ChemicalBook

Chemical Safety Data Sheet MSDS / SDS

Ammonia

Revision Date:2026-06-06 Revision Number:1

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

Product identifier

Product name	: Ammonia
CBnumber	: CB9854275
CAS	: 7664-41-7
EINECS Number	: 231-635-3
Synonyms	: ammonia,NH3

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

Relevant identified uses	: For R&D use only. Not for medicinal, household or other use.
Uses advised against	: none

Company Identification

Company	: Chemicalbook
Address	: Building 1, Huihuang International, Shangdi 10th Street, Haidian District, Beijing
Telephone	: 010-86108875

SECTION 2: Hazards identification

Classification of the substance or mixture

Gases under pressure: Liquefied gas

Flammable gases, Category 2

Skin corrosion, Sub-category 1B

Acute toxicity - Category 3, Inhalation

Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1

Label elements

Pictogram(s)

Signal word Danger

Hazard statement(s)

H221 Flammable gas

H225 Highly Flammable liquid and vapour

H280 Contains gas under pressure; may explode if heated

H301 Toxic if swalloed

H302 Harmful if swallowed

H303 May be harmfulif swallowed

H311 Toxic in contact with skin

H314 Causes severe skin burns and eye damage

H315 Causes skin irritation

H318 Causes serious eye damage

H319 Causes serious eye irritation

H331 Toxic if inhaled

H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled

H335 May cause respiratory irritation

H336 May cause drowsiness or dizziness

H340 May cause genetic defects

H341 Suspected of causing genetic defects

H351 Suspected of causing cancer

H360 May damage fertility or the unborn child

H361 Suspected of damaging fertility or the unborn child

H370 Causes damage to organs

H372 Causes damage to organs through prolonged or repeated exposure

H373 May cause damage to organs through prolonged or repeated exposure

H401 Toxic to aquatic life

H410 Very toxic to aquatic life with long lasting effects

H411 Toxic to aquatic life with long lasting effects

H412 Harmful to aquatic life with long lasting effects

Precautionary statement(s)

P201 Obtain special instructions before use.

P202 Do not handle until all safety precautions have been read and understood.

P210 Keep away from heat/sparks/open flames/hot surfaces. — No smoking.

P233 Keep container tightly closed.

P240 Ground/bond container and receiving equipment.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P264 Wash hands thoroughly after handling.

P264 Wash skin thouroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

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

P281 Use personal protective equipment as required.

P284 Wear respiratory protection.

P310 Immediately call a POISON CENTER or doctor/physician.

P311 Call a POISON CENTER or doctor/physician.

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P391 Collect spillage. Hazardous to the aquatic environment

P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off Immediately all contaminated clothing. Rinse SKIN with water/shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continuerinsing.

P307+P311 IF exposed: call a POISON CENTER or doctor/physician.

P370+P378 In case of fire: Use … for extinction.

P403 Store in a well-ventilated place.

P405 Store locked up.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P403+P235 Store in a well-ventilated place. Keep cool.

Prevention

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

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

P264 Wash ... thoroughly after handling.

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

P261 Avoid breathing dust/fume/gas/mist/vapours/spray.

P271 Use only outdoors or in a well-ventilated area.

P273 Avoid release to the environment.

Response

P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381 In case of leakage, eliminate all ignition sources.

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P363 Wash contaminated clothing before reuse.

P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P316 Get emergency medical help immediately.

P321 Specific treatment (see ... on this label).

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P391 Collect spillage.

Storage

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

P403 Store in a well-ventilated place.

P405 Store locked up.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards

no data available

SECTION 3: Composition/information on ingredients

Substance

Product name	: Ammonia
Synonyms	: ammonia,NH3
CAS	: 7664-41-7
EC number	: 231-635-3
MF	: H3N
MW	: 17.03

SECTION 4: First aid measures

Description of first aid measures

If inhaled

Fresh air, rest. Half-upright position. Administration of oxygen may be needed. Refer immediately for medical attention.

