consult however local experts, if necessary.

6.4. Reference to other sections

Please refer to Section 8.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid leaks into the atmosphere; Handle the product with closed circuit systems; Work in well-ventilated places; Do not operate in the presence of ignition sources; Use non-sparking tools. Perform the correct earthing of the devices and prevent the accumulation of electrostatic charges during pouring and bottling operations;

For hygienic purposes, it is recommended: Do not eat, drink and smoke in work areas; Wash your hands after use; Remove contaminated clothing and protective equipment before entering eating areas.

Measurement of hygiene

Avoid skin and eye contact. Do not breathe vapors. Use appropriate personal protective equipment if necessary. Keep away from food and beverages. Do not eat, drink or smoke during use.

7.2 Conditions for safe storage, including any incompatibilities.

Storage conditions

Store in a dry and well-ventilated place. Do not smoke. Keep away from live flames, hot surfaces and ignition sources. Vapours are heavier than air and they can propagate close to ground. Pay special attention to the accumulation in wells and confined spaces.

Incompatible products

Keep away from: strong oxidants.

Storage temperature

≤ 50°C

Storage place

The structure of the storage area, the devices and operational procedures must be compliant with the European, national or local law in force.

Packaging and containers

Keep only in the original container. Keep in suitable, closed and correctly labelled containers. Gas cylinders should not be stored near other gas cylinders containing compressed oxygen. Empty containers may contain combustible product waste. Do not weld, braze, drill, cut or burn empty containers, unless they have not been properly cleaned.

7.3 Special end uses

The storage and handling of the product designed for use with lighters, refills for lighters, aerosols and gas cartridges. The relevant containers must observe ADR regulations, especially the P003 packaging instructions.

SECTION 8: Exposure control/personal protection

8.1 Control parameters

Limit value for professional exposure

National: N/A

Community: N/A

ACGIH 2014: N/A

Note: For the identification of dangerous contractions for professional inhalation, besides those predicting an exposure damage, in the absence of national or community limit exposure values, for common phrases, please refer

to the document ACGIH "Threshold limit value (TLVs) for chemical substances and physical agents & biological exposure indices (BEIs)". Specific TLV for liquefied petroleum gas (LPG) – previously grouped in the classification "aliphatic hydrocarbons: alkanes [C1-C4]" now removed – have been withdrawn together with the 2013 issue. Critical effects lead to asphyxiation with a specific reference to the "minimum oxygen content" in the inhaled atmospheres.

8.2 Exposure controls

- a) **Technical measures of control:** minimize exposure. Before access to the storage tanks and start any type of intervention in a confined space (e.g. tunnels), perform an adequate drainage, check the atmosphere and check the oxygen content and the flammability
- b) **Protective personal equipment (for industrial or professional purposes):** Protection of the skin and of the hands: Use complete antistatic clothes, adapted to also cover the upper limbs and lower. Use leather gloves/crust and have thermally insulating gloves with protection of the forearm (to moschettiera) for eventual emergency. In the factory activities, use antistatic protective gloves, conforming to EN 388 for mechanical risks with high abrasion resistance. In the operations for pouring liquid phase, use antistatic protective gloves, with extended protection to the forearm, conforming to EN 388 for mechanical risks with high resistance to abrasion, internally coated with protection from cold burns.



