



# SAFETY DATA SHEET

Version 2.0  
Revision Date 06.11.2017  
Supersedes Version: 1.22

SDS Number 300000000074  
Print Date 27.04.2018

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

1.1. Product identifier : Hydrogen

CAS No. : 1333-74-0

Chemical formula : H<sub>2</sub>

Synonyms : Hydrogen

REACH Registration Number: Listed in Annex IV / V REACH, exempted from registration.

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

Use of the Substance/Mixture : General Industrial

Restrictions on Use : No data available.

1.3. Details of the supplier of the safety data sheet : Dixons of Westerhope Limited  
Newbiggin Lane  
Westerhope  
Tyne & Wear  
NE5 1LX

Email Address – Technical Information : orders@dixonsofwestershope.co.uk

Telephone : +44 (0)191 271 4888

1.4. Emergency telephone number : +44 (0)191 271 4888  
Only available on weekdays, during the hours of 08:00 to 17:00.

## SECTION 2: Hazards identification

### 2.1. Classification of the substance or mixture

Flammable gases - Category 1 H220:Extremely flammable gas.

Gases under pressure - Compressed gas. H280:Contains gas under pressure; may explode if heated

### 2.2. Label elements

Hazard pictograms/symbols



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Signal Word: Danger

## Hazard Statements:

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

## Precautionary Statements:

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

Response : P377 :Leaking gas fire: Do not extinguish, unless leak can be stopped safely.  
P381 :Eliminate all ignition sources if safe to do so.

Storage : P403:Store in a well-ventilated place.

## 2.3. Other hazards

Burns with an invisible flame.  
Can ignite on contact with air.  
High pressure gas.  
Can cause rapid suffocation.  
Extremely flammable.  
May form explosive mixtures in air.  
Immediate fire and explosion hazard exists when mixed with air at concentrations exceeding the lower flammability limit (LFL).  
High concentrations that can cause rapid suffocation are within the flammable range and should not be entered.  
Avoid breathing gas.  
Self contained breathing apparatus (SCBA) may be required.

## Environmental Effects

Not harmful.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Components	EINECS / ELINCS Number	CAS Number	Concentration (Volume)
Hydrogen	215-605-7	1333-74-0	100 %

Components	Classification (CLP)	REACH Reg. #
Hydrogen	Flam. gas 1 ;H220 Press. Gas (Comp.) ;H280	*1

\*1:Listed in Annex IV / V REACH, exempted from registration.

\*2:Registration not required: Substance manufactured or imported < 1 t/y.

\*3:Registration deadline not expired.

Refer to section 16 for full text of each relevant hazard statement (H).

Concentration is nominal. For the exact product composition, please refer to technical specifications.

3.2. Mixtures : Not applicable.

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## SECTION 4: First aid measures

### 4.1. Description of first aid measures

- General advice : Remove victim to uncontaminated area wearing self-contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Eye contact : In case of direct contact with eyes, seek medical advice.
- Skin contact : Adverse effects not expected from this product. IF exposed or concerned: Get medical advice/attention.
- Ingestion : Ingestion is not considered a potential route of exposure.
- Inhalation : In case of shortness of breath, give oxygen. Move to fresh air. If breathing has stopped or is labored, give assisted respirations. Supplemental oxygen may be indicated. If the heart has stopped, trained personnel should begin cardiopulmonary resuscitation immediately. Seek medical advice.

### 4.2. Most important symptoms and effects, both acute and delayed

- Symptoms : Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of mobility/consciousness.

### 4.3. Indication of any immediate medical attention and special treatment needed

- Treatment : If exposed or concerned: Get medical attention/advice.

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## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

- Suitable extinguishing media : Use extinguishing media appropriate for surrounding fire.

- Extinguishing media which must not be used for safety reasons. : Carbon dioxide (CO<sub>2</sub>).

