

# SAFETY DATA SHEET

Issued on: 09.01.2013

## 1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND COMPANY/ORGANIZATION

### 1.1 Product identification

Substance name	Natural gas, dried
Synonyms	Natural gas
CAS Number	68410-63-9
EC Number	270-085-9
Index Number	n.a (substance not listed in Annex VI of EC Regulation 1272/2008)
Registration Number	n.a. (exempt from mandatory registration, pursuant to Article 2, Section 7, Letter B) of EC Regulation 1907/2006)
Chemical formula	n.a. (the substance is a UVCB complex)
Molecular weight	n.a. (the substance is a UVCB complex)

### 1.2 Recommended uses of the substance or mixture and not recommended uses

*COMMON USES: Fuel for domestic and industrial use, fuel for engines with internal combustion.*

*No other uses are recommended with the exception of those on which an assessment has been performed indicating that the related risks are controlled.*

### 1.3 Information on the supplier of the safety data sheet:

Company name	eni gas & power nv/sa
Address	Guimardstraat 1A, rue Guimard
City / Country	1040 BRUSSELS, BELGIUM
Telephone	+32 (0)2 557 30 01
Fax	+32 (0)2 557 31 12
Competent technician e-mail	<a href="mailto:Guy.Verkest@eni.com">Guy.Verkest@eni.com</a>
Website	<a href="http://www.eni.com/be">www.eni.com/be</a>

### 1.4 Emergency telephone number:

Belgian Poison Center (24h): +32 (0)70 245 245

French Poison Center (Paris) (24h): +33 (0)1 40 05 48 48

Dutch National Poisons Information Center (NVIC) (24u): +31 (0)30 274 88 88

(only accessible for the doctor in case of accidental poisoning)

German Poison Center (24h): +49 (0)30 1 92 40

Italian Poison Center (Pavia) (24h): +39 0382 24444

U.K. Poison Center (24h): +44 844 892 0111

European emergency number (24h): 112

## 2. HAZARD IDENTIFICATION

### *Physical - chemical hazards*

The gas is flammable and forms flammable and explosive mixtures when it comes in contact with air. At ambient temperature methane is lighter than air and can build up in closed environments, sheds or under covers, which lack an opening. The density of low temperature gas can exceed that of air with the risk of accumulation at ground level and danger of fire at a distance. The brusque expansion of gas under pressure can cause a considerable temperature drop with the danger of cold burns.

### *Health hazards*

Prolonged exposure to high concentrations of gas can cause headache, indisposition and breathing difficulties. The accumulation of gas in closed environments can cause the risk of asphyxia due to lack of oxygen (maintain the oxygen level > 18% vol.).

### *Environmental hazards*

None (see section 7.1.1.3)

### 2.1 Classification of the substance or mixture

#### ***Classification as per Regulation (EC) 1272/2008 (CLP)***

HAZARDOUS SUBSTANCE

HAZARD CLASS AND CATEGORY CODES: FLAM. GAS. 1, PRESS. GAS

HAZARD INDICATIONS: H220, H280

#### ***Classification as per Directive 67/548/EEC***

HAZARDOUS SUBSTANCE

CLASSIFICATION: Highly flammable

RISK PHRASES: R12

### 2.2 Elements in the label



Warning: **HAZARD**

#### **Hazard indications:**

**H220 Extremely flammable gas**

**H280 Contains gas under pressure: may explode if heated**

#### **Safety phrases:**

##### *Prevention*

P210 Keep away from heat/sparks/open flames/hot surfaces – do not smoke.

##### *Reaction*

P377 Leaking gas fire - Do not extinguish unless leak can be stopped safely.

P381 Eliminate all ignition sources if safe to do so.

##### *Storage*

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

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### 2.3 Other hazards

Asphyxiating gas. The accumulation of gas in a closed environment can cause asphyxia due to lack of oxygen.  
Not classifiable as PBT or vPvB according to criteria established in Annex XIII of EC Regulation 1907/2006.

## 3. COMPOSITION / INFORMATION ON THE INGREDIENTS

### 3.1 Substances

Natural gas, dried: substance not listed in Annex VI, Part 3 of EC Regulation 1272/2008

CAS No. 68410-63-9

EC No. 270-085-9

### 3.2 Mixtures

Not applicable

### 3.3 Other information

Natural gas, dried, complex combination of hydrocarbons separated from natural gas. It consists of saturated aliphatic hydrocarbons having carbon numbers in the range of C1 through C4, predominantly methane and ethane.

Type of substance: the substance is a UVCB complex. The composition may vary depending on the characteristics of the original gas. The principal component is methane (>80% vol.), other components are ethane, propane, butane and isobutane.