- c) **Eye/face protection:** In case of any possibility of eye contact, wear protective glasses or other protections (FACE SHIELDS). In case, refer to UNI EN 166.
- d) **Guards hands:** In case of any possibility of skin contact, use hydrocarbons resistant gloves, internally panned. Presumably eligible materials: nitrile (NBR) or PVC with a protection index at least equal to 5 (time of permeation ≥ 240 min). If contact with the liquefied product is possible or foreseeable, gloves must be thermally insulated in order to avoid cold burns. Use gloves caring of the conditions and limits described by the manufacturer. Immediately replace gloves if shows cuts, holes or other signs of degradation. In the case, refer to UNI EN 374.
- e) **Protection of skin and body:** Work clothes with long sleeves. For the definition of the characteristics and performance related to work risks, refer to UNI EN 340 and other UNI-EN-ISO STANDARDS APPLICABLE. Antistatic and anti slip safety shoes or boots resistant to chemical agents. Remove contaminated clothes and shoes.
- f) **Respiratory protection:** Independently from the other possible actions (plant adaptation, operating procedures and other means to reduce the workers exposure), indicate the individual protection devices which can be adopted as required. In ventilated rooms or outdoor: in the case of handling the product in the absence of an appropriate vapor containment system, use masks or semi-masks with filter for hydrocarbon vapors (AX). (EN 136/140/145). Filtering apparatus combined (DIN EN 141). In confined environments (e.g. tanks interior): the adoption of respiratory protection devices (semi-masks, masks, breathing apparatus) must be assessed on the basis of the Working activity, duration and intensity of exposure. For the characteristics, refer to DM 02/05/2001. If it is not possible to determine or estimate exposure levels with certain accuracy or if it is possible that verifies a lack of oxygen, only use autonomous breathing apparatus. A large quantity of LPG vapors (liquefied petroleum gas) can create a lack of oxygen in the atmosphere. In this case, only use autonomous breathing apparatus.
- g) **Thermal protection:** None in normal use
- h) **Exposure controls environmental:** Do not release the product in the environment
- i) **Limitations and control of the exposure of consumers:** Must always be handled in a closed system. Ensure an appropriate ventilation.

8.2.3 Environmental exposure controls

There are no evidences to this end. Additional risk management measures are not requested.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

A	Physical condition	Gas
B	Odour	Specific, unpleasant, persistent. Gas odorant for combustion use or automotive ¹ .Mercaptan (legal tracer)
C	Odour threshold 25%	25% L.I.E. with gas odorant
D	PH	Neutral
E	*Density of the liquid at 15°C, in Gg/l	0.585 (ASTM D 1657 method)
F	*Density of the vapour at 15°C in Kg/m3	2.45
G	Melting point in degrees °C	-138°C
H	Initial boiling point and boiling range in °C	-0.5
I	Flashpoint in °C	< -60°C
J	Evaporation rate	Data not available
K	Flammability	Data not available
L	Upper/lower flammability and explosiveness limits % in volume	Lower: 1.86 ÷ 2.27 Upper: 8.41 ÷ 9.50
M	Absolute vapour pressure at 15°C and in bar	1.8 (ASTM D 1657 method)
N	Vapour density	2.0
O	Relative air density (vapour phase)	2.0
P	Water solubility	Negligible
Q	N octanol/water partition coefficient	Data not available
R	Auto-ignition temperature	405
S	Decomposition temperature	Data not available
T	Dynamic viscosity***** of the fluid in Pascal x s	17x10 ⁻⁵
U	Explosion properties	None
V	Oxidizing properties	None

***** Technical Data Book – A.P.I. (2nd edition, 1970).

9.2 Other information

** Thermic conductivity in liquid phase at 15°C in W/m x °C:	13 x 10 ⁻²
***Electric conductivity in liquid phase (at 0°÷ 20°C) in Ω-1 x m -1	1 ÷ 5 x 10 ⁻¹² (butane)
Suitability of materials:	Dissolves greases and attacks natural rubber Does not corrode metallic materials
Solvents:	methanol, ethanol, ethylene

*They are vapours proportional with the related percentages

** Technical Data Book – A.P.I. (2nd edition, 1970).

***Encyclopedie des gaz-ELSVIER (1976)

¹ When they do not have a sufficiently strong odour, odour will be added to the LPG in order to allow the olfactory sensing before reaching dangerous concentrations in case of air release. (law no. 1083 of 6th December 1971, and UNI 7133 regulation).

SECTION 10: Stability and reactivity

10.1 Reactivity

It may react in contact with strong oxidising agents.

10.2 Chemical stability

There are no instability conditions.

10.3 Possibility of hazardous reactions

The contact with strong oxidising agents may cause fire hazard, the mixture with strong oxidising agents can generate explosions.

