

Trade name: R417A

Current version : 1.1.0, issued: 05.08.2025

Replaced version: 1.0.0, issued: 14.12.2023

Region:
GER

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name

R417A

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

Relevant identified uses of the substance or mixture

Industrial Use

Professional uses

Refrigerant

Uses advised against

Consumer use

1.3 Details of the supplier of the safety data sheet

Address

TEGA - Technische Gase und Gasetechnik GmbH

Werner-von-Siemens-Straße 18

97076 Würzburg

Telephone no. +49 931 2093-220

Fax no. +49 931 2093-180

e-mail kaeltmittel@tega.de

Advice on Safety Data Sheet

sdb_info@umco.de

1.4 Emergency telephone number

For medical advice (in German and English):

+49 (0)551 192 40 (Giftinformationszentrum Nord)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification in accordance with Regulation (EC) No 1272/2008 (CLP)

Press. Gas liq.; H280

Classification information

This product is assessed and classified using the methods and criteria below referred to in Article 9 of Regulation (EC) n° 1272/2008:

Physical hazards: determined through assessment data based on the methods or standards referred to in part 2 of Annex I to CLP

Health hazards and environmental hazards: determined through toxicological and ecotoxicological assessment data based on the methods or standards referred to in Part 3, 4 and 5 of Annex I to CLP.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP Regulation)

Hazard pictograms



GHS04

Signal word

Warning

Hazard statement(s)

H280

Contains gas under pressure; may explode if heated.

Precautionary statement(s)

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

Supplemental label elements

Contains fluorinated greenhouse gases.

2.3 Other hazards

This product does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher. Vapours are heavier than air and can cause asphyxiation by displacing the oxygen in the air. Misuse or intentional inhalation can be fatal, as a result of effects on the heart, without alarming symptoms. Rapid evaporation of product may produce frostbite. May displace oxygen and cause rapid asphyxiation.

PBT assessment

The components of this product are not considered to be a PBT.

vPvB assessment

The components of this product are not considered to be a vPvB.

SECTION 3: Composition/information on ingredients**3.1 Substances**

Not applicable. The product is not a substance.

3.2 Mixtures**Hazardous ingredients**

No	Substance name	Classification (EC) 1272/2008 (CLP)	Additional information	
	CAS / EC / Index / REACH no		Concentration	%
1	norflurane			
	811-97-2 212-377-0 - 01-2119459374-33	Press. Gas liq.; H280	>= 50,00 - < 70,00	Vol%
2	pentafluoroethane			
	354-33-6 206-557-8 - 01-2119485636-25	Press. Gas liq.; H280	>= 25,00 - < 50,00	Vol%
3	butane		pls. refer to footnote (1)	
	106-97-8 203-448-7 601-004-00-0 -	Flam. Gas 1A; H220 Press. Gas liq.; H280 STOT SE 3; H336	< 5,00	Vol%

Full text of H- and EUH-phrases, if not already mentioned in section 2.2: see section 16.

(1) Aberrant from/in addition to the classification set out in Annex VI, this substance is classified according to European Regulation (EC) No 1272/2008 (CLP), Article 4 (3), paragraph 2.

SECTION 4: First aid measures**4.1 Description of first aid measures****General information**

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove affected person from danger area, lay him down. Seek medical advice immediately.

After inhalation

Remove affected persons from dangerous area by observing suitable respiratory protection measures. Ensure supply of fresh air. Irregular breathing/no breathing: artificial respiration. Call a doctor immediately.

After skin contact

In case of contact with skin wash off immediately with soap and water. Rinse with much water in case of frostbites. Remove clothes only after unfreezing. Cover wounds with sterile dressing. Call a doctor immediately.

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After eye contact

Remove contact lenses. Rinse eye thoroughly under running water keeping eyelids wide open and protecting the unaffected eye (at least 10 to 15 minutes). Seek medical assistance.

After ingestion

Ingestion is not considered a possible route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms

May cause cardiac arrhythmia. Other symptoms, possibly related to incorrect use or excessive inhalation are:

Inducing cardiac reactions

Narcotic effects

Drowsiness

Dizziness

Confusion

Lack of coordination

Drowsiness

Unconsciousness

Effects

Gas reduces oxygen available for breathing. Contact with liquid or refrigerated gas can cause cold burns and frostbite.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Extinguishing measures to suit surroundings. recommended: alcohol resistant foam, CO₂, powders, water spray/mist

Unsuitable extinguishing media

High power water jet

5.2 Special hazards arising from the substance or mixture

In the event of fire, the following can be released: Hydrogen fluoride (HF); Carbon monoxide and carbon dioxide; Carbonyl fluoride; fluorine compounds; Liquefied gas: Spilled liquid can cause cold burns. This gas is heavier than air and may accumulate in low areas. The product is not flammable.

