Compiled on: 9.12.2010.
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Replaces the previous version of the safety data sheet starting from: 4.2.2016.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE /MIXTURE AND OF THE COMPANY/UNDERTAKING

Subsection 1.1. Product identifier:	**AMMONIA, anhydrous** **007-001-00-5**
Registration number:	01-2119488876-14-0125
Subsection 1.2. Relevant identified uses of the substance or mixture, and uses advised against:	About 90% of produced ammonia is used in the production of nitrogenous fertilizers (CAN, SAN, UREA), ammonium nitrate and nitric acid. The remaining quantity, of about 10%, is used in chemical and textile industry, as well as in food industry as a coolant for food freezing.
Uses advised against:	None
Subsection 1.3. Details of the Supplier: a) Manufacturer/Supplier:	"HIP-AZOTARA" d.o.o. Pančevo
b) Status:	Manufacturer/Producer
c) Street address and telephone number:	Spoljnostarčevačka 80, 26000 Pančevo, The Republic of Serbia +381 13 308067; 7-15 h(Environmental Protection Department) +381 13 308052, 308057; 7-15 h (Sales Department)
d) e-mail address of competent person responsible for the SDS:	gordana.vasojevic@hip-azotara.rs ekologija.info@hip-azotara.rs
e)Only Representative in EU:	BENS consulting d.o.o. Address: Bakovniška 7, 1241 Kamnik, Slovenia Tel.: +386 1 562 19 20; e-mail: info@kemikalije.com Contact person in EU: Mark Stanojević
Subsection 1.4. Emergencyaddress and telephone number:	112
Supplier:	+386 1 562 19 20

SECTION 2. HAZARDS IDENTIFICATION

Subsection 2.1. Classification of the substance or mixture:

Classification according to Reg. 1272/2008:

Hazard class and category	*Hazard statements **
Flammable gas, cat. 2	H221
Gas under pressure, cooled liquid gas	H281
Acute toxicity, cat. 3	H331
Skin corrosion cat. 1B	H314
Aquatic Acute cat. 1	H400
Corrosive to the respiratory tract	EUH071

**see Section 16 for full text of hazard statements.*

Subsection 2.2. Label elements:

Signal word: Danger

H221: Flammable gas.
H281: Contains refrigerated gas; may cause cryogenic burns or injury
H314: Causes severe skin burns and eye damage.
H331: Toxic if inhaled.
H400: Very toxic to aquatic life.
EUH071: Corrosive to the respiratory tract.

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P260: Do not breathe gas.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P304+P340: IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing.
P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P403+P233: Store in a well-ventilated place. Keep container tightly closed.

Subsection 2.3. Other hazards:

a)persistent-bioaccumulative-toxic/very persistent-very bioaccumulative:

The substance is not classified as PBT, or as vPvB.

SECTION 3. INFORMATION ON INGREDIENTS

Subsection 3.1. Information on the ingredients of the substance:

Chemical name	Ammonia, anhydrous	Water
Chemical formula	NH_3	H_2O
Index number	007-001-00-5	/
EC number[*]	231-635-3	/
CAS number	7664-41-7	7732-18-5
Concentration	≥99,5 %	≤0,5 %

[*]EU inventory: *the component is listed on the European Inventory of Existing Chemical Substances – EINECS*

SECTION 4. FIRST AID MEASURES

Subsection 4.1. Description of first aid measures:

- following inhalation: Move the injured person to fresh air at once. Keep the patient warm and at rest. Apply artificial respiration if breathing has stopped or shows signs of failing. If the patient is unconscious, place them on their side in a stable position. If the patient suffers cardiac arrest (absence of heartbeats or pulse) commence cardio-pulmonary resuscitation immediately. Obtain immediate medical attention.

- following skin contact: Rinse with large quantities of water. In case of chemical burns (frostbite) clothing may adhere to the skin. After some time, remove the adhering clothing carefully using lukewarm water. Remove clothing and rinse the affected areas with water. Do not apply any creams or ointments at least 24h after the accident. Immediately obtain medical attention.