10.4 Conditions to avoid

Avoid the formation of explosive mixtures with air and the contact with any ignition source. Avoid strong heating of products and containers. Avoid violent decompression of recipients with biphasic content as it may generate strong cooling, with temperatures under 0°C. Avoid the contact with strong oxidising agents (oxygen, nitrous oxide, chlorine, fluorine, etc.).

10.5 Incompatible materials

Incompatible with oxidising agents.

10.6 Hazardous decomposition products

There is no evidence of decomposition or degradation possibility. In case of ignition, a gas-air mixture within the flammability limits. Burning with exothermic reaction and production of carbon oxides (CO₂, CO).

SECTION 11: Toxicological information

11.1 Information on toxicological effects

No experimental data available on the absorption, distribution, metabolism and elimination of the product in its entirety, but there are many toxicokinetic studies available on the main components. Dahl et al. (1988) have studied and compared the absorption of miscellaneous hydrocarbons in gaseous phase in rats. Toxicokinetic studies relate to alkenes, alkynes, straight-chain alkanes and branch-chain alkanes, cyclic and aromatic hydrocarbons. It has been concluded that the absorption tends to increase when the molecular weight as if the unramified molecules are more easily absorbable compared with the ramified ones and the aromatic molecules are more easily absorbable than the paraffins. The short chain alkanes C1-C4 which exist as vapour at ambient temperature are poorly absorbed and, if absorbed, they will be normally quickly expired.

a) Acute toxicity:

The product is composed of gas at ambient temperature and pressure for which oral and skin toxicity aspects are not considered relevant.

Oral: In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations.

Inhalation: Hereinafter, a synthesis of the most representative studies is presented. These results do not lead to any classification according to the regulation on dangerous substances.

Method	Results	Comments	Source
By inhalation			
RAT Inhalation	LC50 (15 minutes): 800,000 ppm (males/females) LC50 (15 minutes):14,442,738 mg/m ³ (M/F) LC50 (15 minutes):1,443 mg/ml (M/F)	Key study Propane	Clark DG and Tiston DJ (1982)

Method	Results	Comments	Source
Human studies General population	The odour is not detectable under 20,000 ppm (2%) and a concentration of 100,000 ppm (10%) has caused slight irritations of the eyes, nose and respiratory tract, but it has caused minor dizziness in a few minutes.	Weight of evidence	Anon 1982 Herman (Chairman 1966)

Cutaneous: In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations.

b) Skin corrosion/irritation:

In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations. A few dose-response studies performed on humans prove that propane and butane do not have corrosive and irritant effects for the skin and mucous membranes. Contact with the liquefied gas may cause frostbites.

c) Serious eye damage/irritation:

In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations.

d) Respiratory or skin sensitisation:

Respiratory sensitisation

There are no studies available which indicate this type of effect

Skin sensitisation

In accordance with point 2 of Annex XI to REACH Regulation, this study should not be performed.

e) Germ cell mutagenicity

No evidence of genotoxicity for most of LPG components. Moreover, the product contains benzene, and 1,3-butadiene in C <0.1%, therefore, it is not classified as a mutagen according to the regulations on dangerous substances.

Hereinafter, a synthesis of the most representative studies from the Registration file is presented.

Method	Results	Comments	Source
Vitro test Ames test in Salmonella strains OECD TG 471	Negative	Key study Methane	National Toxicology Program (1993)
Vitro test Ames test in Salmonella typhimurium OECD TG 471	Negative	Key study Propane	Kirwin CJ and Thomas WC (1980)
Vivo test Micronucleus test RAT Inhalation OECD Guideline 474	Negative	Key study LPG	Huntingdon Life Sciences (HLS) (2009b)

f) Carcinogenicity

No evidence of carcinogenicity for most of LPG components. Moreover, the product contains benzene, and 1,3-butadiene in C <0.1%, therefore, it is not classified as a carcinogen according to the regulations on dangerous substances.

g) Reproductive toxicity

Reproductive toxicity:

Hereinafter, a synthesis of the most representative studies is presented. Most studies have shown no consistent evidence of toxicity to fertility, therefore the product is not classified as toxic for reproduction according to the regulation on dangerous substances.

