Product Name	GASES, PETROLEUM, C3 – C5 (RAFFINATE 2)

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

Product Identifier

GASES, PETROLEUM, C3 – C5 (RAFFINATE 2)

CAS No. 68477-83-8 EC No. 270-765-5 Index No. 649-067-00-3

Synonym (s)

Gases (petroleum), C3-5 olefinic-paraffinic alkylation feed.

REACH Registration Number

01-2119533031-58-0002

Relevant identified uses and uses advised against

Industrial and Professional:
Manufacture, distribution, formulation, fuel, functional fluid, intermediate. (Exposure Scenarios 1 – 6, 8 –12))
ES1 Manufacturing of Other Petroleum Gases
ES2 Distribution of Other Petroleum Gases
ES3 Formulation of Other Petroleum Gases
ES4 Use in blowing agents of Other Petroleum Gases (Industrial)
ES5 Use in fuels of Other Petroleum Gases (industrial)
ES6 Use in fuels of Other Petroleum Gases (Professional)
ES8 Use in functional fluids of Other Petroleum Gases (industrial)
ES9 Use in functional fluids of Other Petroleum Gases (professional)
ES10 Use in polymer production of Other Petroleum Gases (industrial)
ES11 Use in polymer processing of Other Petroleum Gases (industrial)
ES12 Use in polymer processing of Other Petroleum Gases (professional)
Consumer:
Fuel. (Exposure Scenario 7)
ES7 Use in fuels- Consumer
Avoid any use:
None reported.

Details of the supplier

ECOFUEL SPA
Via Maritano, 26
S. Donato Milanese Telephone: + 39 02 520 56147
ITALY

e-mail address

REACH@ecofuel.eni.it

Emergency Telephone number

+ 39 0382 24444

SECTION 2. HAZARDS IDENTIFICATION

Classification (EC 1272/2008)

2.2 — Flammable gases, Hazard Category 1
2.5 — Gases under pressure: Liquefied
3.6 — Carcinogenicity, Hazard Category 1B
3.5 — Germ cell mutagenicity, Hazard Category 1B

Classification (67/548/EEC)

EXTREMELY FLAMMABLE	R12
CARC. CAT.1	R45
MUTA. CAT. 2	R46

Label Elements:

Signal Word

DANGER

SECTION 2. HAZARDS IDENTIFICATION

Hazard Statements

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer.
H340	May cause genetic defects.

Precautionary Statements

P102	Keep out of reach of children.
P210	Keep away from heat/sparks/open flames/hot surfaces.... No smoking.
P202	Do not handle until all safety precautions have been read and understood.
P281	Use personal protective equipment as required.
P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	Eliminate all ignition sources if safe to do so.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P410+P403	Protect from sunlight. Store in a well-ventilated place.

Supplemental information Not applicable.

Other hazards Contains more than 0.1% 1,3-butadiene (see Section 8 for Occupational Exposure Limits)
Asphyxiant at high concentrations in enclosed or poorly ventilated areas.
Contact with liquid may result in burns and frostbite.
Not classified for PBT and vPvB, based on the assessment carried out according to Annex XIII of REACH regulation.

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical name	CAS No	EC No	REACH Reg No	Classification				Conc'n %
Petroleum gases, C3 – C5 (containing >0.1% 1,3-butadiene)	68477-83-8	270-765-5	01-2119533031-58-0002	Dgr	GHS02	H220	2.2/1	100
					GHS04	H280	2.5	
					GHS08	H350	3.6/1B	
						H340	3.5/1B	
				F+	R12			
				T	R45 Carc. Cat. 1			
					R46 Muta. Cat. 2			

Further information These hydrocarbon streams meet the regulatory definition of UVCB substances, with inherent variations in composition present due to differences in manufacturing history.
Key to abbreviations, hazard statements and risk phrases in Section 16

SECTION 4. FIRST AID MEASURES

Description of first aid measures Before intervention, isolate area from all potential sources of ignition including disconnecting electrical supply. Ensure adequate ventilation and check that a safe, breathable atmosphere is present before entry into confined spaces. If necessary, use approved positive pressure air supplied breathing apparatus with a full facepiece.
Take measures to avoid further contamination or contact and move contaminated patient(s) out of the dangerous area.