### 5.2. Special hazards arising from the substance or mixture

- : Ignitable by static electricity. Burns with an invisible flame. Gas is lighter than air and can accumulate in the upper sections of enclosed spaces. Upon exposure to intense heat or flame, cylinder will vent rapidly and or rupture violently. Keep containers and surroundings cool with water spray. Extinguish fire only if gas flow can be stopped. If possible, shut off the source of gas and allow the fire to burn itself out. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Move away from container and cool with water from a protected position. Keep adjacent cylinders cool by spraying with large amounts of water until fire burns itself out. If flames are accidentally extinguished, explosive re-ignition may occur; therefore, appropriate measures should be taken(e.g. total evacuation to protect persons from cylinder fragments and toxic fumes should a rupture occur).

### 5.3. Advice for firefighters

- : In confined space use self-contained breathing apparatus. Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask. Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

### Further information

- : The presence of a hydrogen flame can be detected by approaching cautiously with an outstretched straw broom to make the flame visible.

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## SECTION 6: Accidental release measures

- 6.1. Personal precautions, protective equipment and emergency procedures : Evacuate personnel to safe areas. Remove all sources of ignition. Never enter a confined space or other area where the flammable gas concentration is greater than 10% of its lower flammable limit. Ventilate the area.
- 6.2. Environmental precautions : Do not discharge into any place where its accumulation could be dangerous. Should not be released into the environment. Prevent further leakage or spillage if safe to do so.
- 6.3. Methods and material for containment and cleaning up : Ventilate the area. Approach suspected leak areas with caution.
- Additional advice : Increase ventilation to the release area and monitor concentrations. If leak is from cylinder or cylinder valve, call the emergency telephone number. If the leak is in the user's system, close the cylinder valve, safely vent the pressure, and purge with an inert gas before attempting repairs.
- 6.4. Reference to other sections : For more information refer to Sections 8 & 13

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## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

May ignite if valve is opened to air. Protect cylinders from physical damage; do not drag, roll, slide or drop. Do not allow storage area temperature to exceed 50°C (122°F). Only experienced and properly instructed persons should handle compressed gases/cryogenic liquids. Before using the product, determine its identity by reading the label. Know and understand the properties and hazards of the product before use. When doubt exists as to the correct handling procedure for a particular gas, contact the supplier. Do not remove or deface labels provided by the supplier for the identification of the cylinder contents. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Use an adjustable strap wrench to remove over-tight or rusted caps. Before connecting the container, check the complete gas system for suitability, particularly for pressure rating and materials. Before connecting the container for use, ensure that back feed from the system into the container is prevented. Ensure the complete gas system is compatible for pressure rating and materials of construction. Ensure the complete gas system has been checked for leaks before use. Employ suitable pressure regulating devices on all containers when the gas is being emitted to systems with lower pressure rating than that of the container. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may damage valve, causing a leak to occur. Open valve slowly. If user experiences any difficulty operating cylinder valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Close valve after each use and when empty. Replace outlet caps or plugs and container caps as soon as container is disconnected from equipment. Do not subject containers to abnormal mechanical shock. Never attempt to lift a cylinder by its valve protection cap or guard. Do not use containers as rollers or supports or for any other purpose than to contain the gas as supplied. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit. Do not smoke while handling product or cylinders. Never re-compress a gas or a gas mixture without first consulting the supplier. Never attempt to transfer gases from one cylinder/container to another. Always use backflow protective device in piping. Purge air from system before introducing gas. When returning cylinder install valve outlet cap or plug leak tight. Never use direct flame or electrical heating devices to raise the pressure of a container. Containers should not be subjected to temperatures above 50°C (122°F). Ensure

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equipment is adequately earthed.

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

Containers should be stored in a purpose build compound which should be well ventilated, preferably in the open air. Observe all regulations and local requirements regarding storage of containers. Stored containers should be periodically checked for general condition and leakage. Protect containers stored in the open against rusting and extremes of weather. Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. The container valves should be tightly closed and where appropriate valve outlets should be capped or plugged. Container valve guards or caps should be in place. Keep containers tightly closed in a cool, well-ventilated place. Store containers in location free from fire risk and away from sources of heat and ignition. Full and empty cylinders should be segregated. Do not allow storage temperature to exceed 50°C (122°F). Smoking should be prohibited within storage areas or while handling product or containers. Display "No Smoking or Open Flames" signs in the storage areas. The amounts of flammable or toxic gases in storage should be kept to a minimum. Return empty containers in a timely manner.