Percentage: 100% (m/m)

## 4. FIRST AID MEASURES

### 4.1 Description of the first aid measures

**Eye contact** in case of irritation caused by prolonged exposure, irrigate with abundant warm water and seek specialist advice, if required.

**Skin contact** in case of cold burns resulting from contact with a rapidly expanding gas jet, cover the area with gauze or clean cloth.  
Immediately seek medical advice or transport the injured person to the hospital.

**Ingestion** not applicable.

**Inhalation** in case of exposure to high concentrations, move the injured person to a non-polluted atmosphere observing appropriate safety procedures, and immediately seek medical advice. If breathing is irregular or stops while awaiting a physician, practice artificial respiration and a cardiac massage in case of cardiac arrest. Administer oxygen, if necessary.

### 4.2 Primary symptoms and effects - both acute and delayed

Effects of contact with eyes: reddening, pain.

Effects of inhalation: generally headache, indisposition and breathing difficulty. Detailed list of primary symptoms caused by inhalation of high concentrations of methane:

- a) exposure to high levels of methane gas impoverishes oxygen levels in the body, causing breathing difficulty and choking;

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- b) low oxygen levels make exposure to methane gas cause cognitive disorders; the person is distracted, suffers from memory loss and has poor judgement; said symptoms are aggravated as exposure to this gas increases;
- c) when oxygen levels drop, the body attempts to compensate for the deficiency by using the oxygen contained in body fluids; this basically causes dehydration;
- d) even nausea and vomiting are symptoms of methane gas poisoning; a person might even collapse due to exposure to methane gas;
- e) cardiac palpitations are another symptom of methane gas exposure; they cause a feeling of discomfort, and the heart beats rapidly, abnormally and out of sequence;
- f) exposure to methane gas also causes dizziness and blurred vision; this symptom diminishes when the person moves away from the area presenting a high concentration of gas;
- g) exposure to methane gas can also reduce motor coordination;
- h) in rare cases exposure to methane gas has produced influenza-like symptoms, mental derangement and lethargy.

#### 4.3 Indication that prompt medical attention and special treatments are needed

- Prolonged exposure to high concentrations and symptoms of asphyxia.
- Cold burns in case of contact with a rapidly expanding gas jet.

## 5. FIRE PREVENTION MEASURES

### 5.1 Extinguishing media

- Suitable extinguishing media: carbon dioxide, chemical powder, water (sprayed water).
- Unsuitable extinguishing media: the use of a full jet of water is only allowed to cool neighbouring surfaces that are exposed to heat.

### 5.2 Special hazards derived from the substance or mixture

In case of combustion, fumes can contain toxic substances, such as:

carbon monoxide (CO) – a highly toxic gas when inhaled.

### 5.3 Recommendations for fire-fighting personnel

- Fire-fighting personnel must have the following basic equipment: self-contained breathing apparatus, helmet with face screen, fireproof gloves, fireproof jacket.
- Do not try to extinguish the fire until the release of gas has been stopped or immediate interception is certain.
- If possible, cool any surfaces that are exposed to the fire with a full jet of water.
- If possible, reduce the emission of fumes by spraying a jet of water.

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, personal protection equipment and emergency procedures

#### 6.1.1 For those who do not intervene directly

Small leaks

- Keep away from the area of the leak, prohibit access to persons and vehicles, remove or deactivate any sources of ignition; if the leak has occurred in a closed space, arrange for adequate ventilation, if possible.

Considerable leaks

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- (If arranged) follow the dedicated corporate emergency plan.
- If there is no emergency plan:
  - call the Fire Brigade;
  - go to a safe place and wait for rescue;
  - if required, notify relevant authorities according to all applicable regulations;
  - inform residents based in downwind areas.

### 6.1.2 For those who intervene directly

#### Small leaks

- Normal antistatic working clothes are usually adequate.
- Check the direction of the wind and stay as upstream as possible from the area of the leak.
- Since natural gas is lighter than air, it disperses in the atmosphere; depending on this, check that all potential ignition sources have been removed and neutralized.
- Stop or contain leak at the source, if safe to do so.
- Only use tools made of spark-proof material.

#### Considerable leaks

- The intervention must only be performed by appropriately trained personnel who must have the following equipment: sensors to detect flammable gases or fumes; full body suit of chemically resistant and antistatic material; antistatic non-skid safety shoes or boots; goggles or face shield, if contact with eyes is possible or anticipated. If the situation cannot be completely assessed or if an oxygen deficiency is possible, only SCBAs should be used.
- Stop or contain leak at the source, if safe to do so.