Inhalation If inhaled, provide fresh air, warmth and rest and SEEK MEDICAL ADVICE. If unconscious, place in the recovery position. If breathing is difficult, give oxygen.

Skin contact Clean areas of skin affected with soap and plenty of water. If necessary seek medical advice. If there are signs of frostbite, (blanching or redness of skin or burning or tingling sensation), do not rub, massage or compress the affected area.

Eye contact In case of contact with eyes, rinse immediately with plenty of water until irritation subsides. If there are signs of frostbite, pain, swelling, lachrimation or persistanr photophobia, seek medical advice.

SECTION 4. FIRST AID MEASURES

Ingestion	Not normally a route of exposure. Frostbite to the lips and mouth may occur if in contact with the liquid.
Most important symptoms and effects, both acute and delayed	Exposure to high concentrations of vapours may cause irritation to the eyes, nose and throat, nausea, dizziness and loss of consciousness.
Indication of any immediate medical attention and special treatment needed	Obtain immediate medical assistance in case of massive inhalation.

SECTION 5. FIRE FIGHTING MEASURES

General hazard	THE PRODUCT IS AN EXTREMELY FLAMMABLE GAS
Extinguishing media	To suit local surroundings (e.g. water spray, carbon dioxide, foam, chemical powder)
Extinguishing media not to be used	Full water jet
Special hazards arising from the substance or mixture	Decomposition products released in a fire, (e.g. oxides of carbon, unburned hydrocarbons), should be considered toxic if inhaled. Vapour is denser than air – flashback may be possible over considerable distances.
Advice for fire-fighters	Wear self-contained breathing apparatus and a chemical resistant suit. Cool endangered containers with water (to prevent container explosion). Avoid run-off water entering the drains (e.g. use barriers) - may cause explosion hazard in drains and may reignite.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Remove all sources of ignition - NO SMOKING! Adhere to personal protective measures and wear personal protective equipment, including self-contained breathing apparatus, unless the atmosphere is proved to be safe. Stop the spillage or leak if the operation does not pose risks. If not, evacuate area. Do not re-enter unless wearing breathing apparatus and chemical resistant suit. A combustible gas detector can be used to check for flammable gas or vapours. Beware of accumulation of extremely flammable vapour in low areas and confined spaces. Ventilate area well after a release.
Environmental precautions	Do not allow to get into waste water or waterways; if this occurs, inform the relevant water authority at once.
Methods and materials for containment and cleaning up	Ensure all equipment is non sparking or electrically bonded. Contain spillage – ventilate area and allow to evaporate. Dispose of wastes safely.
Reference to other sections	Section 8 – personal protective measures. Section 13 – disposal of waste.

SECTION 7. HANDLING AND STORAGE

Precautions for safe handling

Handle in accordance with good hygiene and safety practice.
Remove all sources of ignition - NO SMOKING! Take precautionary measures against static discharges, use bonding and/or grounding procedures.
Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation.
Use only in well ventilated areas. The vapour is heavier than air, beware of accumulation in pits and confined spaces.
Ensure safe systems of work or equivalent arrangements are in place to manage risks.
Regularly inspect, test and maintain all control measures.
Cylinders should transported in a secure position in a well ventilated vehicle or hand truck. Handle empty containers with care; vapour residue may be flammable.

Conditions for safe storage, including any incompatibilities

Ensure adequate ventilation of the storage area. Keep containers tightly closed, cool and dry.
Keep away from strong oxidising agents, chlorine, hydrogen chloride and hydrogen fluoride.
Store only in supplied cylinders or approved vessels. Cylinders which have been are opened must be carefully resealed and kept upright.