## Technical measures/Precautions

Containers should be segregated in the storage area according to the various categories (e.g. flammable, toxic, etc.) and in accordance with local regulations. Keep away from combustible material. All electrical equipment in the storage areas should be compatible with flammable materials stored. Containers containing flammable gases should be stored away from other combustible materials. Where necessary containers containing oxygen and oxidants should be separated from flammable gases by a fire resistant partition.

## 7.3. Specific end use(s)

Refer to section 1 or the extended SDS if applicable.

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## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

If applicable, refer to the extended section of the SDS for further information on CSA.

### 8.2. Exposure controls

#### Engineering measures

Provide natural or explosion-proof ventilation that is adequate to ensure flammable gas does not reach its lower explosive limit.

#### Personal protective equipment

- |                          |   |
|--------------------------|---|
| Respiratory protection   | : High concentrations that can cause rapid suffocation are within the flammable range and should not be entered.  |
| Hand protection          | : Wear working gloves when handling gas containers.<br>Standard EN 388 - Protective gloves against mechanical risk.   |
| Eye/face Protection      | : Safety glasses recommended when handling cylinders.<br>Standard EN 166 - Personal eye-protection.   |
| Skin and body protection | : Consider the use of flame resistant anti-static safety clothing.<br>Standard EN ISO 14116 - Limited flame spread materials.<br>Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties.<br>Safety shoes are recommended when handling cylinders.<br>Standard EN ISO 20345 - Personal protective equipment - Safety footwear. |
| Special instructions for | : Ensure adequate ventilation, especially in confined areas.  |

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protection and hygiene

Environmental Exposure Controls : If applicable, refer to the extended section of the SDS for further information on CSA.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

- (a/b) Physical state/Colour : Compressed gas. Colorless gas
- (c) Odour : Odorless.
- (d) Density : 0.0001 g/cm<sup>3</sup> (0.006 lb/ft<sup>3</sup>) at 21 °C ( 70 °F)  
Note: (as vapor)
- (e) Relative Density : 0.07 (water = 1)
- (f) Melting point / freezing point : -435 °F (-259.2 °C)
- (g) Boiling point/range : -423 °F (-253 °C)
- (h) Vapor pressure : Not applicable.
- (i) Water solubility : 0.0016 g/l
- (j) Partition coefficient:  
n-octanol/water [log Kow] : Not applicable for inorganic gases.
- (k) pH : Not applicable for gases and gas mixtures.
- (l) Viscosity : No reliable data available.
- (m) Particle characteristics : Not applicable for gases and gas mixtures.
- (n) Upper and lower explosion /  
flammability limits : 77 %(V) / 4 %(V)
- (o) Flash point : Not applicable for gases and gas mixtures.
- (p) Autoignition temperature : 560 °C
- (q) Decomposition  
temperature : Not applicable.

### 9.2. Other information

- Explosive properties : Not applicable.
- Oxidizing properties : Not applicable.
- Molecular Weight : 2 g/mol
- Odor threshold : Odour threshold is subjective and inadequate to warn of overexposure.

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Evaporation rate	: Not applicable for gases and gas mixtures.
Flammability (solid, gas)	: Refer to product classification in Section 2
Specific Volume	: 11.9830 m3/kg (191.97 ft3/lb) at 21 °C ( 70 °F)
Upper flammability limit	: 77 %(V)
Lower flammability limit	: 4 %(V)
Relative vapor density	: 0.07 (air = 1) Lighter or similar to air.