Method	Results	Comments	Source
Vivo study RAT Inhalation exposure 13 weeks, 6 h/day, 5 days/week OECD Guideline 413 EPA OPPTS 870.3465	NOAEC: 10,000 ppm (M/F) No effect on the menstruation, spermatogenesis, sperm mobility and count.	Key study LPG	Huntingdon Life Sciences (HLS) (2009b)

Pre-natal developmental toxicity/teratogenicity:

Hereinafter, a synthesis of the most representative studies is presented. Most studies have shown no consistent evidence of toxicity to pre-natal development/teratogenicity for the main components of LPG. Moreover, the product does not contain carbon dioxide in concentration higher than 0.2%, however, it is not classified as toxic for the reproduction according to the regulation on dangerous substances.

Method	Results	Comments	Source
Vivo study RAT Inhalation exposure M: 2 weeks before mating 28 days (minimum) after mating F: 2 weeks before mating 0-19 days of gestation 6 h/day, 5 days a week. Concentrations: 0, 1,600, 5,000 and 16,000 ppm OECD Guideline 422 EPA OPPTS 870.3650	NOAEC (maternal toxicity): 16,000 ppm (no effect of systemic toxicity at the highest tested concentration) NOAEC (maternal toxicity): 19,678 mg/m ³ air NOAEC (pre-natal development toxicity): 16,000 ppm (no effect on pre-natal development) NOAEC (pre-natal development toxicity): 19,678 mg/m ³ air	Key study Ethane (read- across)	Huntingdon Life Sciences (HLS) (2010a)

h) Specific target organ toxicity (STOT) - individual exposure:

No information available

i) Specific target organ toxicity (STOT) - repeated exposure:

Oral:

In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations.

Cutaneous:

In compliance with point 2 of annex XI to REACH regulation, such study should not be performed as the petroleum gas is flammable at ambient temperature and able to form explosive mixtures in contact with air. A high risk of fire and explosion will be associated with any test with significant concentrations.

Inhalation:

Propane: In a 6-week study conducted on male and female rats, no neurological, haematological or clinical effects were observed. At doses of 12,000 ppm, male animals have shown a 25% weight decrease during the first week of exposure. The lowest concentration at which adverse effects were observed (LOAEC) in this study is 12,000 ppm (equivalent to 21,641 mg/m³).

j) Aspiration hazard:

N/A.

Other information

No further information available

SECTION 12: Ecological information

No data available measured for the endpoints of the aquatic toxicity and no PNEC(S) have been derived for fresh water, sea water, sediments and soil. In compliance with column 2 of REACH, annexes VII and VIII, acute toxicity tests should not be performed if there are mitigating factors indicating that aquatic toxicity is improbable. This product is composed of gaseous substances at standard temperature and pressure, which are mainly released into the atmosphere rather than in water, sediments and soil.

12.1 Toxicity

Hereinafter, a synthesis of the most representative studies is presented.

Endpoint	Results	Comments
Aquatic toxicity		
Invertebrates Daphnia Short term	LC50 48/h: 14.22 mg/l	Key study CAS 106-97-8 (Butane) USEPA OPP (2008)
Fish Short term	L50 96/h: 24.11 mg/l	Key study CAS 106-97-8 (Butane) QSAR EPA 2008

12.2 Persistence and degradability

Abiotic degradability

This product can contribute to the formation of ozone in the atmosphere near the surface. However, the photochemical ozone formation depends on a complex interaction of other air pollutants and environmental conditions.

Biotic degradability:

QSAR studies have been conducted with ethane, which has a 100% biodegradability within 16 days. Ethane is not a component of the petroleum gas, but its structure is representative of the stream, and a read-across is possible, therefore based on what has been stated above, the product is biodegradable.

12.3 Bioaccumulation potential

The log Pow for LPG is estimated within the range 1.09-2.8, however, the product is not bioaccumulative.