## 6.2 Environmental precautions

The substance has no effects on the environment. If released, since it is lighter than air, it will naturally disperse in the atmosphere. In case of direct release into water (sea, lakes, etc.), there is no predictable environmental damage for the ecosystem involved, risk of the substance rising to the surface with subsequent dispersion in the atmosphere and potential fire or explosion if an ignition source is present.

## 6.3 Methods and materials for containment and cleaning

### 6.3.1. Containment

In case of release, there is no containment system for the substance. Try to intervene upstream by stopping the supply.

### 6.3.2 Cleaning

If released into closed environments, encourage dispersion of the substance into the atmosphere by opening windows or similar items that might be present.

## 6.4 Reference to other sections

For more details on health hazards and for the environment, see sections 8 and 12.

## 6.5 Other information

None.

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## 7. HANDLING AND STORAGE

The substance is handled and transported through closed systems, such as pipes and containers.

### 7.1 Precautions for safe handling

#### 7.1.1 Protective measures

##### 7.1.1.1 Recommendations for containment and prevention of fires and of the formation of flammable and/or explosive mixtures

Direct use

- It is prohibited to use the substance when there are potential sources of ignition, such as free flames, sparks and high temperature surfaces. Keep all heat sources at a distance.

Container filling/emptying operations

- To minimise the release of fumes into the work environment, use a closed cycle with a fume recovery system.
- Only use equipment that is approved for use with flammable gases.
- Pressurized vessels and, in a broad sense, all connection systems involved must have a grounding system with clamps that have points of contact in unsheathed metal.
- For large scale operations, consider installing automatic leakage and fire detection systems along with automatic fire-extinguishing systems. Use the least possible quantities in well ventilated spaces that are separated from storage areas. Contaminated products must not be reintroduced into the original containers. Avoid damaging containers by impact or other.

Maintenance activities

- Do not perform welding, cutting, tinning, drilling or other hot processing operations on tanks, containers or pipes before they have been purged of fluids and/or fumes.
- In areas that are intended for storage or substance handling, hard material processing (cutting asphalt or cement, grinding, etc.) that may generate sparks must always be preceded by abundant irrigation of the material with water.
- Keep equipment that is suitable to face emergencies, if any, such as a fire, product leakage or escape, at your disposal when performing any activity.

Empty uncleaned containers

- Potential risk of fire/explosion of the residue contained in them. Handle them with the same precautions adopted for full containers.

##### 7.1.1.2 Recommendations to prevent the use of incompatible mixtures or substances

- Do not use with incompatible materials, such as strong oxidizers (peroxides, nitric acid and perchlorates) as this could significantly increase the risk of explosion.
- No combustible material or other flammable liquids/gases must be stored in areas where the product is used.

##### 7.1.1.3 Recommendations to prevent release of the substance into the environment

- Release, if any, of the substance into the environment must be avoided considering that methane contained in natural gas has a greenhouse effect.

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### 7.1.2 Indications regarding hygiene in the workplace

- Do not eat, drink or smoke in workplaces.
- Wash hands after use.
- Remove contaminated garments and protection equipment before accessing eating areas.

### 7.2 Conditions for safe storage, including any incompatibilities

- Storage area layout, tank design, equipment and operating procedures must comply with the relevant European, national or local legislation.
- Cleaning, inspection and maintenance of the internal structure of storage tanks must be done only by properly equipped and qualified personnel, as defined by national, local or company regulations.
- Containers must be protected from sunlight and atmospheric agents, and stored in a cool, dry and well-ventilated place.
- Keep containers perfectly closed, protected from any damage and separated from those containing other dangerous products.
- The empty containers that have not been cleaned and are, hence, dangerous due to the presence of residue must be stored in separate areas.
- The storage area must be clearly identified, well lit with escape routes that are not obstructed by bulky objects or other and only accessible to authorized personnel.
- Do not store the product with incompatible materials, such as strong oxidizers.
- Before storage, check container integrity and the presence of appropriate labelling. If possible, maintain the product stored in the original containers, perform transfers only into containers made of material that is compatible with flammable gases.
- Schedule periodical inspections to check the physical integrity of containers; damaged ones must be eliminated or restored.
- Arrange a fire detection system and automatic fire-extinguishing system in storage areas.
- Storage areas must be as far as possible from processing/production ones, and from escape routes.
- There must be an appropriate quantity of fire-extinguishing substances that can be used with both fixed (fire hydrants, sprinklers) and mobile (fire extinguishers) fire-extinguishing devices.
- Means of transport authorized to access the storage area must be furnished with flame traps.

### 7.3 Specific final uses

Recommendations described in subsections 7.1 and 7.2 refer to the use of the substance for the uses stated in subsection 1.2, namely fuel for domestic and industrial use, fuel for internal combustion engines. Uses other than those indicated must be considered as uncontrolled and, anyhow, not the subject of this document.