Specific end use(s)

Industrial and Professional: Consult Exposure Scenarios 1 – 12, as appropriate.
ES1 Manufacturing of Other Petroleum Gases
ES2 Distribution of Other Petroleum Gases
ES3 Formulation of Other Petroleum Gases
ES4 Use in blowing agents of Other Petroleum Gases (Industrial)
ES5 Use in fuels of Other Petroleum Gases (industrial)
ES6 Use in fuels of Other Petroleum Gases (Professional)
ES7 Use in fuels- Consumer
ES8 Use in functional fluids of Other Petroleum Gases (industrial)
ES9 Use in functional fluids of Other Petroleum Gases (professional)
ES10 Use in polymer production of Other Petroleum Gases (industrial)
ES11 Use in polymer processing of Other Petroleum Gases (industrial)
ES12 Use in polymer processing of Other Petroleum Gases (professional)

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Monitoring of the workplace should be considered in accordance with Community Exposure Limits or other data as indicated below.

LTEL (8 hour TWA):	10	ppm	22	mg/m^3	WEL data for buta-1,3-diene EH40 (2005)
STEL (15 min):	-	ppm	-	mg/m^3	WEL data for buta-1,3-diene EH40 (2005)
TLV (8 hour TWA):	2	ppm	-	mg/m^3	Data for 1,3-butadiene ACGIH 2009
LTEL (8 hour TWA):	-	ppm	2.21	mg/m^3	DNEL long term, inhalation carcinogenicity Data for buta-1,3-diene

Engineering controls

Provide local exhaust ventilation if enclosed system not available.
Take measures against the build up of electrostatic charges.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Personal protection	Observe normal standards for handling carcinogenic substances. Do not breathe vapour. Wash thoroughly after handling (shower if necessary). Store working clothes separately. Wear personal protective equipment appropriate to the task (see below).
Eye protection	Safety goggles.
Skin protection	PVC, nitrile rubber or neoprene gloves. When handling containers, use waterproof and felt-lined, thermally insulated gloves. Protective overalls.
Respiratory protection	Respirator or self-contained breathing apparatus (if ventilation is insufficient).
Other personal protection	Access to a combustible gas detector to check for flammable gas or vapours. Implementation of risk based health surveillance, if necessary.
Environmental exposure controls	Do not allow to get into waste water or waterways.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical form	Gas
Colour	Colourless
Odour	Odourless
Odour threshold	Not applicable
Molecular weight	Not applicable
Molecular formula	Not applicable
pH	Not applicable
Melting pt / range	Not available
Boiling pt / range	-42°C
Flash point	<-80°C
Relative Evaporation Rate (n-Butyl Acetate = 1)	Not applicable
General Flammability	EXTREMELY FLAMMABLE GAS
Flammability/explosive limits	Lower Explosive Limit: 1.6 %(v/v), Upper Explosive Limit: 9.3 %(v/v)
Vapour pressure	412 kPa @ 37.8°C (Reid vapour pressure)
Vapour Density	6.93
Relative Density	0.423 – 0.589
Solubility	Immiscible with water
Partition coefficient (log P or log K n-octanol / water)	1.09 – 2.8
Auto-ignition temperature	>325°C

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Decomposition temperature	Not available
Viscosity	Not applicable
Explosive properties	Not applicable, based on structure.
Oxidising properties	Not applicable, based on structure.
Other information	None reported

SECTION 10. STABILITY & REACTIVITY

Reactivity	Extremely flammable and volatile.
Chemical stability	Stable under normal conditions of handling and storage.
Possibility of hazardous reactions	None reported.
Conditions to avoid	High temperatures.
Incompatible materials	Strong oxidising agents, chlorine, hydrogen chloride and hydrogen fluoride.
Hazardous decomposition products	None reported.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

No specific acute toxicity data are available for this petroleum gas stream which is classed as Unknown, of Variable Composition, or of Biological Origin (UVCB). Acute toxicity and other health data are available for some components.
The presence of 1,3-butadiene in the stream at >0.1% provides the basis for the overall classification for carcinogenicity and mutagenicity.

Acute toxicity - oral

Study technically not feasible.

Acute toxicity - inhalation

LC50rat male/female inhalation (whole body)	> 800000 ppm/15min	Ref: Clark DG and Tinston DJ (1982)

Acute toxicity - dermal

Study technically not feasible.