- following eye contact: Immediately flush eyes with eyewash solution or water for at least 15 minutes. Hold eyelids open during flushing, protecting the eye that is not affected. Continue flushing until medical attention is obtained.

- following ingestion: If the injured person is conscious, wash out mouth with water and give 2 or 3 glasses of water to drink. Do not induce vomiting, but if it occurs, put the patient in the face-down position in order to prevent lung damage. Obtain immediate medical attention.

- advice: The rescuer must be adequately equipped with a facemask and filters approved for ammonia (green, marked K) or SCBA with a full facemask. Give immediate first aid, obtain medical attention and fully inform the physician about the details of the accident. In addition to the facemask and self-contained breathing apparatus, the rescuer must wear chemical-resistant

	protective gloves (rubber gloves), protective clothing, suitable boots and safety goggles.
Subsection 4.2. Most important symptoms and effects, both acute and delayed:	Ammonia may cause the following effects if present in the air in certain concentrations: • 400 ppm (278 mg/m³) = immediate irritation of the throat, • 700 ppm (487 mg/m³) = eye irritation, • 1700 ppm (1182 mg/m³) = cough, • 2500-6500 ppm (1738-4519 mg/m³) =life-threatening after 30 minutes, • 5000-10000 ppm and above (3476-6953 mg/m³) = death. The most important symptoms <u>following inhalation</u> are**:** nose and throat irritation, cough, breathing difficulty, nausea, vomiting, inflammation of the respiratory tract, possible symptoms as in asthma; following a more intensive exposure – reflex respiratory arrest/cardiac arrest, pulmonary edema, pneumonia. <u>Following ingestion,</u> ammonia causes painful corrosion of the mouth, throat, esophagus, stomach and internal organs. Perforations, peritonitis and cardiovascular reactions (shock, collapse) are possible. After the contact of liquid ammonia with <u>skin,</u> damage resulting from freezing is possible. In contact with <u>eyes</u> it causes: burns/pain, lacrimation, conjunctivitis; at high concentrations delayed effects such as edema/corneal turbidity, epithelial loss, cataract, glaucoma are possible; liquid ammonia splashes cause irreversible damage to the eyes.
Subsection 4.3. Indication of any immediate medical attention and special treatment needed:	Obtain medical attention if any of the above symptoms occur.

SECTION 5. FIREFIGHTING MEASURES

Subsection 5.1. Extinguishing media:	Use foam, dry powder or CO_2.
Subsection 5.2. Special hazards arising from the substance or mixture:	***Do not spray water into liquid ammonia.*** (significantly accelerates evaporation). The mixture of ammonia with air is hardly ignitable; however, in the presence of a catalyst it burns and depending on the temperature forms nitrogen oxides or nitrogen. The presence of lubricant oils or some other ignitable material increases the fire hazard. Tanks or cylinders may rupture or explode if exposed to heat. Large leaks of liquid ammonia may produce a dense cloud, restricting visibility. Ammonia in contact with mercury, chlorine, iodine, bromine, calcium, silver oxide or hypochlorite may produce explosive compounds. Fire may be caused by: non-compliance with the maintenance instructions (working without the permit obtained from the responsible person), not following the instructions from the work permit (negligence,