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## SECTION 10: Stability and reactivity

10.1. Reactivity	: No reactivity hazard other than the effects described in sub-sections below.
10.2. Chemical stability	: Stable under normal conditions.
10.3. Possibility of hazardous reactions	: No data available.
10.4. Conditions to avoid	: Heat, flames and sparks. May form explosive mixtures with air and oxidizing agents.
10.5. Incompatible materials	: Oxygen. Oxidizing agents.
10.6. Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

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## SECTION 11: Toxicological information

### 11.1. Information on toxicological effects

#### Likely routes of exposure

Effects on Eye	: In case of direct contact with eyes, seek medical advice.
Effects on Skin	: Adverse effects not expected from this product.
Inhalation Effects	: In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Asphyxiation may bring about unconsciousness without warning and so rapidly that victim may be unable to protect themselves.
Ingestion Effects	: Ingestion is not considered a potential route of exposure.
Symptoms	: Exposure to oxygen deficient atmosphere may cause the following symptoms: Dizziness. Salivation. Nausea. Vomiting. Loss of mobility/consciousness.

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## Acute toxicity

- Acute Oral Toxicity : No data is available on the product itself.
- Acute Inhalation Toxicity : No data is available on the product itself.
- Acute Dermal Toxicity : No data is available on the product itself.
- Skin corrosion/irritation : No data available.
- Serious eye damage/eye irritation : No data available.
- Sensitization. : No data available.

## Chronic toxicity or effects from long term exposures

- Carcinogenicity : No data available.
- Reproductive toxicity : No data is available on the product itself.
- Germ cell mutagenicity : No data is available on the product itself.
- Specific target organ systemic toxicity (single exposure) : No data available.
- Specific target organ systemic toxicity (repeated exposure) : No data available.
- Aspiration hazard : No data available.

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## SECTION 12: Ecological information

### 12.1. Toxicity

- Aquatic toxicity : No data is available on the product itself.
- Toxicity to other organisms : No data is available on the product itself.

### 12.2. Persistence and degradability

No data available.

### 12.3. Bioaccumulative potential

Refer to Section 9 "Partition Coefficient (n-octanol/water)".

### 12.4. Mobility in soil

Because of its high volatility, the product is unlikely to cause ground pollution.

### 12.5. Results of PBT and vPvB assessment



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If applicable, refer to the extended section of the SDS for further information on CSA.

## 12.6. Other adverse effects

This product has no known eco-toxicological effects.

Effect on the ozone layer  
Ozone Depleting Potential : No data available.

Global Warming Potential : No data available.

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## SECTION 13: Disposal considerations

13.1. Waste treatment methods : Contact supplier if guidance is required. Return unused product in original cylinder to supplier. Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrestor. Refer to the EIGA code of practice Doc. 30 "Disposal of Gases", downloadable at <http://www.eiga.org> for more guidance on suitable disposal methods. List of hazardous waste codes: 16 05 04: Gases in pressure containers (including halons) containing dangerous substances.

Contaminated packaging : Return cylinder to supplier.

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## SECTION 14: Transport information

### ADR

UN/ID No. : UN1049  
Proper shipping name : HYDROGEN, COMPRESSED  
Class or Division : 2  
Tunnel Code : (B/D)  
Label(s) : 2.1  
ADR/RID Hazard ID no. : 23  
Marine Pollutant : No

### IATA

UN/ID No. : UN1049  
Proper shipping name : Hydrogen, compressed  
Class or Division : 2.1  
Label(s) : 2.1  
Marine Pollutant : No

### IMDG

UN/ID No. : UN1049  
Proper shipping name : HYDROGEN, COMPRESSED  
Class or Division : 2.1  
Label(s) : 2.1  
Marine Pollutant : No  
Segregation Group: : None

### RID

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UN/ID No. : UN1049  
Proper shipping name : HYDROGEN, COMPRESSED  
Class or Division : 2  
Label(s) : 2.1  
Marine Pollutant : No

Transport in bulk according to Annex II of Marpol and the IBC Code  
For complete transportation information, contact customer service.

#### Further Information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. The transportation information is not intended to convey all specific regulatory data relating to this material. For complete transportation information, contact customer service.