5.3 Advice for firefighters

Use self-contained breathing apparatus. Wear full protective suit. Containers close to fire should be transferred to a safe place. Cool closed containers exposed to fire with water. Pressure increase, bursting and explosion hazard during heating. Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel

Refer to protective measures listed in sections 7 and 8. Provide good room ventilation even at ground level (vapours are heavier than air). Remove persons to safety. Cordon and mark contaminated area. Use personal protective clothing. Do not breathe gas. Keep away from ignition sources. Avoid skin contact with leaking liquid (danger of frostbite!).

For emergency responders

No data available. Personal protective equipment (PPE) - see Section 8.

6.2 Environmental precautions

Avoid release in the environment. Suppress gases/vapours/mists with water spray jet.

6.3 Methods and material for containment and cleaning up

Ensure adequate ventilation. Dispose of absorbed material in accordance with the regulations.

6.4 Reference to other sections

Information regarding safe handling, see section 7. Information regarding personal protective measures, see section 8. Information regarding waste disposal, see section 13.

SECTION 7: Handling and storage**7.1 Precautions for safe handling****Advice on safe handling**

Only qualified and trained persons are authorised to handle. Provide good ventilation at the work area (local exhaust ventilation, if necessary). To be used only according to instructions for use. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose containers heat or sources of ignition. In case of accidental release: danger due to low temperature of the liquid product. The product should only be used in areas from which all naked lights and other sources of ignition have been excluded. Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C. Do not pierce or burn, even after use. Comply with the health and safety at work laws.

General protective and hygiene measures

Wash hands before breaks and after work. Do not inhale gases. Do not eat, drink or smoke during work time. Keep away from foodstuffs and beverages. Provide eye wash fountain in work area. Have emergency shower available.

Advice on protection against fire and explosion

The product is not combustible. Isolate from sources of heat, sparks and open flame. Take precautionary measures against electrostatic loading (earthing necessary during loading operations). Electrical equipment should be protected to the appropriate standard.

7.2 Conditions for safe storage, including any incompatibilities**Technical measures and storage conditions**

Keep container tightly closed in a cool, well-ventilated place, open and handle carefully. Protect from heat and direct sunlight.

Recommended storage temperature

Value < 50 °C

Storage stability

Value > 10 year(s)

Comments When stored properly, the storage life is unlimited.

Requirements for storage rooms and vessels

Containers which are opened must be carefully closed and kept upright to prevent leakage. Always keep in containers of same material as the original.

Incompatible products

Do not store together with: self-reactive substances and mixtures; organic peroxides; oxidizing agents; inflammatory substances; pyrophoric substances; self-heating substances and mixtures; Substances and mixtures which, in contact with water, emit flammable gases; explosives; toxic substances and mixtures

Storage Class according TRGS 510

2A Gases (except aerosol dispensers and lighters)

7.3 Specific end use(s)

No data available.

SECTION 8: Exposure controls/personal protection**8.1 Control parameters****Occupational exposure limit values**

No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
	TRGS 900		
	Norfluran		
	WEL long-term (8-hr TWA reference period)	4200	mg/m ³ 1000
	Ceiling Limit	8(II)	ml/m ³

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	Notes	Y
2	butane	106-97-8 203-448-7
	TRGS 900	
	Butan	
	WEL long-term (8-hr TWA reference period)	2400 mg/m ³ 1000 ml/m ³
	Ceiling Limit	4(II)

Biological limit values

No	Substance name
1	pentafluoroethane
	TRGS 903
	Fluorwasserstoff und anorganische Fluorverbindungen (Fluoride)
	parameter Fluorid
	Value 7,0 mg/g Kreatinin
	sample material U
	Sampling moment b
	TRGS 903
	Fluorwasserstoff und anorganische Fluorverbindungen (Fluoride)
	parameter Fluorid
	Value 4,0 mg/g Kreatinin
	sample material U
	Sampling moment d

