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SAFETY DATA SHEET

Anhydrous Ammonia

Section 1. Identification

Product identifier : Anhydrous Ammonia
Product type : gas (Liquefied gas.)
Product code : PA01HL
Uses
Area of application : Industrial applications, Professional applications
Supplier
Supplier's details : YARA PILBARA FERTILISERS PTY LTD
Address
Street : Eastpoint Plaza level 10, 233 Adelaide Terrace
Postal code : 6000
City : Perth
Country : Australia
Telephone number : +61 8 9183 4000
Fax no. : +61 8 9185 6776
e-mail address of person responsible for this SDS : Info.yara.pilbara@yara.com
Emergency telephone number (with hours of operation) : Australia: 1300 927 200
Intl: +61 2801 44558 / +44 (0) 1235 239 670
(24 HRS)

National advisory body/Poison Center

Name : Poisons Information Centre
Telephone number : 131126
Hours of operation : 24h, within Australia only

Section 2. Hazard(s) identification

Classification of the substance or mixture. : FLAMMABLE GASES - Category 2
GASES UNDER PRESSURE - Liquefied gas
ACUTE TOXICITY (inhalation) - Category 3
SKIN CORROSION/IRRITATION - Category 1B
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1
AQUATIC HAZARD (ACUTE) - Category 1
AQUATIC HAZARD (LONG-TERM) - Category 2

GHS label elements

Hazard pictograms

:



Signal word

:

DANGER

Hazard statements

:

H280 Contains gas under pressure; may explode if heated.
 H314 Causes severe skin burns and eye damage.
 H331 Toxic if inhaled.
 H400 Very toxic to aquatic life.
 H411 Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention

:

P280 Wear protective gloves/clothing and eye/face protection.

Response

:

P260 Do not breathe gas or vapour.
 P305 IF IN EYES:
 P351 Rinse cautiously with water for several minutes.
 P338 Remove contact lenses, if present and easy to do. Continue rinsing.
 P304 IF INHALED:
 P340 Remove person to fresh air and keep comfortable for breathing.
 P310 Immediately call a POISON CENTER or doctor/physician.
 P303 IF ON SKIN (or hair):
 P361 Take off immediately all contaminated clothing.
 P353 Rinse skin with water.
 P410 + P403 Protect from sunlight. Store in a well-ventilated place.

Storage

:

Supplemental label elements

:

Not applicable.

Other hazards which do not result in classification

:

None known.

Additional information

:

Liquid can cause burns similar to frostbite.

Section 3. Composition and ingredient information

Substance/mixture

:

Substance

CAS number/other identifiers

Other means of identification

:

ammonia, anhydrous

CAS number

:

7664-41-7

EC number

:

231-635-3

Ingredient name	% (v/v)	CAS number
ammonia, anhydrous	100	7664-41-7
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There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified and hence require reporting in this section. Occupational exposure limits, if available, are listed in Section 8.

The total concentration of ingredients in this product, reported or not in this section, is 100%.

Chemical formula : H₃ N

Section 4. First aid measures

Description of necessary first aid measures

- | | | |
|---------------------|---|---|
| Eye contact | : | Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention immediately. |
| Inhalation | : | If inhaled, remove to fresh air. Get medical attention immediately. If not breathing, give artificial respiration. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If necessary, call a poison center or physician. |
| Skin contact | : | In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Flush contaminated skin with plenty of water. Do not rub affected area. Get medical attention immediately. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Chemical burns must be treated promptly by a physician. |
| Ingestion | : | Not applicable (gas). Get medical attention. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. As this product rapidly becomes a gas when released, refer to the inhalation section. |

Most important symptoms/effects, acute and delayed

Potential acute health effects

- | | | |
|---------------------|---|--|
| Eye contact | : | Causes serious eye damage. Liquid can cause burns similar to frostbite. |
| Inhalation | : | Toxic if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure. |
| Skin contact | : | Causes severe burns. Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite. |
| Ingestion | : | May cause burns to mouth, throat and stomach. Ingestion of liquid can cause burns similar to frostbite. |