Following skin contact

Rinse skin with plenty of water or shower for at least 15 minutes. ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer immediately for medical attention .

Following eye contact

Rinse with plenty of water for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

Most important symptoms and effects, both acute and delayed

Excerpt from ERG Guide 125 [Gases - Corrosive]: TOXIC; may be fatal if inhaled, ingested or absorbed through skin. Vapors are extremely irritating and corrosive. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. (ERG, 2016)

Vapors cause irritation of eyes and respiratory tract. Liquid will burn skin and eyes. Poisonous; may be fatal if inhaled. Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite. (EPA, 1998)

Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]: TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

Indication of any immediate medical attention and special treatment needed

Inhalation of ammonia gas: Observe carefully for signs of progressive upper airway obstruction, and intubate early if necessary. Administer humidified supplemental oxygen and bronchodilators for wheezing. Treat noncardiogenic pulmonary edema if it occurs. Asymptomatic or mildly symptomatic patients may be discharged after a brief observation period. Ingestion of aqueous solution: If a solution of 10% or greater has been ingested or if ther are any symptoms of corrosive injury (dysphagia, drooling, or pain), perform flexible endoscopy to evaluate for serious esophageal or gastric injury. Obtain chest and abdominal radiograph to look for mediastinal or abdominal free air, which suggests esophageal or gastrointestinal perforation. Eye exposure: After eye irrigation, perform fluorescein examination and refer the patient to an ophthalmologist if there is evidence of corneal injury.

SECTION 5: Firefighting measures

Extinguishing media

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

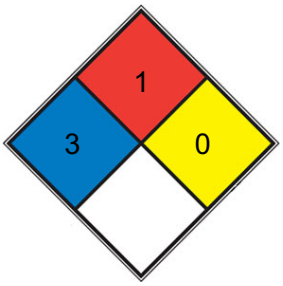
Specific Hazards Arising from the Chemical

Excerpt from ERG Guide 125 [Gases - Corrosive]: Some may burn but none ignite readily. Vapors from liquefied gas are initially heavier than air and spread along ground. Some of these materials may react violently with water. Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. For UN1005: Anhydrous ammonia, at high concentrations in confined spaces, presents a flammability risk if a source of ignition is introduced. (ERG, 2016) Mixing of ammonia with several chemicals can cause severe fire hazards and/or explosions. Ammonia in container may explode in heat of fire. Incompatible with many materials including silver and gold salts, halogens, alkali metals, nitrogen trichloride, potassium chlorate, chromyl chloride, oxygen halides, acid vapors, azides, ethylene oxide, picric acid and many other chemicals. Mixing with other chemicals and water. Hazardous polymerization may not occur. (EPA, 1998)
Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. For electric vehicles or equipment, ERG Guide 147 (lithium ion batteries) or ERG Guide 138 (sodium batteries) should also be consulted. (ERG, 2016)

Advice for firefighters

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with water.

NFPA 704



■	HEALTH	3	Short exposure could cause serious temporary or moderate residual injury (e.g. liquid hydrogen, sulfuric acid, calcium hypochlorite, hexafluorosilicic acid)
■	FIRE	1	Materials that require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. Includes some finely divided suspended solids that do not require heating before ignition can occur. Flash point at or above 93.3 °C (200 °F). (e.g. mineral oil, ammonia)
■	REACT	0	Normally stable, even under fire exposure conditions, and is not reactive with water (e.g. helium,N2)
□	SPEC. HAZ.		

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Shut off cylinder if possible. Isolate the area until the gas has dispersed. Remove gas with fine water spray. NEVER direct water jet on liquid.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Shut off cylinder if possible. Isolate the area until the gas has dispersed. Remove gas with fine water spray. NEVER direct water jet on liquid.

Methods and materials for containment and cleaning up

ACCIDENTAL RELEASE MEASURES: Personal precautions, protective equipment and emergency procedures: Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas. Environmental precautions: Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided. Methods and materials for containment and cleaning up: Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations.