	carelessness, lack of knowledge). Explosion can occur in all containers and pipelines if blowing with air is performed causing leaks at safety valves.
Subsection 5.3. Advice for firefighters:	Firefighters must be protected against possible exposure to ammonia gas by wearing suitable protective clothing and self-contained breathing apparatus. They must also be trained for carrying and properly using the equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Subsection 6.1. Personal precautions, protective equipment and emergency procedures:	Use personal protective equipment. For information on protective equipment see *Subsection 8.2. Exposure controls and personal protection.* Those dealing with major releases should wear full protective clothing and respiratory protection.
Subsection 6.2. Environmental precautions:	Stop leak of liquid ammonia as, due to its high basicity and solubility in water, it could increase the pH of surface waters and soil. Ammonia is toxic to aquatic flora and fauna. In case of ammonia gas spreading try to clean up the location as quickly as possible and notify emergency response personnel.
Subsection 6.3. Methods and material for containment and cleaning up:	Evacuate the area downwind of the release, if it is safe to do so. If not, close all windows and switch off any extraction fans or electrical appliances. Trained personnel should isolate the source of leak as soon as possible. Ventilate area of spill or leak to disperse vapours. Remove ignition sources. Cover with foam to reduce evaporation. Contain spillages, if possible. Use water sprays to combat gas clouds. Do not apply water directly into large ammonia spills. Take care to avoid contamination of watercourses. Inform appropriate authorities in case of accidental contamination of watercourses or drains.
Subsection 6.4. Reference to other sections:	See *Section 8.2. Exposure controls and personal protection* for information on protective equipment. For information on waste treatment see *Section 13. Disposal considerations*

SECTION 7. HANDLING AND STORAGE

Subsection 7.1. Precautions for safe handling:	<u>Information on safe handling of the chemical substance</u>: - follow the operating instructions; - wear full protective equipment; - avoid skin and eye contact and inhalation of vapours; - provide adequate ventilation. <u>Handling of incompatible chemical substances or mixtures:</u> Ammonia may react violently with acids, fluorine, acetaldehyde, boron halogenides, chlorine mixtures, carbon dioxide, platinum catalysts, phosphorus oxides, sulphur dioxide, hydrogen sulfide. Do not store together with the following substances: pharmaceutical products, foodstuffs and

	animal feed including additives, radioactive and explosive materials and flammable substances. Information on handling in case of release of the chemical substance to the environment: - control atmospheric levels for compliance with occupational exposure limits; - personal protective equipment and firefighting equipment should always be at hand; - clean up the location as quickly as possible and notify emergency response personnel. General occupational hygiene: -do not eat, drink or smoke in work areas; -wash hands after use; -remove contaminated clothing and protective equipment before exiting the work areas;
Subsection 7.2. Conditions for safe storage, including any incompatibilities:	Technical measures: anhydrous ammonia evaporates at regular temperatures and at regular pressures and therefore it must be kept in pressurized, tightly closed containers. Storage conditions: storage containers should be kept in a cool, well-ventilated area. Keep away from heat, ignitable sources and incompatible substances. Do not permit smoking in the storage area. Reactions of ammonia with construction materials: Non-ferrous metals such as bronze and copper are incompatible materials for the storage of ammonia as their use produces a chemical reaction. Materials that can be used are aluminium, steel (carbon and stainless) and plastic materials (polytetrafluoroethylene and polychlorotrifluoroethylene). Electrical equipment: electrical installation resistant to ammonia vapours is required.
Subsection 7.3. Specific end use(s):	Professional use only, in accordance with the prescribed operating instructions.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Subsection 8.1. Control parameters:

Occupational Exposure limit values according to Commission Directive 2000/39/EC:**Occupational exposure limit values**	
mg/m^3	**ppm**
14	20

