SAFETY DATA SHEET

Revision date: 12-May-2021

Revision Number 4

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product identifier

Product Name AMMONIA PLANT BACK END PROCESS GAS

Product Code(s) 000000009324

Other means of identification

Proper shipping name COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. (CONTAINS HYDROGEN, AMMONIA)

UN number 3305

Pure substance/mixture Mixture

Recommended use of the chemical and restrictions on use

Recommended use Process gas stream.

Uses advised against No information available.

Supplier
Orica Australia Pty Ltd
ABN: 99 004 117 828
1 Nicholson Street
Melbourne 3000
Australia

Telephone Number: +61 3 9665 7111
Facsimile: +61 3 9665 7937

Emergency telephone number

Emergency telephone number **AUSTRALIA: 1 800 033 111 (ALL HOURS)**
INTERNATIONAL AUSTRALIA: +61 3 9663 2130 (ALL HOURS)

Please ensure you refer to the limitations of this Safety Data Sheet as set out in the "Other Information" section at the end of this Data Sheet.

2. HAZARDS IDENTIFICATION

GHS Classification

Classified as dangerous goods in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG).

Classified as a hazardous chemical in accordance with the criteria of Safe Work Australia - Globally Harmonized System (GHS).

Flammable Gases Category 1A	-
Compressed gas	
Acute toxicity - Inhalation (Gases)	Category 4

Skin corrosion/irritation	Category 1 Sub-category A
Acute aquatic toxicity	Category 1

SIGNAL WORD
Danger

Label elements

Hazard statements
H220 - Extremely flammable gas
H280 - Contains gas under pressure; may explode if heated
H314 - Causes severe skin burns and eye damage
H332 - Harmful if inhaled
H400 - Very toxic to aquatic life

Precautionary Statements - Prevention
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
Do not breathe mist, vapours, spray.
Wash hands thoroughly after handling
Use only outdoors or in a well-ventilated area
Wear protective gloves / protective clothing / eye protection / face protection
Avoid release to the environment
Precautionary Statements - Response
Immediately call a POISON CENTER or doctor/physician
Specific treatment (see First aid on this SDS)
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
IF ON SKIN (or hair):
Remove/Take off immediately all contaminated clothing
Rinse skin with water/shower
Wash contaminated clothing before reuse
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
IF SWALLOWED: Rinse mouth. DO NOT induce vomiting
Leaking gas fire: Do not extinguish, unless leak can be stopped safely
In case of leakage, eliminate all ignition sources
Collect spillage
Precautionary Statements - Storage
Store locked up
Protect from sunlight. Store in a well-ventilated place
Precautionary Statements - Disposal
Dispose of contents/container in accordance with local, regional, national, and international regulations as applicable

Other hazards which do not result in classification
Poisons Schedule (SUSMP) 6

3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixture

Chemical name	CAS No.	Weight-%
Hydrogen gas	1333-74-0	10-94%
Nitrogen gas	7727-37-9	4.5-55%

Methane	74-82-8	0.5-50%
Ammonia	7664-41-7	0-27%
Argon gas	7440-37-1	0.3-7%

4. FIRST AID MEASURES

Description of first aid measures

General advice

For advice, contact a Poisons Information Centre (e.g. phone Australia 13 11 26; New Zealand 0800 764 766) or a doctor.

Emergency telephone number

Poisons Information Center, Australia: 13 11 26
Poisons Information Center, New Zealand: 0800 764 766

Inhalation

Remove to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult, (trained personnel should) give oxygen. Immediately give oxygen if victim turns blue (lips, ears, fingernails). If breathing has stopped, give artificial respiration. Get medical attention immediately. Delayed pulmonary edema may occur.

Eye contact

Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. Call a physician immediately.

Skin contact

Wash off immediately with plenty of water. Take off contaminated clothing and wash before reuse. Seek immediate medical attention/advice. A physician should see the patient promptly if contact with the product has resulted in blistering of the dermal surface or in deep tissue freezing.