## 8. EXPOSURE CONTROL/PERSONAL PROTECTION

### 8.1 Control parameters

#### 8.1a) National professional exposure limits corresponding to Community exposure limits

No professional exposure limits have been established by law for either natural gas, dried, or for the principal substances contained in it, namely methane, ethane, propane, butane and isobutane.

#### 8.1b) Professional exposure limits established by other organs that are not legally recognised

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Chemical identity	CAS No.	Limit measured and calculated during an 8 hour reference period	Limit measured and calculated during a 15 minute reference period	Source
Aliphatic hydrocarbons (alkanes C1-C4)		1000 ppm	"	ACGIH (2011)
Propane	74-98-6	1000 ppm ~ 1800 mg/m <sup>3</sup>	"	NIOSH (2006)
n-butane	106-97-8	800 ppm ~ 1,900 mg/m <sup>3</sup>	"	
iso-butane (values for 10-hour exposure)	75-28-5	800 ppm ~ 1,900 mg/m <sup>3</sup>	"	

#### 8.1c) National biological limits corresponding to Community exposure limits

No biological exposure limits have been established by law for either natural gas, dried, or for the principal substances contained in it, namely methane, ethane, propane, butane and isobutane.

#### 8.1d) Biological limits established by other organs that are not legally recognised

Biological exposure limits have not been proposed for either natural gas, dried, or for the principal substances contained in it, namely methane, ethane, propane, butane and isobutane.

### 8.1.2 Information on recommended exposure monitoring procedures

The choice of the most appropriate devices of those cited is discretionary and depends on the specific working condition to be monitored.

- UNI EN 482:1998 Workplace atmospheres. General requirements for the performance of procedures for the measurement of chemical agents
- UNI EN 689:1997 Workplace atmospheres. Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy.
- UNI EN 838:1998 Workplace atmospheres - Procedures for measuring gases and vapours using diffusive samplers - Requirements and test methods.
- UNI EN 1076:1999 Workplace atmospheres. Procedures for measuring gases and vapours using pumped samplers - Requirements and test methods.
- UNI EN 1231:1999 Workplace atmospheres. Short term detector tube measurement systems - Requirements and test methods.
- UNI EN 1232:1999 Workplace atmospheres. Pumps for personal sampling of chemical agents. Requirements and test methods.
- UNI EN 1540:2001 Workplace atmospheres. Terminology.
- UNI EN 12919:2001 Workplace atmospheres. Pumps for the sampling of chemical agents with a volume flow rate of over 5 L/min. Requirements and test methods.

### 8.1.3 Information on the formation of atmospheric pollutants, if any, after envisaged use

The following are reported among environmental pollutants that are generated by the envisaged use as domestic/industrial fuel and as engine fuel for motors:

- carbon monoxide

### 8.1.4 Information resulting from DNEL(S) and PNEC(S) chemical safety reports

Data not available.

Substance exempted from the application of provisions in Titles II, V and VI of EC Regulation 1907/2006, which establishes mandatory registration and draft of a report on the assessment of chemical safety for envisaged uses.



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## 8.2 Exposure controls

### 8.2.1 Suitable technical checks

Minimise exposure to gas. Before entering areas with transportation pipes or equipment, and before commencing any operation in a closed space, check adequate cleaning, check the atmosphere and check oxygen content and flammability.

### 8.2.2 Personal protection measures

#### a) Eye and face protection

In case of a risk of contact with eyes/face, full head and face protection (protective shield and/or safety goggles) should be used (EN 166)].

#### b) Skin protection

##### i) hand protection

In case of risk of contact with the skin, use felt-lined gloves. Use gloves under the conditions and respecting the limits set by the manufacturer. If necessary, refer to standard UNI EN 374. Gloves must be periodically inspected and changed in case of wear, perforation or contamination. If contact with a very low temperature substance is either possible or anticipated due to rapid expansion, gloves should be thermally insulated to prevent cold burns.

##### ii) other

When handling the product, use long-sleeved antistatic working clothes, depending on the risks related with the classification of working areas. If necessary, refer to standards UNI EN 465-466-467. In case of contamination of clothes, replace them and clean them immediately.

#### c) Respiratory protection

In case of risk of direct exposure:

use approved respiratory protection devices: full face masks with cartridge/filter type AX (brown for inorganic vapours with low boiling point). If exposure levels cannot be determined or estimated with adequate confidence, or an oxygen deficiency is possible, only SCBAs should be used (EN 529).

#### d) Thermal hazards

If operative conditions make the release of rapidly expanding gas theoretically possible with subsequent cooling of the same, or if the substance is stored as a refrigerated liquefied gas, use insulation gloves to avoid cold burns.