Skin corrosion/irritation

There is no evidence that components of this petroleum gas stream are irritating to skin. Propane and butane are non-irritating to the skin, in humans.
Direct skin or mucous membrane contact with liquefied material can cause burns and frostbite due to the extreme cold of the liquid. (Cavender F (1994))

Serious eye damage/irritation

There is no evidence that components of this petroleum gas stream are irritating to eyes.
Slight reddening of the eyelids with some lachrymation has been observed after human exposure to propene. (Kahn MH and Riggs LK (1931))

Respiratory sensitisation

No studies have been conducted but there no indications that components of this petroleum gas stream are respiratory sensitisers.

Skin sensitisation

There are no data on skin sensitisation and no indications that components of this petroleum gas stream are skin sensitisers.

CMR effects

Carcinogenicity: data for buta-1,3-diene support classification of product as a human carcinogen.
Mutagenicity: data for buta-1,3-diene support classification of product as a suspected mutagen.
Reproductive toxicity: data conclusive, no effects detected.

SECTION 11. TOXICOLOGICAL INFORMATION

Single dose toxicity
Component gases (C1-C4 alkanes and propene) show low acute inhalation toxicity and are regarded as practically non-toxic for single exposures below their lower flammability limits.

Repeated dose toxicity
Components of this petroleum gas stream are flammable gases at room temperature and therefore dermal and oral exposure is unlikely. There is sufficient repeat-dose exposure information to indicate they have low sub-chronic inhalation toxicity.

Exposure - oral
Study technically not feasible.

Exposure - inhalation

Rat, male/female combined repeated dose and reproduction / developmental screening (inhalation) (whole body)	NOAEC (overall systemic toxicity): 4000 ppm	OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)	Data for propane

Exposure - dermal
Study technically not feasible.

Aspiration hazard
None reported.

Adverse health effects and symptoms
Exposure to high concentrations of vapours may cause effects ranging from irritation to the eyes, nose and throat to nausea, dizziness and loss of consciousness.
Burns and frostbite may result from direct contact with liquefied material.
The gas mixture may act as a simple asphyxiant in closed or poorly ventilated areas.

Other information
Components of the Other Petroleum Gases category indicate members of the category show low sub-chronic and chronic toxicity and low potential for neurotoxicity.
Liquid product may cause burns and frostbite in contact with skin and eyes.

SECTION 12. ECOLOGICAL INFORMATION

Toxicity
The product is a gaseous hydrocarbon mixture and is extremely unlikely to reside in the aquatic compartment. It is not expected to undergo hydrolysis due to the lack of hydrolysable functional groups.
In the absence of measured data, estimated data have calculated using the QSAR model ECOSAR Program v1.00 in EPI Suite v4.00.

Fish, acute	LC_{50} fish	24.11 mg/l/96H	Estimated using ECOSAR Program v1.00.	Data for butane
	LC_{50} fish	27.98 mg/l/96H	Estimated using ECOSAR Program v1.00.	Data for iso-butane
Fish, chronic	Data not available.			
Invertbrates	LC_{50} Daphnid	14.22 mg/l/48H	Estimated using ECOSAR Program v1.00.	Data for butane
Algae	EC_{50} green algae	8.57 mg/l/72H	Estimated using ECOSAR Program v1.00.	Data for iso-butane
Soil organisms	Study technically not feasible.			
Micro-organisms	Study technically not feasible.			
Other organisms	Study technically not feasible.			

Persistence and degradability
Based on QSAR estimates for representative substances, this petroleum gas stream is considered to be readily biodegradable. Other Petroleum gases partition predominantly to the atmosphere where they degrade by indirect photolysis in air.

SECTION 12. ECOLOGICAL INFORMATION

In air	Phototransformation	Half-life (DT50): 1906 days (Calculated)	Ref: Atkinson, R. (1985)	
Aquatic	Degradation, calculated, QSAR	Readily biodegradable Degradation of test substance: 50% after 3.46 days	BioHCwin v1.01 in EPISuite 4 (2009).	Data for butane

Terrestrial Petroleum gas streams generally have a low potential for adsorption to soil and sediment.

Bioaccumulative potential Experimental data on bioaccumulation potential is not available for any component gases. However due to their low Kow (<3), the Other Petroleum gases are predicted to have a low potential for bioaccumulation and adsorption.