Exposure limit value – short term	
mg/m^3	**ppm**
36	50

	Information on monitoring procedures: BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents. Derived no-effect level (DNEL): DNEL (short term exposure, skin-workers): 6.8 mg/kg DNEL(long term exposure,inhalation-workers): 36mg/m^3 Predicted no-effect concentration (PNEC): PNEC (water): 0.0011 mg/l
Subsection 8.2. Exposure controls and personal protection:	Appropriate engineering controls: • provide ventilation in work area, • eyewash stations with fresh water are required (these places must be clearly marked), • avoid contact with skin: frostbite hazard, • avoid inhalation of gas, • change and ventilate clothing which was in contact with gas. Personal protection: *Eye/face protection:* Safety glasses/face-shield (EN 166) *Skin protection:* Wear overalls (EN ISO 13688) and suitable boots (EN ISO 20345). In case of accident wear special chemical-resistant overall (EN 943). Protective ammonia-resistant gloves (rubber gloves) (EN 374). *Respiratory protection:* Use facemask (EN 136) and filter approved for ammonia (green, marked K) (EN 149).Use self-contained breathing apparatus with a full facemask (EN 145) if ammonia concentration in the air exceeds maximum allowable concentrations. Environmental Exposure Controls: Environment exposure control should be performed in accordance with the applicable regulations.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Subsection 9.1. Information on basic physical and chemical properties:	
a) appearance-physical state and colour:	Gas at ambient temperature; however, easily transformed into liquid. Colourless gas/liquid
b) odour:	Intensive and pungent odour
c) odour treshold:	Data not available
d) pH:	11.7 (conc. 1% water solution, 20°C)
e) melting point/freezing point:	-77.7 °C (1013 hPa)

f) initial boiling point and boiling range:	-33.3°C (1013 hPa)
g) flash point:	Data not available
h) evaporation rate:	Data not available
i) flammability:	Flammable
j) upper/lower flammability or explosive limits:	16-27%
k) vapour pressure:	861100 Pa (20 °C)
l) vapour density:	Data not available
m) relative density:	Liquid NH_3 0.6386 kg/m^3 at 0°C, 101.3kPa Gaseous NH_3 0.7714 kg/m^3 at 0°C, 101.3kPa
n) solubility:	510-531 g/l (Water, 20 °C)
o) partition coefficient: n-octanol/water:	0.23 (20 °C)
p) auto-ignition temperature:	651 °C
q) decomposition temperature:	Data not available
r) viscosity:	0.75 mPa s (25 °C)
s) explosive properties:	Not explosive
t) oxidising properties:	Not oxidising
9.2. Other information: Dissociation constant:	pKa=9.25 (25 °C)

SECTION 10. REACTIVITY AND STABILITY

Subsection 10.1. Reactivity:	Water soluble, forms base solutions. Ammonia gas forms explosive mixtures in the air in contact with hydrocarbons, chlorine, fluorine and silver nitrate.
Subsection 10.2. Chemical stability:	Chemically stable at temperatures up to 150-200°C. Flammable; may explode if present in the air at higher concentrations (16-27%).
Subsection 10.3. Possibility of hazardous reactions:	Explosion hazard in contact with strong oxidizing agents, hydrogen peroxide, calcium, halogens (except bromine), hydrocarbons, in mixture with air.
Subsection 10.4. Conditions to avoid:	Stable within the limits of designed conditions of use and storage. Heat input can cause liquid to vaporize. Avoid physical damage and heating of containers.

Subsection 10.5. Incompatible materials:	Ammonia may have a violent reaction with acids, fluorine, acetaldehyde, boron halogenides, chlorine mixtures, carbondioxide, platinum catalysts, phosphorus oxides, sulphur dioxide, hydrogen sulfide
Subsection 10.6. Hazardous decomposition products:	Thermal decomposition (combustion) produces NOx gases.