DNEL, DMEL and PNEC values**DNEL values (worker)**

No	Substance name	CAS / EC no
	Route of exposure Exposure time Effect	Value
1	norflurane	811-97-2 212-377-0
	inhalative Long term (chronic) systemic	13936 mg/m ³
2	pentafluoroethane	354-33-6 206-557-8
	inhalative Long term (chronic) systemic	16444 mg/m ³

DNEL value (consumer)

No	Substance name	CAS / EC no
	Route of exposure Exposure time Effect	Value
1	norflurane	811-97-2 212-377-0
	inhalative Long term (chronic) systemic	2476 mg/m ³
2	pentafluoroethane	354-33-6 206-557-8
	inhalative Long term (chronic) systemic	1753 mg/m ³

PNEC values

No	Substance name	CAS / EC no
	ecological compartment Type	Value
1	norflurane	811-97-2 212-377-0
	water fresh water	0,1 mg/L
	water marine water	0,01 mg/L
	water fresh water sediment	0,75 mg/kg dry weight
	sewage treatment plant -	73 mg/L
2	pentafluoroethane	354-33-6 206-557-8
	water fresh water	0,1 mg/L

	water	fresh water sediment	0,6	mg/kg dry weight
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8.2 Exposure controls**Appropriate engineering controls**

Ensure adequate ventilation, local exhaust at the work station if necessary.

Personal protective equipment**Respiratory protection**

In case of insufficient ventilation or long-term effect use breathing apparatus. Danger of suffocation due to high concentrations in breathing air. Type organic gases and vapours of low boilers (AX)

Eye / face protection

Tightly fitting safety glasses (EN 166).

Hand protection

Low-temperature-resistant gloves (EN 511). Sufficient protection is given wearing suitable protective gloves checked according to i.e. EN 374, in the event of risk of skin contact with the product. Before use, the protective gloves should be tested in any case for its specific work-station suitability (i.e. mechanical resistance, product compatibility and antistatic properties). Adhere to the manufacturer's instructions and information relating to the use, storage, care and replacement of protective gloves. Protective gloves shall be replaced immediately when physically damaged or worn. Design operations thus to avoid permanent use of protective gloves.

Other

Chemical-resistant work clothes. Protective shoes.

Environmental exposure controls

Avoid release into sewage and environment.

SECTION 9: Physical and chemical properties**9.1 Information on basic physical and chemical properties**

State of aggregation	
gas	
Form	
liquified gas	
Colour	
colourless	
Odour	
ether-like	
pH value	
No data available	
Boiling point / boiling range	
Value	-39,1 °C
Source	supplier
Melting point/freezing point	
No data available	
Decomposition temperature	
No data available	
Flash point	
Not applicable	
Source	supplier
Ignition temperature	
No data available	
Oxidising properties	

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not fire-propagating			
Explosive properties			
not explosive			
Flammability			
The product is not combustible.			
Source		supplier	
Lower explosion limit			
none			
Method		ASTM E 681	
Source		supplier	
Upper explosion limit			
none			
Method		ASTM E 681	
Source		supplier	
Vapour pressure			
Value		9,835	hPa
Reference temperature		25	°C
Source		supplier	
Relative vapour density			
Value		3,8	
Source		supplier	
Comments		Air = 1	
Evaporation rate			
Not applicable			
Source		supplier	
Relative density			
No data available			
Density			
Value		1,2	g/cm³
Source		supplier	
Comments		as liquid	
Solubility			
No data available			
Partition coefficient n-octanol/water (log value)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
log Pow		1,06	
Reference temperature		25	°C
with reference to		pH 6.0	
Method		OECD 107	
Source		ECHA	
2	pentafluoroethane	354-33-6	206-557-8
log Pow		1,48	
Reference temperature		25	°C
with reference to		pH 6.34	
Method		OECD 107	
Source		ECHA	
Kinematic viscosity			
Not applicable			
Source		supplier	

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Comments	Not applicable
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9.2 Other information**Other information**

No data available.

SECTION 10: Stability and reactivity**10.1 Reactivity**

Dangerous reactions are not expected if the product is handled according to its intended use.

10.2 Chemical stability

Stable under recommended storage and handling conditions (See section 7).

10.3 Possibility of hazardous reactions

No hazardous reaction when handled and stored according to provisions. Reacts with strong oxidizing agents.

10.4 Conditions to avoid

Temperatures > 50°C. Heat, naked flames and other ignition sources.

10.5 Incompatible materials

Oxidizing agents

10.6 Hazardous decomposition products

None if stored, handled and transported properly. In case of fire: see section 5.