12.4 Mobility in soil

Koc absorption: the standard tests for this endpoint have not been applied to UVCB substances

12.5 Results of the PBT and vPvB assessment

The data show that the properties of the product do not meet the specific criteria detailed in Annex XIII or do not allow a direct comparison with all the criteria set out in Annex XIII, but, however it indicates that the product does not have such properties, so it is not considered a PBT/vPvB.

12.6 Other adverse effects

Not present.

SECTION 13: Disposal considerations

13.1 Waste treatment method

Disposal recommendations: Code(s) of the European

Waste Catalog (Decision 2001/118/EC): 16 05 04* (gas in pressure vessels (including halons), containing dangerous substances). The EWC-code indicated is only a general indication, based on the original composition of the product and on the intended use. The user has the final responsibility to choose the EWC-code more appropriate, on the basis of the actual use of the product and any alterations or contamination.

More information: the empty containers can contain combustible residues of product. Do not puncture, cutting, grinding, welding, soldering, burn or incinerate the containers or the empty drums not reclaimed. Dispose of empty containers not reclaimed in safety conditions, according to D. Lgs 152/2006 and s.m.i.

Ecology - Waste: such a product does not contain halogenated compounds

EURAL (ERC): 16 05 04 - Gas under pressure vessels (including halons), containing dangerous substances

SECTION 14: Transport information

14.1 UN number 2037

14.2 UN proper shipping name Receptacles, small, containing gas (gas cartridges), without a release device, nonrefillable

14.3 . Transport hazard class(es)

Class	2
Classification code	5F
Hazard labels	2.1



14.4 Packing group not applicable

14.5 Environmental hazards: Sea transport is subject to IMDG regulations, Division 2.1, recorded under UN 2037. The substance is not dangerous for the environment. Air transport is subject to ICAO / IATA regulations, division 2.1, recorded under UN 2037.

14.6 Special precautions for user

Before the transport of gas cylinders: make sure that the load is well insured.

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

Not relevant.

SECTION 15: Regulatory information

15.1 Legislative and regulatory provisions on health, safety and environment specific for the substance or mixture:

Legislative Decree no. 105 of 26th June 2015 "Implementation of directive 2012/18/EU concerning the control on major-accident hazards related to dangerous substances"

M.D. of 13th October 1994 "Technical fire prevention regulation for the design, construction, installation and operation of LPG deposits from fixed tanks of an overall capacity of over 5 m³ and/or from mobile recipients of an overall capacity over 5,000 kg", with subsequent amendments and additions. (Min. of Interior);
Decree of 14th May 2004 "Technical fire prevention regulation for the installation and operation of LPG deposits with an overall capacity not higher than 13 m³", as amended by the decree of 4th March 2014 (Min. of Interior)
Circular of 20th September 1956, no. 74 of the Ministry of Interior, for the following parts:
1) Second part of "Safety standards for the construction and operation of LPG tank deposits, up to 5,000 kg"
2) Third part of "Safety standards for the resale of LPG, up to 75 kg"
3) Fourth part "Safety standards for centralised LPG tank distribution systems, for civil uses, up to 2,000 kg"
Legislative Decree no. 78 of 12th June 2012, "Implementation of Directive 2010/35/EU, on transportable pressure equipment repealing the Directives 76/767/EEC, 84/525/EEC, 84/526/EEC, 84/527/EEC and 1999/36/EC."

15.2 Chemical safety assessment Has not been carried out any chemical safety assessment in accordance with the provisions of Article 2(7)a and Annex IV of the REACH Regulation, the substance is exempted from registration.

SECTION 16: Other information

The data is based on the present state of our knowledge, however, it does not represent any guarantee of the properties of the product and it does not establish a legally valid contractual relationship.

H220- Extremely flammable gas

H280- Contains gas under pressure; may explode if heated

P102 - Keep out of reach of children.

P210- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

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

P381- Eliminate all ignition sources if safe to do so.

P410+P403-Protect from sunlight. Store in a well-ventilated place.