### 8.2.3 Environmental exposure controls

Considering the fact that the substance presents no risks for the environment, no specific measures are indicated.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on the essential physical and chemical properties

PARAMETER	VALUE MEASURED - DESCRIPTION	METHOD - NOTES
a) appearance	gas	
b) odour	odourless	For civil uses in compliance with provisions in Law No. 1083/71 the gas in distribution networks is odorized in compliance with Regulation UNI-CIG 7133/94
c) olfactory threshold	n.a.	
d) pH	n.a.	
e) melting/freezing point	-182.5°C (at 1013.25 hPa)	Source IUCLID DATASET FOR METHANE The substance is a UVCB complex; this data may vary depending on the composition. The indicated value refers to methane.
f) initial boiling point and boiling range	from -185°C to -159°C (at 1013.0 hPa)	Source IUCLID DATASET FOR NATURAL GAS, DRIED The substance is a UVCB complex; this data may vary depending on the composition.
g) flash point	n.a.	
h) evaporation rate	n.a.	
i) flammability (solids and gases)	highly flammable	
j) upper/lower flammability or explosive limits	(UEL) 17.5 (%Vol) (LEL) 3.93 (%Vol)	
k) vapour pressure	87-1013.25 (hPa) at T=-185°C	Value calculated through "Berliner Prozess Berechnungs Paket, TU Berlin,1988"
l) vapour density	0.7 – 1 kg/m <sup>3</sup> at 0°C	Value calculated through "Berliner Prozess Berechnungs Paket, TU Berlin,1988"
m) relative density	0.55 - 0.77 (air =1)	Value calculated through "Berliner Prozess Berechnungs Paket, TU Berlin,1988"
n) solubility/solubilities	scarcely soluble <input checked="" type="checkbox"/> 33.8 mL/L at 20°C at 1013hPa (ref. pure methane). <input checked="" type="checkbox"/> 33.8 – 85.6 mL/L at 20°C (ref. natural gas, dried)	<input checked="" type="checkbox"/> No reference to the method used. In saturated condition pH = 7 <input checked="" type="checkbox"/> Value calculated applying Henry's Law to the hydrocarbon mixture that forms the natural gas
o) partition coefficient (n-octanol/water)	1.103 (Methane)	Value calculated through CLOGP3 - Source IUCLID DATASET FOR METHANE
p) self-ignition temperature	575-640(°C) (Ref. natural gas, dried)	Value calculated based on the variable composition of natural gas.
q) decomposition temperature	n.a.	
r) viscosity	n.a.	
s) explosive properties	n.a.	None of the chemical groups associated with the molecule have explosive properties (Ref. column 2 of REACH in Annex VII)
t) oxidizing properties	n.a.	The substance is highly flammable (Ref. column 2 of REACH in Annex VII)

Data reported have been collected from technical references (details are given below) for the substance identified with CAS Number 68410-63-9 (natural gas, dried).

Source: EUROPEAN COMMISSION – European Chemicals Bureau

Database: IUCLID

File title "DATASET FOR NATURAL GAS DRIED"

Date of creation: 19 February 2000

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## 9.2 Other information

There is no other important information available on the safe use of the substance, besides the details listed in subsection 9.1).

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

There is no other hazard related to reactivity, besides details reported in the following subsections.

### 10.2 Chemical stability

Stable in all ordinary circumstances and in normal conditions of use.

### 10.3 Possibility of dangerous reactions

Contact with strong oxidizers (peroxides, chromates, etc.) may cause a fire hazard.

### 10.4 Conditions to avoid

Store separately from oxidizing agents.

Keep away from heat/sparks/open flames/hot surfaces. Do not smoke.

Prevent the formation of electrostatic charges.

### 10.5 Incompatible materials

Strong oxidizers.

### 10.6 Hazardous decomposition products

Not applicable.

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Toxicological Information

Information reported in this section, unless specified otherwise, refers to UVCB complex identified as natural gas dried (CAS No. 68410-63-9).

#### 11.1a) Acute toxicity

#### Oral exposure - ingestion

The substance is gaseous at ambient temperature and pressure; therefore, considerations on oral toxicity are not deemed as significant.

No data can be found in literature on animal trials conducted to assess the consequences of ingestion of the substance. This route of exposure seems to be most unlikely.

#### Skin exposure – absorption through skin/eyes

Based on the only data available in the references (human trials), classification criteria have not been met.