Caution - material can be very hot. Contact with product at elevated temperatures can result in thermal burns. For skin burns, cool skin area with rapidly with cold water. For severe burns, immediate medical attention is required.

Caution - material can be very cold. For dermal contact or suspected frostbite, remove contaminated clothing and flush affected areas with lukewarm water. Clothing frozen to the skin should be thawed before being removed. Call a physician immediately.

Ingestion

Not an expected route of exposure.

Self-protection of the first aider

Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination. Use personal protective equipment as required. See section 8 for more information. Avoid contact with skin, eyes, and clothing.

Most important symptoms and effects, both acute and delayed

Symptoms

Difficulty in breathing. Burning sensation. Irritating. May cause redness and tearing of the eyes. Erythema (skin redness). Contact with hot material can cause thermal burns. Contact with very cold material can cause freeze burns.

Indication of any immediate medical attention and special treatment needed

Note to physicians

Treat symptomatically. Material is gas under pressure and may be extremely hot and can cause severe thermal burns. Material may be very cold and may cause freeze burns.

Delayed pulmonary edema may occur. Some component gases are asphyxiants. Can cause corneal burns.

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media

Suitable Extinguishing Media	Water spray or fog.
Unsuitable extinguishing media	No information available.

Specific hazards arising from the chemical

Specific hazards arising from the chemical	Extremely flammable. May be ignited by heat, sparks or flames. May form explosive mixtures with air. Fire may produce irritating, corrosive and/or toxic gases. Vapors may travel to source of ignition and flash back.
Hazardous combustion products	Carbon oxides. Nitrogen oxides. Ammonia.

Special protective actions for fire-fighters

Special protective equipment for fire-fighters	Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Fight fire remotely due to the risk of explosion. Fires to be fought from a protected location.
Hazchem code	2PE

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions	Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Remove all sources of ignition. Ensure adequate ventilation. Avoid breathing vapors or mists. Use personal protective equipment as required. See section 8 for more information. Seek specialist advice. Avoid contact with skin, eyes and inhalation of vapors.
Other information	Refer to protective measures listed in Sections 7 and 8.
For emergency responders	Shut off ignition sources. Ventilate the area. Use personal protection recommended in Section 8. Seek specialist advice.

Environmental precautions

Environmental precautions	Should not be released into the environment. Local authorities should be advised if significant spillages cannot be contained. Keep out of waterways.

Methods and material for containment and cleaning up

Methods for containment	Stop leak if you can do it without risk.
Methods for cleaning up	This product is a gas. Work up wind or increase ventilation.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling	Remove all sources of ignition. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid contact with skin, eyes, and clothing. Do not breathe gas. Use personal protection equipment. Contents under pressure. Take precautionary measures against static discharges.
General hygiene considerations	Wear suitable gloves and eye/face protection. Avoid breathing vapors or mists. Wash hands before breaks and after work.

Conditions for safe storage, including any incompatibilities

Storage Conditions Not applicable.

This material is a Scheduled Poison and must be stored, maintained and used in accordance with the relevant regulations.

Packaging materials Not applicable. Process gas stream.

Incompatible materials No information available. Process gas stream.

Poisons Schedule (SUSMP) 6

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Limits No value assigned for this specific material by Safe Work Australia. However, Workplace Exposure Standard(s) for constituent(s):

Chemical name	Australia	ACGIH TLV
Hydrogen gas 1333-74-0		: See Appendix F: Minimal Oxygen Content, explosion hazard
Nitrogen gas 7727-37-9		: See Appendix F: Minimal Oxygen Content
Methane 74-82-8		: See Appendix F: Minimal Oxygen Content, explosion hazard
Ammonia 7664-41-7	25 ppm 17 mg/m^3 35 ppm STEL 24 mg/m^3 STEL	STEL: 35 ppm TWA: 25 ppm
Argon gas 7440-37-1		: See Appendix F: Minimal Oxygen Content

Argon: Asphyxiant
Ammonia: 8hr TWA = 17 mg/m^3 (25 ppm), 15 min STEL = 24 mg/m^3 (35 ppm)
Hydrogen: Asphyxiant
Methane: Asphyxiant
Nitrogen: Asphyxiant

As published by Safe Work Australia Workplace Exposure Standards for Airborne Contaminants.