The workers must be informed, trained and instructed according to their specific tasks, according to the relevant legal provisions. Hereinafter, we present the most important legal provisions and technical rules containing the related provisions.

M.D. 13th October 1994 (Min. of Interior), Title XIII, point 13.1 "Personnel"

Decree of 15th May 1996 (Min. of the Environment) "Technical safety procedures and regulations for the performance of pouring activities for (LPG) tanks and cisterns"

M.D. 10th March 1998 (Min. of Interior) "Obligation to form and train the employees from firefighting crews and for the management of emergencies for all activities subject to the fire prevention certificate"

Legislative Decree no. 105 of 26th June 2015 "Implementation of directive 2012/18/EU concerning the control on major-accident hazards related to dangerous substances" - Annex B - Annex 1 ADR 2017, Part 1,

- Chapter 1.3 "Training of persons involved in the carriage of dangerous goods"
- Chapter 1.4 "Obligations regarding the safety of operators"
- Chapter 1.10 "Provisions concerning safety"

Legislative Decree no. 81 of 9th April 2008, "Implementation of article 1 of law no. 123 of 3rd August 2007, concerning occupational health and safety".

Legend – Abbreviations and acronyms

Pursuant to Regulation 1272/2008 Article 31 and Regulation (UE) 2015/830 of the Commission of 28 May 2015, Regulation (UE) 2018/1881 of the Commission of 3 December 2018, Regulation (UE) 2018/2005 of the Commission of 18 DECEMBER 2018 amending Regulation (EC) n. 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). (Date of 1^o compilation January 2003; updated edition XIII -

ACGIH	American Conference of Governmental Industrial Hygienists (USA);
ADR	Agreement concerning the international carriage of dangerous goods by road;
CLP	(Classification, Labelling and packaging) Regulation EC 1272/2008, related to the classification, labelling and packaging of substances and mixtures;
D	Decree;
M.D.	Ministerial Decree;
L.D.	Legislative decree;
IATA	International Air Transport Association (Associaz. Internaz. del Trasporto Aereo)
ICAO	International Civil Aviation Organisation (Organizzaz. Internaz. dell'Aviazione Civile)
IMDG	International Maritime Dangerous Goods code (Codice del Trasporto Marittimo delle merci pericolose)
RID	Agreement concerning the international carriage of dangerous goods by rail
TLV-TWA	Average weighted concentration in the time for a working day of 8 hours and 40 hours per week (chronic exposure).

Data sources used:

Handbook butane-propane gases - Denny, Luxon and Hall (4th ed. 1962)
Engineering Data Book – Gas Processors Suppliers Association (fifth revision, 1981)
Technical Data Book – A.P.I. (2nd edition, 1970)
Encyclopédie des gaz – ELSEVIER (1976)
ECB - ESIS - European Chemicals Substances Information System
ACGIH "Threshold Limit Value (TLV's) for Chemical Substances and Physical Agents & Biological Exposure Indices (BEI's), editions 2013 and 2014.

Contact: Technical Office

Abbreviations and acronyms:

RID: Regulation concerning the international carriage of dangerous goods by rail;
ICAO: International Civil Aviation Organisation
ADR: Agreement concerning the international carriage of dangerous goods by road;
IMDG: International Maritime Dangerous Goods Code;
IATA: International Air Transport Association;
GHS: Globally Harmonised System of Classification and Labelling of Chemicals;
VOC: Volatile organic compounds;
LC50: Median lethal concentration (Concentration of substance detected as lethal for 50% of organisms used in a toxicity test for certain exposure time);
LD50: Median lethal dose (dose of a substance, administered only once, able to kill 50% (i.e. half) of a sampling population of animals).

The information from this sheet refer only to the identified product and may not be of relevance if the product is used in combination with other products or for other uses than the intended ones.

The information from this Sheet are based on our knowledge available on 1st January 2019.

Downstream users and the distributors to whom this Sheet is intended should have at disposal their own material safety data sheet based on the relevant scenarios and information.