Mobility in soil Petroleum gas streams generally have a low potential for adsorption to soil

Results of PBT and vPvB assessment Not classified, based on the assessment carried out according to Annex XIII of REACH regulation.

Other adverse effects This product may contribute to ozone formation in the near surface atmosphere.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste treatment methods Dispose of waste in accordance with national (i.e. Hazardous Waste Regulations) and local authority regulations.
Handle empty containers with care; vapour residue may be flammable. Do not pressurise, cut, weld, braze, solder, drill, or grind containers.
Dispose of rinse water in accordance with local and national regulations.

SECTION 14. TRANSPORT INFORMATION

Land transport (ADR/RID)

UN number 1965

UN proper shipping name HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (GASES, PETROLEUM, C3 – C5)

Transport hazard class(es) 2.1

Packing group Not allocated.

Environmental hazards The product is not classified as environmentally hazardous.

Special provisions None reported.

Emergency action code 2YE

Hazard Identification Number 23

Marine transport (IMDG)

UN number 1965

UN proper shipping name HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (GASES, PETROLEUM, C3 – C5)

Transport hazard class(es) 2.1

Packing group Not allocated.

SECTION 14. TRANSPORT INFORMATION

Environmental hazards The product is not classified as environmentally hazardous or a marine pollutant.

Special provisions None reported.

Air transport (ICAO/IATA)

UN number 1965

UN proper shipping name HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S. (GASES, PETROLEUM, C3 – C5)

Transport hazard class(es) 2.1

Packing group Not allocated

Environmental hazards The product is not classified as environmentally hazardous.

Special provisions None reported.

SECTION 15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for product Classification, Labelling and Packaging Regulation (EC) 1272/2008
Control of major accident hazards involving dangerous substances 96/82/EC

Chemical Safety Assessment A Chemical Safety Assessment has been carried out.

SECTION 16. OTHER INFORMATION

Date of revision Not applicable

Reason for revision Not applicable

Sections revised Not applicable

Key to abbreviations and acronyms

67/548/EEC	EU Dangerous Substances Directive
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
ADR	European agreement governing the international carriage of dangerous goods by road
CAS No	Chemical Abstracts Service Registry Number
CLP	Classification, Labelling and Packaging Regulation (EC) 1272/2008
CMR	Carcinogen, Mutagen, Reprotoxin
DGEAC	Dangerous Goods Emergency Action Code List 2009
DNEL	Derived No Effect Level
EC_{50}	Half maximal effective concentration
EC No	European Inventory of Chemical Substances number
EH40 (2005)	HSE's list of Workplace Exposure Limits, as updated and amended
GHS	Globally Harmonised System for classification and labelling chemicals
GHS02	Pictogram - Flame
GHS04	Pictogram - Gas cylinder
GHS08	Pictogram – Health hazard
HSE	Health and Safety Executive (UK)

SECTION 16. OTHER INFORMATION

	kPa	kilopascal
	LC_{50}	Concentration of a material in air that kills 50% of the test subjects
	LTEL	Long Term Exposure Limit
	mg/m^3	milligrams per cubic metre
	PBT	Persistent, Bioaccumulative and Toxic
	ppm	Parts per million
	REACH	Registration, Evaluation and Authorisation of Chemicals Regulation (EC) 1907/2006
	STEL	Short Term Exposure Limit
	TLV	Threshold Limit Value
	TWA	Time Weighted Average
	vPvB	very Persistent, very Bioaccumulative
	WEL	Workplace Exposure Limit

Sources of data Generic Chemical Safety Report, ADR, DGEAC, EH40, ACGIH

Methods used to evaluate information used for classification Generic Chemical Safety Report

Key to Hazard Statements in Section 3

H220	Extremely flammable gas.
H280	Contains gas under pressure; may explode if heated.
H350	May cause cancer
H340	May cause genetic defects

Key to Risk Phrases in Section 3

R12	Extremely flammable
R45	May cause cancer
R46	May cause heritable genetic damage

This information is based on our present state of knowledge and is intended to describe our products from the point of view of the safety requirements. It should not be construed as guaranteeing specific properties.

Data sheet prepared by Environmental Science Limited. EI4594 Printing date 16/02/2011