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year	substance tested	Description	result	Source
1969	Natural gas with the following composition: 90% methane 4.63% ethane 3.91% propane 0.51% butane 0.47% pentane 0.08% other 0.4% CO <sub>2</sub>	4 persons exposed to an environment containing 25 vol. % of natural gas	no adverse effect was observed	IUCLID DATASET FOR NATURAL GAS DRIED

### Exposure by inhalation

Based on available data (see enclosed table with values reported in the references on toxicity tests performed or on observations of effects on humans) the classification criteria have not been met.

toxicity indicator	result	species	strain	sex	n° animals per sample	vehicle	dosage	year	GLP	substance tested
observation of effects	no adverse effect	rat	n.av.	n.av.	n.av.	none	exposure to atmosphere containing 8% in vol. of natural gas for 36 hours	1969	no data	natural gas
observation of effects	no adverse effect	rabbit	n.av.	n.av.	n.av.	none	exposure to an atmosphere containing methane	1974	no data	methane
EC50 (cardiac sensitization to adrenaline)	70000 ppm	dog	n.av.	n.av.	n.av.	none	exposure to atmosphere containing isobutane for 5 minutes	1982	no data	isobutane
observation of effects	no adverse effect	humans	n.av.	n.av.	n.av.	none	4 persons exposed for 2 hours to an atmosphere containing 25 vol. % of natural gas	1969	no data	natural gas
onset of polycythemia (normal reaction to oxygen deficiency)	250,000 – 300,000 ppm	monkey	n.av.	n.av.	n.av.	none	3 monkeys exposed for 744 hours to an atmosphere containing natural gas in a percentage between 25% and 30%	1969	no data	natural gas

### 11.1b) Corrosion/skin irritation

#### Corrosion

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

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Skin irritation

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

11.1c) Severe ocular lesions/severe ocular irritation

Irreversible effects on eyes/severe ocular lesions

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

Irreversible effects on eyes/severe ocular irritation

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

11.1d) Sensitization of respiratory tract and skin

Sensitization of respiratory tract

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

Sensitization of skin

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

11.1e) Germ cell mutagenicity

In vitro genetic toxicity

Based on data that can be found in the references (see table) regarding tests conducted for methane, propane, butane and isobutane, classification criteria for this hazard class have not been met.

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### Summary table of "in vitro" test results

type	control system	strain/s	metabolic activation	result	Source and (year)	GLP	substance tested
Genetic mutation test in bacteria	Ames test on Salmonella typhimurium	TA98 TA100 TA1535 TA1537 TA1538	with and without activation	negative	Kirwin CJ and Thomas WC (1980)	no data	Propane
Five strains of Salmonella typhimurium were exposed for six hours to variable concentrations of propane in air (5, 10, 20, 30, 40, and 50% vol/vol). 50% was the highest non toxic dose. There was no evidence of a significant increase in the rate of mutations, both with or without metabolic activation.							
Genetic mutation test in bacteria	Ames test on Salmonella typhimurium	TA98 TA100 TA1535 TA1537 TA1538	with and without activation	negative	Kirwin CJ and Thomas WC (1980)	no data	Butane
Five strains of Salmonella typhimurium were exposed for six hours to variable concentrations of butane in air (5, 10, 20, 30, 40, and 50% vol/vol). 50% was the highest non toxic dose. There was no evidence of a significant increase in the rate of mutations, both with or without metabolic activation.							
type	Ames test on Salmonella typhimurium	TA98 TA100 TA1535 TA1537 TA1538	with and without activation	negative	Kirwin CJ and Thomas WC (1980)	no data	Isobutane
Five strains of Salmonella typhimurium were exposed for six hours to variable concentrations of isobutane in air (5, 10, 20, 30, 40, and 50% vol/vol). 50% was the highest non toxic dose. There was no evidence of a significant increase in the rate of mutations, both with or without metabolic activation.							
Genetic mutation test in bacteria	Ames test on Salmonella typhimurium	TA98 TA100 TA1535 TA1537 TA1538	with and without activation	negative	National Toxicology Program (1993)	no data	Methane

### Genetic toxicology in vivo

No data available

#### 11.1f) Carcinogenicity

There is no evidence of carcinogenicity for the major components of natural gas dried. Based on the available information, classification criteria for this differentiation were not met.

#### 11.1g) Toxicity for reproduction

Hazardous effects on sexual function and fertility

There is no data available in the references. There is no evidence of toxicity on sexual function and fertility for the major components of natural gas dried.

Hazardous effects on the development of offspring

There is no data available in the references. There is no evidence of hazardous effects on the development of offspring for the major components of natural gas dried.

Effects on breast-feeding or through breast-feeding

There is no data available in the references. There is no evidence of hazardous effects on breast-feeding or through breast-feeding for the major components of natural gas dried.

#### 11.1.1h ) Specific target organ toxicity (STOT) - single exposure

There is no data available in the references.