## SECTION 15: Regulatory information

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

Country	Regulatory list	Notification
USA	TSCA	Included on Inventory.
EU	EINECS	Included on Inventory.
Canada	DSL	Included on Inventory.
Australia	AICS	Included on Inventory.
South Korea	ECL	Included on Inventory.
China	SEPA	Included on Inventory.
Philippines	PICCS	Included on Inventory.
Japan	ENCS	Included on Inventory.

#### Other Regulations

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Regulation (EC) No 1272/2008 the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Health and Safety at Work etc. Act 1974

Management of Health and Safety at Work Regulations (Northern Ireland) 2000 c.388, and as amended

The Health and Safety at Work etc. Act 1974 (Application to Environmentally Hazardous Substances) Regulations 2002 (England and Wales and Scotland) 11 March 2002 c.282, and as amended

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Health and Safety at Work Order (Application to Environmentally Hazardous Substances) Regulations (Northern Ireland) 2003 (Northern Ireland) 14 March 2003 c52, and as amended

The Control of Major Accident Hazards Regulations 2015 c483

The Control of Major Accident Hazards Regulations (Northern Ireland) 2015 c325

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2011 c1885, and as amended

The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations with amendments (Northern Ireland) 2011 c365

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 c.407

The Water Environment Regulations (Northern Ireland) 2017 c.81

Pollution Prevention and Control Act 1999 c.24

The Fluorinated Greenhouse Gases Regulations 2015 c.310

The Fluorinated Greenhouse Gases Regulations (Northern Ireland) 2015 c.425

The Acetylene Safety (England and Wales and Scotland) Regulations 2014 c.1639

The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations 1972 c.917

The Highly Flammable Liquids and Liquefied Petroleum Gases Regulations (Northern Ireland) 1975 c.256

Dangerous Substances and Explosive Atmospheres Regulations (Northern Ireland) 2003 c.152

The Dangerous Substances and Explosive Atmospheres Regulations 2002 c.2776

Pollution Prevention and Control Act 1999

The Environmental Permitting (England and Wales) Regulations 2016

Ozone Depleting Substances Regulations 2015

## 15.2. Chemical safety assessment

A CSA does not need to be carried out for this product.

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## SECTION 16: Other information

Ensure all national/local regulations are observed.

Hazard Statements:

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

#### Indication of Method:

Flammable gases Category 1 Extremely flammable gas. Calculation method

Gases under pressure Compressed gas. Contains gas under pressure; may explode if heated. Calculation method

#### Abbreviations and acronyms:

ATE - Acute Toxicity Estimate  
CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008  
REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006  
EINECS - European Inventory of Existing Commercial Chemical Substances  
ELINCS - European List of Notified Chemical Substances  
CAS# - Chemical Abstract Service number  
PPE - Personal Protection Equipment  
Kow - octanol-water partition coefficient  
DNEL - Derived No Effect Level  
LC50 - Lethal Concentration to 50 % of a test population  
LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose)  
NOEC - No Observed Effect Concentration  
PNEC - Predicted No Effect Concentration  
RMM - Risk Management Measure  
OEL - Occupational Exposure Limit  
PBT - Persistent, Bioaccumulative and Toxic  
vPvB - Very Persistent and Very Bioaccumulative  
STOT - Specific Target Organ Toxicity  
CSA - Chemical Safety Assessment  
EN - European Standard  
UN - United Nations  
ADR - European Agreement concerning the International Carriage of Dangerous Goods by Road  
IATA - International Air Transport Association  
IMDG - International Maritime Dangerous Goods  
RID - Regulations concerning the International Carriage of Dangerous Goods by Rail  
WGK - Water Hazard Class

#### Key literature references and sources for data:

ECHA - Guidance on the compilation of safety data sheets  
ECHA - Guidance on the application of the CLP Criteria  
ARIEL database

Prepared by : Air Products and Chemicals, Inc. Global EH&S Department

For additional information, please visit our Product Stewardship web site at  
<http://www.airproducts.com/productstewardship/>

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws. COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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