TWA - The time-weighted average airborne concentration of a particular substance when calculated over an eight-hour working day, for a five-day working week.

STEL (Short Term Exposure Limit) - the airborne concentration of a particular substance calculated as a time-weighted average over 15 minutes, which should not be exceeded at any time during a normal eight hour work day. According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers.

Asphyxiant - gases which can lead to reduction of oxygen concentration by displacement or dilution. The minimum oxygen content in air should be 18% by volume under normal atmospheric pressure.

These Workplace Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These workplace exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

Appropriate engineering controls

Engineering controls

Apply technical measures to comply with the occupational exposure limits. Ensure adequate ventilation, especially in confined areas. Contains asphyxiant gases which can lead to the displacement or dilution of oxygen.

If in the handling and application of this material, safe exposure levels could be exceeded, the use of engineering controls such as local exhaust ventilation must be considered and the results documented. If achieving safe exposure levels does not require engineering controls, then a detailed and documented risk assessment using the relevant Personal Protective Equipment (PPE) (refer to PPE section below) as a basis must be carried out to determine the minimum PPE requirements.

Individual protection measures, such as personal protective equipment

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors.

OVERALLS, CHEMICAL GOGGLES, SAFETY SHOES, FACE SHIELD OR AIR MASK, GLOVES (Long).

Eye/face protection

Face protection shield. Tight sealing safety goggles.

Skin and body protection

Wear suitable protective clothing. Chemical resistant apron. Overalls. Protective shoes or boots.

Hand protection

Impervious gloves.

Respiratory protection

If determined by a risk assessment an inhalation risk exists, wear an air supplied respirator meeting the requirements of AS/NZS 1715 and AS/NZS 1716.

Environmental exposure controls

No information available.

Thermal hazards

Caution - material can be very hot.
Caution - material can be very cold.
Avoid contact with escaping gas.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Compressed gas Hot or Cold -23 to 320 °C
Appearance	No information available.
Color	Colourless
Odor	No information available.
Odor threshold	No information available.

Property	**Values**	**Remarks • Method**
pH	No data available	None known
Melting point / freezing point	No data available	None known
Boiling point / boiling range	No data available	None known
Flash point	Not available	None known
Evaporation rate	No data available	None known

Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		None known
Upper flammability or explosive limits	No data available	
Lower flammability or explosive limits	No data available	
Vapor pressure	1000-15000 kPag	None known
Vapor density	No data available	None known
Relative density	No data available	None known
Water solubility	No data available	None known
Solubility(ies)	No data available	None known
Partition coefficient	No data available	None known
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	None known
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known

Other information

10. STABILITY AND REACTIVITY

Reactivity

Reactivity No information available.

Chemical stability

Stability Process gas stream under pressure - may be extremely hot.

Explosion data

Sensitivity to mechanical impact None.

Sensitivity to static discharge Yes.

Possibility of hazardous reactions

Possibility of hazardous reactions No information available.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid

Conditions to avoid Static discharge (electrostatic discharge). Keep away from open flames, hot surfaces and sources of ignition. Loss of containment.

Incompatible materials

Incompatible materials No information available. Process gas stream.