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11.1i) Specific target organ toxicity (STOT) - repeated exposure

There are no specific studies available due to the high risk of fire and explosion that would be associated with any test conducted at considerable concentrations. Classification criteria for this differentiation were not met.

11.1j) Inhalation hazard

Not applicable.

11.1k) Additional information

No other information available.

## 12. ECOLOGICAL INFORMATION

Information reported in this section, unless specified otherwise, refers to UVCB complex identified as natural gas dried (CAS No. 68410-63-9).

### 12.1 Toxicity

*Acute hazard for the aquatic environment*

This product is formed by gaseous substances at standard temperature and pressure, which are principally partitioned in air rather than in water, sediments and soil. The following are the outcome of the principal studies performed that are reported in the references:

type	result	source
Acute toxicity test for invertebrates	LC50 48/hours: 69.43 mg/L	Key study CAS 74-82-8 (Methane) QSAR USEPA OPP (2008)
Acute toxicity test for algae	EC50 (96 h): 19.37 mg/L	Key study CAS 74-82-8 (Methane) QSAR
Acute toxicity test for fish	LC50 96/hours: 147.54 mg/L	Key study CAS 74-82-8 (Methane) QSAR, EPA 2008

### 12.2 Persistence and degradability

The principal results reported in the references regarding the potential degradation of the substance in the environment through processes, such as photolysis, hydrolysis, oxidation or other processes, are specified below.

Photodegradation

All components of natural gas dried are degraded by indirect photolysis (photochemical transformation mediated by a sensitizer)

The following table reports the degradation time for indirect photolysis (sensitizer -OH concentration -OH = 1,070,000 molecules/cm<sup>3</sup>) of the principal components of natural gas:

- methane: 36.8% after 11.3 years
- ethane: 36.8% after 83 days
- propane: 36.8% after 15 days
- iso-butane: 36.8% after 9.3 days
- n-butane: 36.8% after 8.6 days

Source iucid dataset for Natural Gas Dried (19 February 2000)

Stability in water

In environmental conditions the substances forming natural gas do not undergo hydrolysis in water.

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Rapid degradability of organic substances

Not applicable.

**12.3 Bioaccumulation potential**

The principal results reported in the references regarding the potential accumulation of the substance in the biota and its final passage into the food chain are specified below.

Partition coefficient of n-octanol in water

Log Pow (propane) = 2.3 (Source Database Pomona College)

Log Pow (n-butane) = 2.8 (Source Database Pomona College)

Log Pow (iso-butane) = 2.8 (Source Database Pomona College)

Log Pow (natural gas) ≤ 2.8 (value extrapolated from previous data)

Based on these data, the substance is not subject to bioaccumulation

Bioconcentration factor (BCF)

No data available for this parameter

**12.4 Mobility in the soil**

Data reported in the references on the mobility of the substance in the various environmental compartments are specified below.

The data presented refer to a mobility study conducted in various environmental compartments in 1981, in which distribution was calculated based on the Mackay Level I model, using parameters defined by Van der Zandt and Van Leeuwen in one of their publications. The substance is solely distributed in air

	air	water	soil	sediments	materials in suspension	biota
C1-C4	100.0	0.0	0.0	0.0	0.0	0.0

**12.5 Results of PBT and vPvB evaluation**

No report on chemical safety has been prescribed for this substance. Results of PBT and vPvB evaluation are not available.

Based on the data presented in the previous sections, the substance does not present such characteristics as to comply with requisites for PBT or vPvB substances.

**12.6 Other adverse effects**

If dispersed in the atmosphere, the methane component of natural gas has a greenhouse effect.

**13. DISPOSAL CONSIDERATIONS**

**13.1 Waste treatment methods**

Transport, handling and use of natural gas dried do not generate the production of waste or residue that require disposal.

Considering that the producer is responsible for assigning waste the most relevant CER code, based on the production cycle that generated said waste, in the framework of European codes for waste and based on the envisaged uses indicated in this document, some reference codes are listed below, such as:

for gases in pressurized containers out-of-spec

- Chapter 16 (waste not specified otherwise in the list) of the index:  
160504\* gases in pressurized containers (including halon), containing hazardous substances for empty containers



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that have not been cleaned;

- Chapter 15 (waste not specified otherwise in the list) of the index:

150111\* metal packages containing hazardous solid porous matrices (e.g. asbestos), including empty pressurized containers.

Disposal of containers: do not dispose of the containers in the environment. Dispose of them in compliance with current local standards.

Do not perforate, cut, grind, weld, braze, burn or incinerate empty containers or drums which have not been cleaned.

## 14. INFORMATION ON TRANSPORT

Transport is usually performed through pipes.