SECTION 11: Toxicological information**11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008****Acute oral toxicity**

No data available

Acute dermal toxicity

No data available

Acute inhalational toxicity

No	Substance name	CAS no.	EC no.
1	pentafluoroethane	354-33-6	206-557-8
LC50	>	800000	ppmV
Duration of exposure		4	h
State of aggregation	Gas		
Species	rat		
Method	OECD 403		
Source	ECHA		

Skin corrosion/irritation

No data available

Serious eye damage/irritation

No data available

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Type of examination	Genotoxicity in vitro		
Species	Salmonella typhimurium		
Method	OECD 471		
Source	ECHA		

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Evaluation/classification	Based on available data, the classification criteria are not met.		
Type of examination	Genotoxicity in vitro		
Species	Human Lymphocyte		
Method	OECD 473		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Route of exposure	inhalational		
Type of examination	Genotoxicity in vivo		
Species	mouse		
Method	EPA		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
2	pentafluoroethane	354-33-6	206-557-8
Type of examination	in vitro gene mutation study in bacteria		
Species	Salmonella typhimurium / Escherichia coli		
Method	OECD 471		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Type of examination	In vitro Mammalian Chromosomal Aberration Test		
Species	Chinese hamster Ovary (CHO)		
Method	OECD 473		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Route of exposure	inhalational		
Type of examination	Mammalian Erythrocyte Micronucleus Test, In vivo		
Species	mouse		
Method	OECD 474		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		

Reproduction toxicity			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	
Species		mouse	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	
2	pentafluoroethane	354-33-6	206-557-8
Route of exposure		inhalational	
Type of examination		Prenatal Developmental Toxicity Study	
Species		rabbit	
Method		OECD 414	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

Carcinogenicity			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	
Species		rat	
Source		ECHA	
Evaluation/classification		Based on available data, the classification criteria are not met.	

STOT - single exposure	
No data available	

STOT - repeated exposure			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Route of exposure		inhalational	

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Species	rat
Method	OECD 453
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
2	pentafluoroethane
	354-33-6
	206-557-8
Route of exposure	inhalational
Species	rat
Method	OECD 413
Source	ECHA
Evaluation/classification	Based on available data, the classification criteria are not met.
Aspiration hazard	
No data available	
Endocrine disrupting properties	
No data available	

11.2 Information on other hazards**Other information**

No data available.

SECTION 12: Ecological information**12.1 Toxicity**

Toxicity to fish (acute)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
LC50		450	mg/l
Duration of exposure		96	h
Species	Salmo gairdneri		
Method	EU C.1		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Toxicity to fish (chronic)			
No data available			
Toxicity to Daphnia (acute)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
EC50		980	mg/l
Duration of exposure		48	h
Species	Daphnia magna		
Method	EU C.2		
Source	ECHA		
Evaluation/classification	Based on available data, the classification criteria are not met.		
Toxicity to Daphnia (chronic)			
No data available			
Toxicity to algae (acute)			
No data available			
Toxicity to algae (chronic)			
No data available			
Bacteria toxicity			
No data available			

12.2 Persistence and degradability

Biodegradability

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No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
Type	aerobic biodegradation		
Value	appr.	3	%
Duration		28	d
Method	OECD 301 D		
Source	ECHA		
Evaluation	not readily biodegradable		
2	pentafluoroethane	354-33-6	206-557-8
Type	aerobic biodegradation		
Value	appr.	5	%
Duration		28	d
Method	Closed Bottle Test (OECD 301D)		
Source	ECHA		
Evaluation	not readily biodegradable		

12.3 Bioaccumulative potential

Partition coefficient n-octanol/water (log value)			
No	Substance name	CAS no.	EC no.
1	norflurane	811-97-2	212-377-0
log Pow		1,06	
Reference temperature		25	°C
with reference to	pH 6.0		
Method	OECD 107		
Source	ECHA		
2	pentafluoroethane	354-33-6	206-557-8
log Pow		1,48	
Reference temperature		25	°C
with reference to	pH 6.34		
Method	OECD 107		
Source	ECHA		

12.4 Mobility in soil

No data available.

12.5 Results of PBT and vPvB assessment

Results of PBT and vPvB assessment	
Product Name	
R417A	
PBT assessment	The components of this product are not considered to be a PBT.
vPvB assessment	The components of this product are not considered to be a vPvB.

12.6 Endocrine disrupting properties

No data available.