Hazardous decomposition products

Hazardous decomposition products Nitrogen oxides. Carbon oxides. Ammonia.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Information on likely routes of exposure

Product Information No adverse health effects expected if the chemical is handled in accordance with this Safety Data Sheet and the chemical label. Symptoms or effects that may arise if the chemical is mishandled and overexposure occurs are:

Inhalation Irritating to respiratory system. Corrosive to the respiratory tract. Harmful if inhaled. Inhalation of corrosive fumes/gases may cause coughing, choking, headache, dizziness, and weakness for several hours. Pulmonary edema may occur with tightness in the chest, shortness of breath, bluish skin, decreased blood pressure, and increased heart rate.

Simple asphyxiant. May cause drowsiness or dizziness. May cause central nervous system depression. Causes headache, drowsiness or other effects to the central nervous system. In high concentration the gas may cause a suffocation. Victim may not be aware of asphyxiation. Large exposures may be fatal. Inhalation of hot gases may result in thermal burns to the respiratory tract.

Eye contact Severely irritating to eyes. Causes burns. Corrosive to the eyes and may cause severe damage including blindness. Contact with the hot material can result in pain, thermal burns, and permanent injury. When cold:. Contact with product may cause frostbite. Can result in permanent injury.

Skin contact Contact causes severe skin irritation and possible burns. Contact with hot material may cause skin burns. Caution - material can be very cold. Contact with product may cause frostbite.

Ingestion Not an expected route of exposure. Can burn mouth, throat, and stomach.

Symptoms Irritation/Corrosion. Burning. May cause redness and tearing of the eyes. May cause blindness. Coughing and/ or wheezing. Difficulty in breathing. Dizziness. Drowsiness.

Numerical measures of toxicity - Product Information

No information available.

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Hydrogen gas	-	-	> 15000 ppm (Rat) 1 h
Methane	-	-	50,000 ppm/2hr (Mouse)
Ammonia	= 350 mg/kg (Rat)	-	= 2000 ppm (Rat) 4 h

See section 16 for terms and abbreviations

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation Causes severe burns.

Serious eye damage/eye irritation Causes burns. Causes serious eye damage.

Respiratory or skin sensitization No information available.

Germ cell mutagenicity No information available.

Carcinogenicity No information available.

Reproductive toxicity No information available.

STOT - single exposure No information available.

STOT - repeated exposure No information available.

Aspiration hazard No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity Keep out of waterways. Component (ammonia) is very toxic to aquatic life.

Chemical name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Ammonia	-	LC50: =0.44mg/L (96h, Cyprinus carpio) LC50: 0.26 - 4.6mg/L (96h, Lepomis macrochirus) LC50: =1.17mg/L (96h, Lepomis macrochirus) LC50: 0.73 - 2.35mg/L (96h, Pimephales promelas) LC50: =5.9mg/L (96h, Pimephales promelas) LC50: >1.5mg/L (96h, Poecilia reticulata) LC50: =1.19mg/L (96h, Poecilia reticulata)	-	LC50: =25.4mg/L (48h, Daphnia magna)

Persistence and degradability

Persistence and degradability No information available.

Bioaccumulative potential

Bioaccumulation Bioaccumulation is not expected.

Chemical name	Partition coefficient
Ammonia	-1.14

Mobility

Mobility in soil After release, disperses into the air.

Other adverse effects

Other adverse effects High concentrations may harm aquatic life by the effect on pH. Ammonia is readily absorbed by water, resulting in an alkaline solution.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Waste from residues/unused products Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

14. TRANSPORT INFORMATION

ADG

Classified as Dangerous Goods by the criteria of the Australian Dangerous Goods Code (ADG Code) for Transport by Road and Rail; DANGEROUS GOODS.

UN number	3305
Proper shipping name	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. (CONTAINS HYDROGEN, AMMONIA)
Hazard class	2.3
Subsidiary hazard class	2.1
Subsidiary hazard class 2	8
Hazchem code	2PE

IATA

Forbidden

Subsidiary hazard class 2	8

IMDG

Classified as Dangerous Goods by the criteria of the International Maritime Dangerous Goods Code (IMDG Code) for transport by sea; DANGEROUS GOODS.