The information provided below applies to transport in containers:

### 14.1 UN Number

1971

### 14.2 UN shipping name

NATURAL GAS, COMPRESSED

### 14.3 Hazard classes related to transport:

land/rail transport (ADR/RID):

CLASS 2  
CLASSIFICATION CODE 1F  
LABEL: MOD 2.1  
HAZARD IDENTIFICATION NUMBER: 23  
TUNNEL RESTRICTION CODE: B/D



maritime transport (IMDG Code):

CLASS 2  
LABEL: MOD 2.1



air transport (IATA DGR)

CLASS 2  
LABEL: MOD 2.1



### 14.4 Packing Group

land/rail transport (ADR/RID):

NOT DEFINED

maritime transport (IMDG Code):

NOT DEFINED

air transport (IATA DGR)

NOT DEFINED

### 14.5 Environmental hazards

land/rail transport (ADR/RID):

NOT CLASSIFIED

maritime transport (IMDG Code):

NOT CLASSIFIED

air transport (IATA DGR)

NOT CLASSIFIED

### 14.6 Special precautions for users

THE SAME PRECAUTIONS THAT ARE DESCRIBED IN SECTION 7) REGARDING SAFE HANDLING APPLY TO PRODUCT LOADING/UNLOADING PHASES.  
PREVENTIVELY ENSURE CARGO COMPATIBILITY IN COMMON WITH OTHER GOODS, IF ANY, TO BE LOADED.

### 14.7 Bulk transport as per Annex II of the MARPOL Convention 73/78 and IBC code

NOT APPLICABLE

## 15. REGULATORY INFORMATION

### 15.1 Specific health safety and environment standards and legislation for the substance or mixture

REACH Regulation (EC Regulation No. 1907/2006 and subsequent amendments and integrations):

- substance exempt from provisions in Titles II, V and VI, pursuant to Article 2, Section 7, Letter b);
- substance subject to restrictions as per Title VIII (Annex XVII, Appendix 2, Point 28);
- substance not listed as a substance of very high concern (SVHC) submitted for authorization.

Other EU regulations and national transpositions:

- Seveso Category 8 Highly flammable (Note 3c) – (Dir. 96/82/EC and Dir 105/2003/EC);

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### 15.2 Chemical safety assessment

Pursuant to Article 2, Section 7, Letter b) of EC Regulation No. 1907/2006 and subsequent amendments and integrations, the substance is exempted from provisions in Titles II, V and VI of said regulation. Since Art.14 Title II of the cited Regulation establishes the mandatory need for a chemical safety assessment, the substance is exempted from said obligation.

## 16. OTHER INFORMATION

### 16.a) Information on the revision

This is a revision of the previous version V1 issued on June, 24 2011 due to the following modifications:

- Par. 2 Hazard Identification – Modified point *Physical - chemical hazards*;
- Par. 4.2 Primary symptoms and effects - both acute and delayed - *b) point*;
- Par. 9.1 Information on the essential physical and chemical properties – *p) point*.

### 16.b) Key to abbreviations or acronyms used:

ACGIH = American Conference of Governmental Industrial Hygienists  
 ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road  
 DNEL = Derived No-Effect Level  
 EC50 = Effective concentration 50% of the sample  
 IATA DGR = International Air Transport Association Dangerous Goods Regulations  
 IMDG Code= International Maritime Dangerous Goods Code  
 IUCLID: International Uniform Chemical Information Database  
 LC50 = Lethal Concentration, 50% of the sample  
 n.a. = not applicable  
 n. av. = not available  
 NIOSH = National Institute for Occupational Safety and Health  
 PBT = Persistent, bioaccumulative, toxic substance  
 PNEC = Predicted No Effect Concentration  
 RID = Regulations concerning the International Carriage of Dangerous Goods by Rail  
 STOT = Specific target organ toxicity  
 (STOT) RE = (Specific target organ toxicity) - repeated exposure  
 (STOT) SE = (Specific target organ toxicity) - single exposure  
 UVCB= Substances of unknown or variable composition, products of complex reactions or biological materials  
 vPvB = Very Persistent and Very Bioaccumulative

### 16.c) Main bibliography and sources of data

“iuclid dataset for gas natural, dried” -- European Commission -- European Chemicals Bureau -- 19 February 2000  
 “Threshold Values” -- Italian Journal of Occupational and Environmental Hygiene - year 2010.  
 “Pocket Guide to Chemical Hazards” -- Niosh -- 2010’

### 16.d) List of relevant R phrases

R12 Highly flammable

### 16.e) Indications for training

Provide workers who may be exposed to the substance with adequate training as outlined in this safety data sheet.