Over-exposure signs/symptoms

- | | | |
|---------------------|---|---|
| Eye contact | : | Adverse symptoms may include the following: pain, watering, redness, frostbite (Cryogenic burn) |
| Inhalation | : | Adverse symptoms include the following: wheezing and breathing difficulties, asthma |
| Skin contact | : | Adverse symptoms may include the following: pain or irritation, |

Ingestion : frostbite (Cryogenic burn), blistering may occur
: Adverse symptoms may include the following: frostbite (Cryogenic burn)

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : In case of fire, allow gas to burn if flow cannot be shut off immediately. Use an extinguishing agent suitable for the surrounding fire. Apply water from a safe distance to cool container and protect surrounding area.

Unsuitable extinguishing media : None identified.

Specific hazards arising from the chemical : Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode. This material is very toxic to aquatic life. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : Decomposition products may include the following materials: nitrogen oxides, Avoid breathing dusts, vapors or fumes from burning materials., In case of inhalation of decomposition products in a fire, symptoms may be delayed.

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

Remark : Non-explosive.

Hazchem or Emergency Action Code : 2XE

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
- For emergency responders** : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
- Environmental precautions** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

Methods and materials for containment and cleaning up

- Small spill** : Immediately contact emergency personnel. Stop leak if without risk.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage**Precautions for safe handling**

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Contains gas under pressure. Do not breathe gas. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in a segregated and approved area. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Keep container tightly closed and sealed until ready for use.

Section 8. Exposure controls and personal protection**Control parameters**

Occupational exposure limits

Ingredient name	Exposure limits
ammonia, anhydrous(Ammonia)	Safe Work Australia (1995-05-01). [Ammonia] STEL 24 mg/m ³ 35 ppm TWA 17 mg/m ³ 25 ppm

Biological exposure indices

No exposure indices known.

- Appropriate engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

- Hygiene measures** : A washing facility or water for eye and skin cleaning purposes should be present. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Wash contaminated clothing before reusing.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.
Recommended: full-face mask, Europe: CEN: EN136, If inhalation hazards exist, a full-face respirator may be required instead.

Skin protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. For general applications, we recommend gloves with a thickness typically greater than 0.35 mm. It should be emphasized that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn.
> 8 hours (breakthrough time): butyl rubber, PTFE, Viton®
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary.

Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Personal protective equipment :
(Pictograms)



Section 9. Physical and chemical properties and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Appearance

Physical state	: gas [Liquefied gas.]
Color	: Colorless.,
Odor	: Pungent.
Odor threshold	: 5 ppm
pH	: Not applicable.
Melting point/freezing point	: -78 °C (-108 °F)
Boiling point, initial boiling point, and boiling range	: -33 °C (-27 °F)
Flash point	: Not applicable.
Flammability	: Flammable
Lower and upper explosion limit/flammability limit	: Lower: 15 %(V) Upper: 27 %(V)
Vapor pressure	: 8,611 hPa @ 20 °C (68 °F)
Relative vapor density	: 0.6 [Air = 1]
Relative density	: 0.682 @ -33.4 °C (-28.1 °F)
Density	: Not applicable.
Solubility in water	: 510 - 531 g/l @ 20 °C (68 °F)
Partition coefficient: n-octanol/water	: Not applicable.
Auto-ignition temperature	: 651 °C (1204 °F)
Decomposition temperature	: Not applicable.
Viscosity	: Dynamic: 0.22 mPa.s Kinematic: Not determined.
Molecular weight	: 17.04 g/mol
Explosive properties	: Non-explosive.
Oxidizing properties	: Non-oxidizer. No oxidizing ingredients present.

Particle characteristics

Median particle size	: Not applicable.
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Section 10. Stability and reactivity

- Reactivity** : No specific test data related to reactivity available for this product or its ingredients.
- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Conditions to avoid** : Avoid contamination by any source including metals, dust and organic materials.
- Incompatible materials** : No specific data.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Method	Species	Result	Exposure
ammonia, anhydrous				
	LC50 Inhalation Vapor	Rat	7.939 mg/l	1 h

- Conclusion/Summary** : Toxic if inhaled.