SECTION 11. TOXICOLOGICAL INFORMATION

Subsection 11.1. Information on toxicological effects:	
a) acute toxicity:	*-oral (LD $_{50}$):* 350 mg/kg (rat) *-inhalation (LC_{50}):* 11590 mg/m³ air, 60 min (rat) *-skin (LD $_{50}$):* Data not available Humans, inhalation: 400 ppm (=278 mg/m³; in the air)= Immediate throat irritation 1700 ppm (= 1182 mg/m³; in the air)=Cough 2500 - 6500 ppm (= 1738-4519 mg/m³; in the air) = Life-threatening after 30 minutes
b) skin corrosion/irritation:	12% solution of NH_3 - corrosive (rabbit) 10% solution of NH_3 - causes irritation (rabbit)
c) serious eye damage/irritation:	study scientifically unjustified (Corrosive)
d) respiratory or skin sensitization:	study scientifically unjustified (Corrosive)
e) germ cell mutagenicity:	Ammonia was negative for genotoxicity in S. typhimurium and E. coli with and without metabolic activation.
f) carcinogenicity:	Life-time exposure (mouse) to ammonium hydroxide in drinking water did not produce any carcinogenic effects.
g) reproductive toxicity:	The substance is not toxic to reproduction
h) STOT – single exposure:	Available data insufficient for classification
i) STOT – repeated exposure:	Available data insufficient for classification
j) aspiration hazard:	Available data insufficient for classification
Subsection 11.2. Information on likely routes of exposure:	- skin exposure: skin burns - eye exposure: lacrimation - peroral: nose and throat irritation - inhalation: lung damage
Subsection 11.3. Symptoms related to the physical, chemical and toxicological characteristics:	See Subection *4.2. Most important symptoms and effects, both acute and delayed*

Subsection 11.4. Delayed and immediate effects, as well as chronic effects from short and long term exposure:	See Subection *4.2. Most important symptoms and effects, both acute and delayed*
Subsection 11.5. Interactive effects:	Data not available
Subsection 11.6. Absence of specific data:	All the available and relevant data are shown
Subsection 11.7. Other information:	All the available and relevant data are shown

SECTION 12. ECOLOGICAL INFORMATION

Subsection 12.1. Toxicity:	
- aquatic organisms:	fish: * LC_{50} =0.5 mg/l, 96h – lethal (Lepomis cyanellus - Green sunfish); *LC_{50} =11-48 mg/l, 96h - lethal (Oncorhynchus mykiss - Rainbow trout) daphnia: * LC_{50}=101 mg/l, 48h - lethal (Daphnia magna)
- soil organisms:	Data not available
- plants and terrestrial organisms:	Data not available
Subsection 12.2. Persistence and degradability:	
- biodegradation:	In fresh water it is nitrified by microorganisms or adsorbed on sediment particles and colloids. In soil, ammonia is oxidized by bacteria to nitrate.
- other processes of degradation:	In the atmosphere, it may be degraded by photolysis or neutralized by acid pollutants of the air.
- degradation in wastewaters:	Substantially biodegradable in water.
Subsection 12.3. Bioaccumulative potential:	The substance has no potential for bioaccumulation.
Subsection 12.4. Mobility in soil:	The substance has low mobility in soil.
Subsection 12.5. Results of PBT and vPvB assessment:	The substance is not classified as PBT, or as vPvB.
Subsection 12.6. Other adverse effects:	May cause changes in pH in the aquatic system. Depending on the local conditions and existing concentration, degradation activity may be inhibited by activated sludge.

SECTION 13. DISPOSAL CONSIDERATIONS

Subsection 13.1. Waste treatment methods:	Waste generation should be prevented or reduced to minimum wherever possible. Disposal of this product, its solutions and any by-products must always be performed in accordance with the laws on environmental protection, laws on waste management and all the local requirements.

SECTION 14. TRANSPORT INFORMATION

Subsection 14.1. UN number ADR/RID/ADN/IMDG/ICAO:	1005
Subsection 14.2. UN proper shipping name ADR/RID/ADN/IMDG/ICAO:	AMMONIA ANHYDROUS
Subsection 14.3. Transport hazard class(es):	ADR / RID / ADN / IMDG/ ICAO: 2
Subsection 14.4. Packing group:	ADR / RID / ADN / IMDG/ ICAO: None
Subsection 14.5. Environmental hazards:	Environmentally hazardous
Subsection 14.6. Special precautions for user:	

	ADR	**RID**	**ADN**
Hazard Identification Number (Kemler Code)	268		/
Classification code:	2TC		
Hazard warning label:	2.3+8	2.3+8 (+13)	2.3+8+2.1
Special provisions:	23		1; 31
Tank code:	PxBH(M)		G
Tank-vessel carriage:	AT	/	/
Transport category (Tunnel restriction code):	1(C1D)	1	/
Required equipment:	/	/	PP, EP, EX,TOX,A