UN number	3305
UN proper shipping name	COMPRESSED GAS, TOXIC, FLAMMABLE, CORROSIVE, N.O.S. (CONTAINS HYDROGEN, AMMONIA)
Transport hazard class(es)	2.3
Subsidiary hazard class	2.1
Subsidiary hazard class 2	8
IMDG EMS Fire	F-D
IMDG EMS Spill	S-U
Marine pollutant	Yes

15. REGULATORY INFORMATION

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

National regulations

Australia

Classified as dangerous goods in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG).

Classified as a hazardous chemical in accordance with the criteria of Safe Work Australia - Globally Harmonized System (GHS).

See section 8 for national exposure control parameters

Poisons Schedule (SUSMP) 6

Chemical name	Threshold quantity (T)
Hydrogen gas - 1333-74-0	50 tonne TQ
Methane - 74-82-8	200 tonne TQ
Ammonia - 7664-41-7	200 tonne TQ anhydrous, liquefied or solution;relative density <0.880 at 15°C in water;with >50% Ammonia
Chemical name	National pollutant inventory
Nitrogen gas - 7727-37-9	15 tonne/yr Threshold category 3 total
Methane - 74-82-8	20 MW Threshold category 2b total

	60000 MWH Threshold category 2b total 1 tonne/h Threshold category 2a total 25 tonne/yr Threshold category 1a total 400 tonne/yr Threshold category 2a total 2000 tonne/yr Threshold category 2b total
Ammonia - 7664-41-7	10 tonne/yr Threshold category 1 total

International Inventories

AICS All the constituents of this material are listed on the Australian Inventory of Industrial Chemicals.

Legend:
- Australian Inventory of Industrial Chemicals

International Regulations

The Montreal Protocol on Substances that Deplete the Ozone Layer Not applicable

The Stockholm Convention on Persistent Organic Pollutants Not applicable

The Rotterdam Convention Not applicable

16. OTHER INFORMATION

Reason(s) For Issue: 5 Yearly Revised Primary SDS

Issuing Date: 12-May-2021

This Safety Data Sheet has been prepared by Ixom Operations Pty Ltd (Toxicology and SDS Services).

Revision Note:
The symbol (*) in the margin of this SDS indicates that this line has been revised.

Key or legend to abbreviations and acronyms used in the safety data sheet

Legend Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation
C	Carcinogen		

Key literature references and sources for data used to compile the SDS

EPA (Environmental Protection Agency)
Acute Exposure Guideline Level(s) (AEGL(s))
U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act
U.S. Environmental Protection Agency High Production Volume Chemicals
Food Research Journal
Hazardous Substance Database
International Uniform Chemical Information Database (IUCLID)
Japan GHS Classification
Australian Industrial Chemicals Introduction Scheme (AICIS)
NIOSH (National Institute for Occupational Safety and Health)
National Library of Medicine's ChemID Plus (NLM CIP)
National Library of Medicine's PubMed database (NLM PUBMED)
National Toxicology Program (NTP)
New Zealand's Chemical Classification and Information Database (CCID)
Organization for Economic Co-operation and Development Environment, Health, and Safety Publications
Organization for Economic Co-operation and Development High Production Volume Chemicals Program

Organization for Economic Co-operation and Development Screening Information Data Set
RTECS (Registry of Toxic Effects of Chemical Substances)
World Health Organization

Disclaimer

This SDS summarises to our best knowledge at the date of issue, the chemical health and safety hazards of the material and general guidance on how to safely handle the material in the workplace. Since The Supplier cannot anticipate or control the conditions under which the product may be used, each user must, prior to usage, assess and control the risks arising from its use of the material.

If clarification or further information is needed, the user should contact their Supplier representative or The Supplier at the contact details on page 1.

The Supplier's responsibility for the material as sold is subject to the terms and conditions of sale, a copy of which is available upon request.

End of Safety Data Sheet