Irritation/Corrosion

Conclusion/Summary

- Skin** : Corrosive.
- Eyes** : Causes serious eye damage.
- Respiratory** : Corrosive to the respiratory system.

Sensitization

Conclusion/Summary

- Skin** : Not sensitizing
- Respiratory** : Not sensitizing

Mutagenicity

- Conclusion/Summary** : No known significant effects or critical hazards.

Carcinogenicity

Product/ingredient name	Method	Species	Result	Exposure
ammonia, anhydrous				
	OECD 453 Oral	Rat	Negative NOAEL 67 mg/kg bw/day	Not applicable.

Conclusion/Summary : No known significant effects or critical hazards.

Reproductive toxicity

Product/ingredient name	Method	Species	Result	Exposure
ammonia, anhydrous				
	OECD 422 Oral	Rat	Fertility effects- Negative NOAEL 408 mg/kg bw/day	28 days
	OECD 414 Oral	Rabbit	Developmental- Negative NOAEL 100 mg/kg bw/day	28 days
	Inhalation	Pig	Developmental- Negative NOAEC 25 mg/m ³	6 weeks

Conclusion/Summary : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

No known significant effects or critical hazards.

Specific target organ toxicity (repeated exposure)

No known significant effects or critical hazards.

Aspiration hazard

No known significant effects or critical hazards.

Information on the likely routes of exposure : Not available.

Potential acute health effects

- Eye contact** : Causes serious eye damage. Liquid can cause burns similar to frostbite.
- Inhalation** : Toxic if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
- Skin contact** : Causes severe burns. Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
- Ingestion** : May cause burns to mouth, throat and stomach. Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following: pain, watering, redness, frostbite (Cryogenic burn)
- Inhalation** : Adverse symptoms include the following: wheezing and breathing difficulties, asthma
- Skin contact** : Adverse symptoms may include the following: pain or irritation, frostbite (Cryogenic burn), blistering may occur
- Ingestion** : Adverse symptoms may include the following: frostbite (Cryogenic burn)

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Reproductive toxicity : No known significant effects or critical hazards.

Effects on or via lactation : No known significant effects or critical hazards.

Other effects : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: pain, watering, redness, frostbite (Cryogenic burn)

Inhalation : Adverse symptoms include the following: wheezing and breathing difficulties, asthma

Skin contact : Adverse symptoms may include the following: pain or irritation, frostbite (Cryogenic burn), blistering may occur

Ingestion : Adverse symptoms may include the following: frostbite (Cryogenic burn)

Numerical measures of toxicity

Acute toxicity estimates

Product/ingredient name	Oral	Dermal	Inhalation (gases)	Inhalation (vapors)	Inhalation (dusts and mists)
Anhydrous Ammonia	N/A	N/A	700 ppm	4 mg/l	N/A
ammonia, anhydrous	N/A	N/A	700 ppm	3.9695 mg/l	N/A

Section 12. Ecological information

Toxicity

Product/ingredient name	Method	Species	Result	Exposure
ammonia, anhydrous				
	Acute LC50 Fresh water	Fish	0.89 mg/l	96 h
	Acute LC50 Fresh water	Daphnia	101 mg/l	48 h
	Acute EC50 Fresh water	Algae	3,283.2 mg/l	72 h
	Chronic NOEC	Fish	0.0135 mg/l	60 d

	Fresh water			
	Chronic NOEC Fresh water	Daphnia	0.961 mg/l	21 d

Conclusion/Summary : Very toxic to aquatic life. Toxic to aquatic life with long lasting effects.

Persistence and degradability

Conclusion/Summary : Readily biodegradable in plants and soils.

Bioaccumulative potential

Product/ingredient name	LogPow	BCF	Potential
ammonia, anhydrous	0.23	Not applicable.	low

Conclusion/Summary : No known significant effects or critical hazards.