12.7 Other adverse effects

Other adverse effects
Global warming potential within 100 years: 2346

12.8 Other information

Other information
Do not discharge product unmonitored into the environment.

SECTION 13: Disposal considerations**13.1 Waste treatment methods****Product**

Allocation of a waste code number, according to the European Waste Catalogue, should be carried out in agreement with the regional waste disposal company.

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dispose of in accordance with local regulation.

Packaging

Take empty containers to an approved waste disposal facility for recovery or disposal.

Return empty pressure vessels to the supplier.

SECTION 14: Transport information**14.1 UN number or ID number**

ADR/RID/ADN UN1078

IMDG UN1078

ICAO-TI / IATA UN1078

14.2 UN proper shipping name

ADR/RID/ADN REFRIGERANT GAS, N.O.S.

Technical name norflurane

pentafluoroethane

IMDG

Technical name REFRIGERANT GAS, N.O.S.

norflurane

pentafluoroethane

ICAO-TI / IATA

Technical name Refrigerant gas, n.o.s.

norflurane

pentafluoroethane

14.3 Transport hazard class(es)

ADR/RID/ADN - Class 2

Label 2.2 RID: (+13)

Classification code 2A

Tunnel restriction code C/E

Hazard identification no. 20

IMDG - Class 2.2

Label 2.2

ICAO-TI / IATA - Class 2.2

Label 2.2

14.4 Packing group

ADR/RID/ADN -

IMDG -

ICAO-TI / IATA -

14.5 Environmental hazards

EmS F-C, S-V

14.6 Special precautions for user

To be transported always in closed, upright and safe containers. Make sure that persons handling these containers are aware of the rules of conduct in case of incident or spillage.

14.7 Maritime transport in bulk according to IMO instruments

Not relevant

SECTION 15: Regulatory information**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****EU regulations****Regulation (EC) No 1907/2006 (REACH) Annex XIV (List of substances subject to authorisation)**

According to the data available and/or specifications supplied by upstream suppliers, this product does not contain any substances considered as substances requiring authorisation as listed on Annex XIV of the REACH regulation (EC) 1907/2006.

REACH candidate list of substances of very high concern (SVHC) for authorisation

According to available data and the information provided by preliminary suppliers, the product does not contain substances that are considered substances meeting the criteria for inclusion in annex XIV (List of Substances Subject to Authorisation) as laid down in Article 57 and article 59 of REACH (EC) 1907/2006.

Regulation (EC) No 1907/2006 (REACH) Annex XVII: RESTRICTIONS ON THE MANUFACTURE, PLACING ON THE MARKET AND USE OF CERTAIN DANGEROUS SUBSTANCES, MIXTURES AND ARTICLES

According to the data available and/or specifications supplied by upstream suppliers, this product does not contain any substances subject to restriction as listed in Annex XVII of the REACH regulation (EC) 1907/2006.

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances

This product is not subject to Part 1 or 2 of Annex I.

Other regulations

REGULATION (EU) No 2024/573 on fluorinated greenhouse gases

Adhere to the national sanitary and occupational safety regulations when using this product.

National regulations**Water Hazard Class (Germany)**

Class

1

Source

Classification according to AwSV (Regulation on facilities for handling substances that are hazardous to water).

Other regulations

Take into account: TRGS 510 "Storage of hazardous substances in non-stationary containers"

15.2 Chemical safety assessment

A chemical safety assessment has not been carried out for this mixture.

SECTION 16: Other information**Sources of key data used to compile the data sheet:**

Regulation (EC) No 1907/2006 (REACH), 1272/2008 (CLP) as amended in each case.

Directives 2000/39/EC, 2006/15/EC, 2009/161/EU, (EU) 2017/164.

National Threshold Limit Values of the corresponding countries as amended in each case.

Transport regulations according to ADR, RID, IMDG, IATA as amended in each case.

The data sources used to determine physical, toxic and ecotoxic data, are indicated directly in the corresponding section.

Full text of the H- and EUH- phrases drawn up in sections 2 and 3 (provided not already drawn up in these sections)

H220 Extremely flammable gas.

H336 May cause drowsiness or dizziness.

Creation of the safety data sheet

UMCO GmbH

This information is based on our present knowledge and experience.

The safety data sheet describes products with a view to safety requirements.

It does not however, constitute a guarantee for any specific product properties and shall not establish a legally valid contractual relationship.

Alterations/supplements:

Alterations to the previous edition are marked in the left-hand margin.

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