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Fireproof. Separated from oxidants, acids and halogens. Cool. Keep in a well-ventilated room.Keep container tightly closed in a dry and well-ventilated place. Contents under pressure. Storage class (TRGS 510): Gases

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SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 25 ppm as TWA; 35 ppm as STEL.EU-OEL: 14 mg/m3, 20 ppm as TWA; 36 mg/m3, 50 ppm as STEL.MAK: 14 mg/m3, 20 ppm; peak limitation category: I(2); pregnancy risk group: C

Biological limit values

no data available

Exposure controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Cold-insulating gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties

Information on basic physicochemical properties

Physical state	Liquid
Colour	Colorless
Odour	Sharp, cloying, repellent
Melting point/freezing point	-77.7 °C. Atm. press.:1 013 mBar.
Boiling point or initial boiling point and boiling range	33.4 °C. Atm. press.:1 013 mBar. Remarks:Ammonia, anhydrous.;> 48 - < 60 °C. Atm. press.:> 1 013 mBar. Remarks:Water solution with.
Flammability	Flammable. Cylinder may explode in heat of fire.
Lower and upper explosion limit/flammability limit	25%
Flash point	132°C
Auto-ignition temperature	651 °C. Atm. press.:1 013 mBar.
Decomposition temperature	no data available
pH	pH of 1.0N aqueous solution 11.6; 0.1N aqueous solution 11.1; 0.01N aqueous solution 10.6
Kinematic viscosity	dynamic viscosity (in mPa s) = 0.7. Temperature:48.9°C.;dynamic viscosity (in mPa s) = 5. Temperature:-40.0°C.
Solubility	Miscible with ethanol (95%) and water.
Partition coefficient n-octanol/water	log Kow = -2.66 /estimate for ammonium hydroxide which is the form of ammonia in water/
Vapour pressure	8.75 atm (21 °C)
Density and/or relative density	0.771 kg/m3. Temperature:0 °C.
Relative vapour density	0.6 (vs air)
Particle characteristics	no data available

SECTION 10: Stability and reactivity

Reactivity

Mixtures with mercury, silver and gold oxides are shock-sensitive. The substance is a strong base. It reacts violently with acid and is corrosive. Reacts violently with strong oxidants, halogens and many other substances. Attacks copper, aluminium, zinc and their alloys. Dissolves in water evolving heat. The substance reacts with most organic and inorganic compounds, causing fire and explosion hazard.

A poisonous, visible vapor cloud is produced from contact of ammonia with water.Ammonia dissolves readily in water evolving heat (exothermic), to form ammonium hydroxide a corrosive, alkaline solution.Ammonia forms shock sensitive compounds with mercury, silver, and

gold oxides.Ammonia reacts violently with strong oxidants, acids, halogens, and many heavy metals.Ammonia is corrosive to copper and galvanized surfaces.When ammonia is heated to decomposition, it emits toxic fumes and nitrogen oxides.Liquid ammonia will attack some forms of plastics, rubber, and coatings.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

Not flammable.The gas is lighter than air.,Ammonia gas is lighter than air. However, under certain conditions, when compressed liquified ammonia gas initially escapes a cylinder and comes into contact with moisture in the air it will form an ammonia fog. This fog is likeley to remain low to the ground, and could prevent ammonia gas from rising in the air.Dangerous concentrations of ammonia gas will occur quickly in enclosed or poorly ventilated spaces.Ammonia solutions react exothermically with acids to produce water and ammonium salts, Heating or treating with strong bases also causes evolution of gaseous ammonia. Ammonia can burn or explode if exposed to an intense source of ignition but can generally be treated as nonflammable. Readily combines with silver oxide, silver chloride, silver nitrate, silver azide or mercury to form explosive compounds. Forms explosive ammonium chlorate on contact with chlorates [Kirk-Othmer, 3rd ed., Vol. 2, 1978, p. 470]. Reacts violently or produces explosive products with fluorine, chlorine, bromine and iodine and bromine pentafluoride and chlorine trifluoride. Mixing of bleaching powder (hypochlorite solution) with ammonia solutions produces toxic/explosive ammonia trichloride vapors. May react violently with boron halides, ethylene oxide (polymerization), perchlorates and strong oxidizing agents (chromyl chloride, chromium trioxide, chromic acid, nitric acid, hydrogen peroxide, chlorates, fluorine, nitrogen oxide, liquid oxygen).