Mobility in soil

Soil/water partition coefficient (KOC) : Not available.

Mobility : Not available.

Other adverse effects : No known significant effects or critical hazards.





Section 13. Disposal considerations

Product

Methods of disposal : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Empty pressure vessels should be returned to the supplier. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	ADG	ADR/RID	IMDG	IATA
UN number	UN1005	1005	1005	1005
UN proper shipping name	AMMONIA, ANHYDROUS	AMMONIA, ANHYDROUS	AMMONIA, ANHYDROUS Marine pollutant (ammonia, anhydrous)	AMMONIA, ANHYDROUS

Transport hazard class(es)	2.3 	2 	2.3 	2.3 
Packing group	Not applicable.			
Environmental hazards	Yes. The environmentally hazardous substance mark is not required.		Yes.	Yes.

Additional information

ADG : **Hazchem or Emergency Action Code** 2XE
ADR/RID : **Hazard identification number** 268
Tunnel code (C/D)
IMDG : **Hazchem or Emergency Action Code** 2XE
IMDG Code Segregation group SG18
Emergency schedules (EmS) F-C, S-U

Special precautions for user : Transport within user's premises: Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : **Proper shipping name** : Not applicable.

Section 15. Regulatory information

Standard for the Uniform Scheduling of Medicines and Poisons

Not regulated.

Model Work Health and Safety Regulations - Scheduled Substances

No listed substance

Inventory list

Philippines inventory (PICCS): All components are listed or exempted.

New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.

Korea inventory: All components are listed or exempted.

Japan inventory (CSCL): All components are listed or exempted.
Japan inventory (ISHL): All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Australia inventory (AIIIC): All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI): All components are listed or exempted.
Taiwan Chemical Substances Inventory (TCSI): All components are listed or exempted.
United States inventory (TSCA 8b): All components are active or exempted.
EC INVENTORY (EINECS/ELINCS): All components are listed or exempted.
Canada: All components are listed or exempted.
Thailand: All components are listed or exempted.
Turkey: All components are listed or exempted.
Viet Nam: All components are listed or exempted.

Section 16. Any other relevant information

Key to abbreviations

: ADG = Australian Dangerous Goods
 ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
 ATE = Acute Toxicity Estimate
 BCF = Bioconcentration Factor
 bw = Body weight
 GHS = Globally Harmonized System of Classification and Labelling of Chemicals
 IATA = International Air Transport Association
 IBC = Intermediate Bulk Container
 IMDG = International Maritime Dangerous Goods
 LogPow = logarithm of the octanol/water partition coefficient
 MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
 N/A = Not available
 SGG = Segregation Group
 SUSMP = Standard Uniform Schedule of Medicine and Poisons
 UN = United Nations

Procedure used to derive the classification

Classification	Justification
FLAMMABLE GASES - Category 2	Expert judgment
GASES UNDER PRESSURE - Liquefied gas	On basis of test data
ACUTE TOXICITY (inhalation) - Category 3	Calculation method
SKIN CORROSION/IRRITATION - Category 1B	Calculation method
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 1	Calculation method
AQUATIC HAZARD (ACUTE) - Category 1	Calculation method
AQUATIC HAZARD (LONG-TERM) - Category 2	Calculation method

Key data sources

: EU REACH ECHA/IUCLID5 CSR.
 National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda Registry of Toxic Effects of Chemical Substances.
 Sphera Solutions Inc., 4777 Levy Street, St Laurent, Quebec HAR 2P9, Canada. EU REACH ECHA/IUCLID5 CSR.
 National Institute for Occupational Safety and Health, U.S. Dept. of Health, Education, and Welfare, Reports and Memoranda Registry of Toxic Effects of Chemical

Substances.

Sphera Solutions Inc., 4777 Levy Street, St Laurent, Quebec
HAR 2P9, Canada.

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Prepared by	:	Product Stewardship and Compliance (PSC).

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