Subsection 14.7. Transport in bulk:	Not applicable

SECTION 15. REGULATORY INFORMATION

Subsection 15.1. Safety, health and environmental regulations:	- Regulation EC 1272/2008 (CLP) - Regulation EC 1907/2006 (REACH)
Subsection 15.2. Chemical Safety assessment:	Chemical safety assessment performed for ammonia and the relevant Chemical Safety Report (CSR) has been prepared. The relevant information is contained in the sections of the present safety data sheet as well.

SECTION 16. OTHER INFORMATION

Subsection 16.1. Indication of changes:	This safety data sheet has been significantly changed and amended in terms of form and contents in accordance with regulations.
Subsection 16.2. List of abbreviations and acronyms:	**ADNR** European Agreement concerning the International Carriage of Dangerous Goods by inland Waterways **ADR** European Agreement concerning the International Carriage of Dangerous Goods by Road **CAS** Chemical Abstract Service **DNEL** Derived No Effect Levels **EC no** EC number, European Commission number **ECHA** European Chemicals Agency **EC_{50}** half maximal effective concentration **IUCLID** International Uniform Chemical Information Data **IMDG** International Maritime Dangerous Goods **LC_{50}** Lethal concentration 50% **LD_{50}** Lethal Dose 50% **MAC** Maximum allowable concentration **OSHA** Occupational Safety and Health Administration **PBT** Persistence Bioaccumulation potential and Toxicity **PNEC** Predicted No Effect Concentration **ppm** parts per million **RID** International Rule for Transport of Dangerous Substances by Railway **STEL** Short-Term Exposure Limit **TWA** Time Weighted Averages **vPvB** Very persistent and very bioaccumulative
Subsection 16.3. Literature references and sources of data:	/ ECHA-European Chemicals Agency/ /source: „IUCLID Dataset“ European Chemicals Bureau/ /OECD Existing Chemicals Database / / Regulation on preventive measures for safe and healthy work when exposed to chemicals (The Off. Gaz.of the RS 106/2009)/ /Transport regulations according to ADR, RID,IMDG and ADN including the amendments/ /Occupational Medicine, prof.dr.Mirjana Aranđelović and prof.dr.Jovica Jovanović, Faculty of medicine, University of Niš, 2009
Subsection 16.4. List of relevant hazard statements, safety phrases and precautionary statements:	Hazard statements H221: Flammable gas. H281: Contains refrigerated gas; may cause cryogenic burns or injury H314: Causes severe skin burns and eye damage. H331: Toxic if inhaled. H400: Very toxic to aquatic life. EUH071: Corrosive to the respiratory tract. *Precautionary statements* P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P260: Do not breathe gas. P273: Avoid release to the environment.

	P280: Wear protective gloves/protective clothing/eye protection/face protection. P304+P340: IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing. P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P403+P233: Store in a well-ventilated place. Keep container tightly closed.
Subsection 16.5. Advice on appropriate training for workers:	Act in accordance with the applicable regulations regarding the occupational safety and health.

The information indicated is based on the knowledge and experience up to the date of the compilation of the Safety Data Sheet. The purpose of this Safety Data Sheet is to highlight the precautionary and safety measures regarding this product.
"HIP-AZOTARA" does not assume any responsibility for the information out of the scope of what is written here. The Safety Data Sheet shall not by any means be considered a guarantee for the marketability and the use of the product for certain purposes.
It is the responsibility of the user to inspect and examine the product in order to verify personally whether the product is suitable for a particular purpose. Furthermore, the user is responsible for handling, storage and use of this product in accordance with the applicable laws and regulations ensuring the occupational safety and health and environmental protection.

The information in this Safety Data Sheet refers exclusively to our products, and on condition that the products are not used together with the third parties' materials.