Conditions to avoid

no data available

Incompatible materials

Incompatible materials: Oxidizing agents, iron, zinc, copper, silver/silver oxides, cadmium/cadmium oxides, alcohols, acids, halogens, aldehydes.

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Nitrogen oxides (NOx)

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Rat oral 350 mg/kg
- Inhalation: LC50 - rat (male/female) - 28 130 mg/L air.
- Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

no data available

Reproductive toxicity

no data available

STOT-single exposure

Rapid evaporation of the liquid may cause frostbite. The substance is corrosive to the eyes, skin and respiratory tract. Exposure could cause asphyxiation due to swelling in the throat. Inhalation may cause lung oedema, but only after initial corrosive effects on eyes and/or airways have become manifest.

STOT-repeated exposure

Repeated or chronic inhalation of the vapour may cause chronic inflammation of the upper respiratory tract. Lungs may be affected by repeated or prolongated exposure. This may result in chronic obstructive pulmonary disorders (COPD).

Aspiration hazard

A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: LC50 - Oncorhynchus mykiss (previous name: Salmo gairdneri) - > 11 - < 48 mg/L - 96 h.
Toxicity to daphnia and other aquatic invertebrates: LC10 - see below - 0.455 mg/L - 10 d. Remarks:Oligochaete - pH 6.3.
Toxicity to algae: no data available
Toxicity to microorganisms: no data available

Persistence and degradability

AEROBIC: When ammonia appears in water under the normal conditions (aerobic), it is rapidly converted to nitrate by nitrification; the principal water contaminant normally being nitrate. The pH in water is increased by the presence of ammonia ion, in the form of hydroxide ions. ... Bacteria convert the ammonia to nitrate creating an oxygen demand (BOD) several days after the introduction of ammonia. The bacteria that oxidize ammonia to nitrate are largely of the genus Nitrosomonas; conversion of nitrite to nitrate is carried out primarily by the genus Nitrobacter. Temperature, oxygen supply, and pH of the water are factors in determining the rate of oxidation.

Bioaccumulative potential

Plants have a high affinity for gaseous ammonia when leaf stomata are open in daylight.

Mobility in soil

Ammonia is strongly adsorbed on soil, and on sediment particles and colloids in water. This adsorption results in high concentrations of sorbed ammonia in oxidized sediments. Under anoxic conditions, the adsorptive capacity of sediments is less, resulting in the release of ammonia to either the water column or an oxidized sediment layer above.

Toxics Screening Level

The initial threshold screening level (ITSL) for ammonia is 350 µg/m3 (1-hour averaging time), and it is based on a controlled human study (Sundblad et al., 2004). The acute ITSL is being changed at this time, based on an updated review of the toxicological literature.

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN1005 (For reference only, please check.)

IMDG: UN1005 (For reference only, please check.)

IATA: UN1005 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: AMMONIA, ANHYDROUS (For reference only, please check.)

IMDG: AMMONIA, ANHYDROUS (For reference only, please check.)

IATA: AMMONIA, ANHYDROUS (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 2.3 (For reference only, please check.)

IMDG: 2.3 (For reference only, please check.)

IATA: 2.3 (For reference only, please check.)

Packing group, if applicable

ADR/RID: (For reference only, please check.)

IMDG: (For reference only, please check.)

IATA: (For reference only, please check.)

Environmental hazards

ADR/RID: Yes

IMDG: Yes

IATA: Yes

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

PICCS

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home

HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm

IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple

ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg

Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp

ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

Ammonia is normally supplied in compressed liquified form in cylinders.See ICSC 0215.Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.